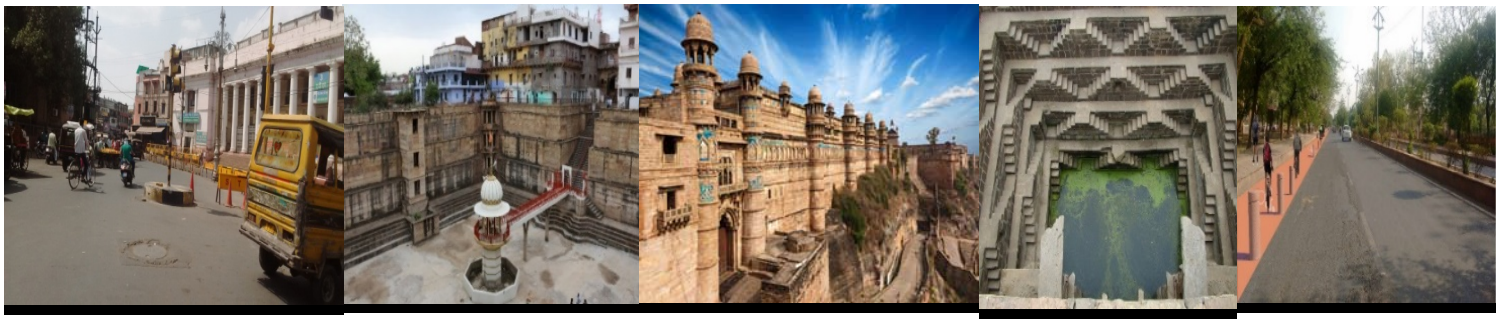


REQUEST FOR PROPOSAL

"Development of Smart Roads in ABD region under Gwalior Smart City Mission"

Ref Number: **[**GSCDCL/038/2018**]**

Date: **[20**th March 2018**]**

EXECUTIVE DIRECTOR

GWALIOR SMART CITY DEVELOPMENT CORPORATION LTD (GSCDCL)

NAGAR NIGAM MUKHYALAY, CITY CENTER, GWALIOR

Disclaimer

Gwalior Smart City Proposal **(SCP)** has been selected to implement the Area Based Development **(ABD)** and pan-city proposals by Government of India (GoI) under Smart City Mission **(SCM).** Gwalior SCP proposes smart solutions in ABD area and across pan city with various smart features and infrastructure.

To implement smart city projects in Gwalior, Gwalior Municipal Corporation **(GMC)** and Madhya Pradesh Urban Development Corporation has formed a special purpose vehicle called Gwalior Smart City Development Corporation Limited **(GSCDCL).**

GSCDCL has prepared this Tender Document (TD) for the "Development of Smart roads in ABD region under Gwalior Smart City Mission". This TD is a detailed document with specific terms and conditions on which the Bidder is expected to work. GSCDCL has taken due care in preparation of information contained herein and believes it to be accurate. However, neither GSCDCL or any of its authorities or agencies nor any of their respective officers, employees, agents, or advisors give any warranty or make any representations, express or implied as to the completeness or accuracy of the information contained in this document or any information which may be provided in connection or arising out of it.

The information provided in this document is to assist the Bidder(s) preparing their proposals. However, this information is not intended to be exhaustive and interested parties are expected to make their own inquiries to supplement and verify information in this document. The information is provided on the basis that it is non-binding on GSCDCL or any of its authorities or agencies, or any of their respective officers, employees, agents, or advisors. Each Bidder is advised to consider the TD as per its understanding and capacity. The Bidders are also advised to do appropriate examination, enquiry and scrutiny of all aspects mentioned in the TD before bidding. The Bidders are encouraged to take professional help of experts on financial, legal, technical, taxation, and any other matters/ sectors appearing in the document or specified work. The Bidders should go through the TD in detail and bring to notice of GSCDCL any kind of error, misprint, inaccuracy or omission.

GSCDCL reserves the right not to proceed with the project, to alter the timeline reflected in this document, or to change the process or procedure to be applied. It also reserves the right to decline to discuss the project further with any party submitting a proposal. No reimbursement of cost of any type will be paid to persons, entities submitting a proposal under or pursuant to this TD.

[To be provided on a non-judicial stamp papers of appropriate amount, duly notarized]

{Location, Date}

To:

The Executive Director,

Gwalior Smart City Development Corporation Limited (GSCDCL)

Nagar Nigam Mukhyalay, City Center, Gwalior, Madhya Pradesh

Reference: GSCDCL NIT No. …….. ("TD") dated. ……

Dear Sir/Madam,

Over and above all our earlier confirmations and submissions as per the requirements of the TD, I/ we hereby declare, confirm and undertake that:

1 I/ We have quoted item rate price considering all items as requested by GSCDCL in the TD and stand committed to deliver to the highest standards and quality as required by GSCDCL to meet the timelines of the project. My/ Our bid submission is in line with the requirements of GSCDCL as stated in the TD.
2 I/ We confirm that we have factored in all costs and expenses for meeting the complete scope and deliverables of the TD.
3 I/ We are completely aware of the service level requirements and timelines specified by GSCDCL and are committed to adhering to the same. I/ We have also clearly taken note of the service level requirements of GSCDCL and expectations from us and wish to confirm that we have taken care of every aspect to meet the same.
4 I/We have gone through the bid documents and its terms and conditions and fully understood it. All the terms and conditions are acceptable to me / us.
5 I/ We have clearly understood GSCDCL's requirements and wish to confirm that I/ we shall abide by the terms and conditions of the TD.
6 I/ We confirm and understand that all arithmetical totaling errors will be corrected for the purpose of evaluation only and the consideration of that error for payment would be completely according to GSCDCL's discretion. I/ We also confirm and understand that for all other errors which we have made in the bid, GSCDCL, for the purpose of evaluation will take the corrected amount based on the price quoted by me/ us in the price sheets but the payment of such amounts would be completely according to GSCDCL's discretion.
7 I/ We confirm that I/ we will provide the best of my/ our resources and the people proposed by me/ us will be dedicated to GSCDCL for the sake of resource continuity. Further, I/ We also confirm that GSCDCL may interview the key resources proposed by me/ us and confirm its acceptability. In any event if a resource is found unfit by GSCDCL I/ we agree to change the same and provide GSCDCL with a replacement within reasonable time so as not to affect the services/ project timelines.
8 I/ We confirm and understand that GSCDCL has an aggressive rollout schedule and I/ we will adhere to the rollout schedule at no additional cost/burden to GSCDCL.
9 I/ We confirm that all the proposed solution components are compatible and interoperable with each other and the solution will meet the functional and technical requirements of GSCDCL.
10 I/ We confirm that the prices and values quoted by me/ us encompass the complete scope of the project and I/ we will ensure that the quality of deliverables for the project is not affected due to any pricing pressures.

11 There has been no conviction by a Court of Law or indictment / adverse order by a regulatory authority for a grave offence against me/ us. It is further certified that there is no investigation pending against me/us or the CEO, Directors/ Manager/ key employees of my/ our concern.
12 That the decision of GSCDCL will be final and undisputable in accepting or rejection of my / our offer.
13 That the self-certified information given in the bid document is fully true and authentic.
14 That:
   a) Earnest money, will be deposited ONLINE/RTGS/NEFT/IMPS.
   b) Information regarding financial qualification and annual turn-over is correct.
   c) Information regarding various physical qualifications is correct.
15 No close relative of the undersigned and firm/company is employed with GSCDCL or any of its affiliates, shareholders or such other agencies that may influence the outcomes of this tender.

Dated this……..by …….20

[*Signature of the authorized signatory*]

[*Name of the authorized signatory*]

[*Designation*]

Phone no, [*insert phone number*]

Address: [*insert postal address for correspondence*]

E-mail [*insert e-mail for correspondence*]

Section – 1

Gwalior Smart City Development Corporation Limited

NOTICE INVITING TENDER (NIT)

NIT No. GSCDCL/038/2018 Date: 20-03-2018

Gwalior Smart City Development Corporation Limited (GSCDCL) invites online **item rate bids** for the following works (estimated on UADD SOR w.e.f. 10/05/2012) from eligible registered contractors and firms of repute fulfilling eligibility criteria (Bidders) through www.mpeproc.gov.in for "DEVELOPMENT OF SMART ROAD IN ABD REGION UNDER GWALIOR SMART CITY MISSION".

The details are as under:

Key Schedule		
Sr. No.	**Event's Name**	**Information**
1.	Probable Amount of Contract	Rs.18,37,50,000.00 Crore /- (Rupees Eighteen Crore Thirty Seven Lakh Fifty Thousand only)
2.	Tender document Fee	Rs.30,000.00 /- (Rupees Thirty Thousand only) to be paid only through Online e-Tendering Payment Gateway
3.	Earnest Money Deposit (EMD)	Rs. 9,18,750.00 /- (Rupees Nine Lakh Eighteen Thousand Seven Hundred Fifty only)
4	Last date for sending pre-bid queries	26/03/2018 till 17:30 hours. at gscdcltender@gmail.com
5.	Date, Time & Place of Pre-bid Meeting	27/03/2018 at 15:00 hours. Venue: Gwalior Smart City Development Corporation Limited, Nagar Nigam Mukhyalay, City Center, Gwalior, Madhya Pradesh
6.	Last date for Online Purchase of Tender Document	17/04/2018 till 1730 hours.
7.	Last date of Online Submission of Bids	18/04/2018 till 1730 hours.
8.	Date & Time for Opening of Pre-Qualification	19/04/2018 at 1600 hours.

9.	Date & Time for Opening of Technical Proposal	19/04/2018 at 1610 hours.
10.	Date & Time for Opening of Financial Proposals	21/04/2018 at 1600 hours. Will be intimated later to the technically qualified Bidders
11.	Project Award Criteria	Lowest Bidding

Note: The bidders shall have to submit their bids online and upload the relevant documents as per key schedule (key dates).

1. All details relating to the Bid Document(s) can be viewed and downloaded from the website mentioned in NIT.
2. Bid document can be purchased after making online payment of portal fees through Credit/Debit/Cash Card/internet banking.
3. At the time of submission of the Bid the eligible bidder shall be required to:
    i) pay the cost of Bid Document(No exemption is applicable);
    ii) deposit the Earnest Money(No exemption is applicable);
    iii) Submit a check list; and
    iv) Submit an affidavit.

    Details can be seen in the Bid Data Sheet.
4. Eligibility for Bidders:
    (a) At the time of submission of the Bid the bidder should have valid registration with the Government of Madhya Pradesh, PWD in appropriate class. However, such bidders who are not registered with the Government of Madhya Pradesh and are eligible for registration can also submit their bids after having applied for registration with appropriate authority.
    (b) The bidder would be required to have valid registration with MPPWD in appropriate class at the time of signing of the Contract.
    (c) Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of the earnest money deposit.
5. Pre-qualification – Prequalification conditions, as applicable, are given in the Bid Data Sheet.
6. Special Eligibility - Special Eligibility Conditions, if any, are given in the Bid Data Sheet.
7. Amendment to NIT, if any, would be published on website only, and not in Newspaper.

Executive Director
Gwalior Smart City Development Corporation Ltd.

Tender Document

Table of Contents

SECTION 2

INSTRUCTIONS TO BIDDERS (ITB)

A. GENERAL

1. SCOPE OF BID

The detailed description of work (hereinafter referred to as 'Work'), is given in the Detailed Project Report prepared by the project consultants.

2. GENERAL QUALITY OF WORK:

The work shall have to be executed in accordance with the drawings (prepared by Contractor and approved by the competent authority), technical specifications specified in the Bid Data Sheet/Contract Data, and shall have to meet high standards of workmanship, safety and security of workmen and works.

3. PROCEDURE FOR PARTICIPATION IN E-TENDERING

The procedure for participation in e-tendering is given in the Bid Data Sheet.

4. ONE BID PER BIDDER

4.1 The bidder can be an individual entity or a Consortium/joint venture (if permitted as per Bid Data sheet). In case Consortium/Joint Venture is permitted, the requirement of Consortium/Joint Venture shall be as per the Bid Data Sheet.

4.2 No bidder shall be entitled to submit more than one bid whether jointly or severally. If he does so, all bids wherein the bidder has participated shall stand disqualified.

5. COST OF BIDDING

The bidder shall bear all costs associated with the preparation and submission of his bid, and no claim whatsoever for the same shall lie on the GSCDCL.

6. SITE VISIT AND EXAMINATION OF WORKS

The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the work. All costs shall have to be borne by the bidder.

B. BID DOCUMENTS

7. CONTENT OF BID DOCUMENTS

The Bid Document comprises of the following documents:

1. NIT with all amendments.
2. Instructions to Bidders,
3. Conditions of Contract:

i. Part I General Conditions of Contract and Contract Data; and
ii. Part II Special Conditions of Contract.

4. Specifications
5. Drawings,
6. Priced Bill of Quantities
7. Technical and Financial Bid
8. Letter of Acceptance
9. Agreement and
10. Any other document(s), as specified.

8. The bidder is expected to examine carefully all instructions, conditions of contract, the contract data, forms, terms and specifications, bill of quantities, forms and drawings in the Bid Document. Bidder shall be solely responsible for his failure to do so.

9. PRE-BID MEETING

Wherever the Bid Data Sheet provides for pre-bid meeting:

9.1 Details of venue, date and time would be mentioned in the Bid Data Sheet. Any Change in the schedule of pre-bid meeting would be communicated on the website only, and intimation to bidders would not be given separately.

9.2 Any prospective bidder may raise his queries and/or seek clarifications in writing before or during the pre-bid meeting. The purpose of such meeting is to clarify issues and answer questions on any matter that may be raised at that stage. The Employer may, at his option, give such clarifications as are felt necessary.

9.3 Minutes of the pre-bid meeting including the gist of the questions raised and the responses given together with any response prepared after the meeting will be hosted on the website.

9.4 Pursuant to the pre-bid meeting if the Employer deems it necessary to amend the Bid Document, it shall be done by issuing amendment to the online NIT.

10. AMENDMENT OF BID DOCUMENTS

10.1 Before the deadline for submission of bids, the Employer may amend or modify the Bid Documents by publication of the same on the website.

10.2 All amendments shall form part of the Bid Document.

10.3 The Employer may, at its discretion, extend the last date for submission of bids by publication of the same on the website.

C. PREPARATION OF BID

11. The bidders have to prepare their bids online, encrypt their Bid Data in the Bid Forms and submit Bid Seals (Hashes) of all the envelopes and documents related to the Bid required to be uploaded as per the time schedule mentioned in the key dates of the Notice Inviting e-Tenders after signing of the same by the Digital Signature of their authorized representative.

12. DOCUMENTS COMPRISING THE BID

The bid submitted online by the bidder shall be in the following parts:

Part 1 – This shall be known as Envelope A and would apply for all bids. Envelope A shall contain the following as per details given in the Bid Data Sheet:

i. Registration number or proof of application for registration and organizational details in format given in the Bid Data sheet
ii. Payment of the cost of Bid Document;
iii. Earnest Money; and
iv. EPF Registration
v. An affidavit duly notarized.

Part 2 – This shall be known as Envelope B and required to be submitted only in works where pre-qualification conditions and/or special eligibility conditions are stipulated in the Bid Data Sheet. Online Envelope B shall contain a self-certified sheet duly supported by documents to demonstrate fulfilment of pre-qualification conditions.

Part 3 – This shall be known as Online Envelope C and would apply to all bids. Envelope C shall contain financial offer in the format prescribed enclosed with the Bid Data Sheet. Financial offer shall be submitted online only.

13. LANGUAGE

The bid as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer shall be in English. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English. In such case, for the purposes of interpretation of the bid, such translation shall govern.

14. TECHNICAL PROPOSAL

14.1 Only, in case of bids with pre-qualification conditions defined in the Bid data sheet, the Technical Proposal shall comprise of formats and requirements given in the Bid Data Sheet.

14.2 All the documents/ information enclosed with the technical proposals should be self-attested and certified by the Bidder. The Bidder shall be liable for forfeiture of his earnest money deposit, if any document/ information are found false/fake/untrue before acceptance of Bid. If it is found after acceptance of the Bid, the sanctioning authority may at his discretion forfeit his performance security/guarantee, security deposit, enlistment deposit and take any other suitable action.

15. FINANCIAL BID

i. The Bidder shall have to quote rate for each items of Bill of Quantities (BoQ) as described in Annexure J-1.

ii. The Bidder shall fill in rates and prices and line item total (both in figures and words) for all items described in the BoQ along with total bid price (both in figures and words). Items for which no rate or price is entered by the Bidder will not be paid for by GSCDCL when executed and shall be deemed covered by the other rates and prices in the BoQ.

iii. All duties, taxes(excluding GST), and other levels payable by the Bidder under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

iv. The rates and prices quoted by the Bidder shall be fixed for the entire duration of the Contract.

16. PERIOD OF VALIDITY OF BIDS

The bids shall remain valid for a period specified in Bid Data Sheet after the date of "close for biding" as prescribed by the Employer. The validity of the bid can be extended by mutual consent in writing.

17. EARNEST MONEY DEPOSIT (EMD)

17.1 The Bidder shall furnish, as part of the Bid, Earnest Money Deposit (EMD), of the

amount specified in the Bid Data Sheet.

17.2 The amount of EMD to be deposited ONLINE/RTGS/NEFT/IMPS in favour of CEO, Gwalior Smart City Development Corporation Limited (GSCDCL).

17.3 Bid not accompanied by EMD shall be liable for rejection as non-responsive. No exemption is permitted.

17.4 EMD of bidders whose bids are not accepted will be returned within 10(ten) working days of the decision on the bid.

17.5 EMD of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the Bank Guarantee of required value for Performance Security.

17.6 Failure to sign the contract by the selected bidder, for whatsoever reason, shall result in forfeiture of its EMD.

D. SUBMISSION OF BID

18. The bidder is required to submit bid online only under the digital signature of authorized signatory.

E. OPENING AND EVALUATION OF BID

19. PROCEDURE

19.1 Cover 'A' shall be opened first online at the time and date notified and its contents shall be checked. In cases where Cover 'A' does not contain all requisite documents, such bid shall be treated as nonresponsive, and Cover "B" and/or "C" of such bid shall not be opened.

19.2 Wherever Cover 'B' (Technical Bid) is required to be submitted, the same shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Cover 'B'. Cover 'C' (Financial Bid) of bidders who are not qualified in Technical Bid (Cover 'B') shall not be opened.

19.3 Cover 'C' (Financial Bid) of the qualified bidders shall be opened online at the time and date notified. The bidder shall have freedom to witness opening of the Cover 'C'.

19.4 After opening Cover 'C' all responsive bids shall be compared to determine the lowest evaluated bid.

19.5 The GSCDCL reserves the right to accept or reject any bid, and to annul the biding process and reject all the bids at any time prior to contract award, without incurring any liability. In all such cases reasons shall be recorded.

19.6 The GSCDCL reserves the right of accepting the bid for the whole work or for a distinct part of it.

20. CONFIDENTIALITY

20.1 Information relating to examination, evaluation, comparison and recommendation of contract award shall not be disclosed to bidders or any other person not officially concerned with such process until final decision on the bid.

20.2 Any attempt by a bidder to influence the Employer in the evaluation of the bids or

contract award decisions may result in the rejection of its bid.

F. AWARD OF CONTRACT

21. AWARD OF CONTRACT

The Employer shall notify the successful bidder by issuing a 'Letter of Acceptance' (LOA) that his bid has been accepted.

22. PERFORMANCE SECURITY

22.1 Prior to signing of the Contract the bidder to whom LoA has been issued shall have to furnish performance Security and Additional Performance Security (if applicable) of the amount, form and duration, etc. as specified in the Bid Data Sheet.

22.2 If the Bid, which results in the lowest evaluated Bid price, is seriously unbalanced or front loaded the opinion of GSCDCL, GSCDCL after evaluation, taking in to consideration the schedule of the estimated contract price may require Additional Performance Security from the Successful Bidder for such unbalanced Bid price.

22.3 If the lowest evaluated Bid price is lower by 15% or more of the SOR amount, such Bid will be deemed as unbalanced Bid price and classified as unworkable rate. For such unbalanced bids which classify as unworkable rate, the bidder to whom LOA has been issued, shall furnish, in addition to the performance security, an Additional Performance Security of an amount, which will be equal to the difference between the unworkable rate calculated with reference to the SOR amount and agreement amount. By way of illustration, if the lowest evaluated Bid price is lower by 22% of the SOR amount, the Additional Performance Security for the unworkable rate that shall be required from the successful bidder shall be calculated as 7% of the SOR amount, being the difference between 22% of the SOR amount and 15% as the benchmark for classification as unworkable rate.

23. SIGNING OF CONTRACT AGREEMENT

23.1 The successful bidder shall have to furnish Performance security and additional performance security, if any, and sign the contract agreement within 15 days of issue of LOA.

23.2 The signing of contract agreement shall be reckoned as intimation to commencement of work. No separate work order shall be issued by the Employer to the contractor for commencement of work.

23.3 In the event of failure of the successful bidder to submit Performance Security and additional performance security if any or sign the Contract Agreement, its EMD shall stand forfeited without prejudice to the right of the employer for taking action against the bidder.

23.4 An indicative terms and conditions of the GCC, SCC and/or the draft contract that shall be executed by and between GSDCL and the successful bidder is attached. GSDCL reserves the right to modify/ amend the said terms and conditions of the GCC, SCC and/or draft contract after consultation with the successful bidder. Such terms and conditions as may be considered necessary by the GSCDCL at the time of finalization of the Agreement, successful bidder would be required to execute the Agreement with such conditions.

24. CORRUPT PRACTICES

The Employer requires that bidders observe the highest standard of ethics during the procurement and execution of contracts. In pursuance of this policy, the Employer:

i. may reject the bid for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract; and

ii. may debar the bidder declaring ineligible, either indefinitely or for a stated period of time, to participate in bids, if it at any time determines that the bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for, or in executing, a contract.

iii. may debar the bidder if he is being blacklisted by any Department of State Government or Government of India for non-performance/ sub- standard execution or any other reason whatsoever in similar type of works.

For the purposes of this provision, the terms set forth above are defined as follows:

a. "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
b. "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
c. "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
d. "Collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.

End of ITB

BID DATA SHEET

General

S.N.	Particulars	Data
1	Office inviting Tender	Gwalior Smart City Development Corporation Limited
2	NIT No.	GSCDCL/038/2018
3	Date of NIT	20/03/2018
4	Bid document download Available from date & time	20/03/2018 at 1030 hours.
5	Website link	http://www.mpeproc.gov.in

Section 1– NIT

Clause Reference	Particulars	Data
2	Portal fees	Rs. _____(shall be reflected on the portal)
3	Cost of bid document	Rs.30,000/- (Thirty thousand only)
	Cost of bid document payable at	Bidders shall be directed to the payment gateway through the portal
	Cost of bid document in favour of	Executive Director, Gwalior Smart City Development Corporation Limited
4	Affidavit format	Annexure B
5	Pre-qualifications required	Yes
	If Yes, details	As per Annexure C
6	Special Eligibility	Yes
	If Yes, details	As per Annexure D
7	Key Dates	Annexure A

Section 2–ITB

Clause Reference	Particulars	Data
1	Name of work	"Development of Smart Roads of 1.47Km in ABD Area under Gwalior Smart City Mission":- i. Indraganj Junction to Achileshwar Junction road ii. Mahal Gate to GR Medical College Junction road
2	Specifications	Annexure E
3	Procedure for participation in e-tendering	Annexure F

Clause Reference	Particulars	Data
4	Whether Consortium/Joint-venture is allowed	Yes maximum three including lead member
	If yes, requirement for Consortium/JV	Consortium /Joint Venture agreement
9	Pre-bid meeting to held	Yes
	If Yes, Date, Time & Place	Date: 27/03/2018 Time: 15:00 Hrs Place: Gwalior Smart City Development Corporation Limited, Nagar Nigam Mukhyalaya, City Centre, Gwalior
12	Envelope-A should reach in physical form to	Deleted
14	Envelope-B Technical Proposal	Annexure – I (Formats I-1 to I-5)
	Envelope-C Financial Bid	Annexure – J
15	Material to be issued by the department	Nil
16	Period of Validity of Bid	180 Days
	Earnest Money Deposit	Rs. 9,18,750.00 /- (Rupees Nine Lakh Eighteen Thousand Seven Hundred Fifty
17	Forms of Earnest Money Deposit	Amount of EMD to be deposited only ONLINE/RTGS/NEFT/IMPS (Make payments before 48 Hours)
	EMD valid for a period of	Not less than 180 days from the last
	ONLINE/RTGS/NEFT/IMPS Chief Executive Officer, Gwalior Smart	ONLINE/RTGS/NEFT/IMPS Chief Executive Officer, Gwalior Smart
21	Letter of Acceptance (LoA)	Annexure L
22	Amount of Performance Security	5% of contract amount
	Additional Performance Security, if any (as per clauses 22.2, 23.1, 23.3)	Yes, applicable.
	Performance security in the format	Annexure M
	Performance security in favour of	Executive Director, Gwalior Smart City Development Corporation Limited,
	Performance security valid up to	Till 3 (three) months from the date of expiry of the Defect Liability Period

Annexure – A

KEY DATES & EVENTS

S. No.	Department Stage	Bidder's Stage	Start		Expiry		Envelopes
			Date	Time	Date	Time	
1.		Purchase of Tender – Online	20/03/2018	1030 Hours	17/04/2018	1730 Hours	
2.	Pre-Bid Meeting		27/03/2018	1500 Hours			
3.		Bid Submission – Online			18/04/2018	1730 Hours	
4.	Mandatory Submission Opening		19/04/2018	1600 Hours			Envelope A
5.	Technical Proposal Opening		19/04/2018	1610 Hours			Envelope B
6.	Financial Bid Opening		TBA				Envelope C

Note: Original Affidavit shall have to be submitted by the Successful Bidder before agreement. Scan copy of affidavit and all other declaration shall be submitted by the bidder online.

Annexure – B
(See clause 3 of Section 1-NIT)

||AFFIDAVIT||

(To be contained in Envelope A) (On
Non-Judicial Stamp of Rs.100)

I/we_____who is/are _____ (status in the firm/company) and competent for submission of the affidavit on behalf of M/S _____ (name of the bidder) do solemnly affirm an oath and state that: I/we are fully satisfied for the correctness of the certificates/records submitted in support of the following information in bid documents which are being submitted in response to notice inviting e-tender No. _____ for _____ (name of the Work) dated _____ issued by the _____ (name of the Authority).

I/we are fully responsible for the correctness of following self-certified information/ documents and certificates:

1. That the self-certified information given in the bid document is fully true and authentic.
2. That:
   a. Term deposit / Bank Guarantee submitted as Earnest Money Deposit, and other relevant documents provided by the Bank are authentic.
   b. Information regarding financial qualification and annual turn-over is correct.
   c. Information regarding various physical qualifications is correct.
3. No close relative of the undersigned and our firm/company is working in the department.

OR

Following close relatives are working in the department:

Name _____ Post _____ Present Posting _____

Signature with Seal of the Deponent (bidder)

I/ We, _____ above deponent do hereby certify that the facts mentioned in above paras 1 to 3 are correct to the best of my knowledge and belief.

Verified today _____(dated) at _____(place).

Signature with Seal of the Deponent (bidder)

Annexure – C

(See clause 5 of Section 1 NIT)

PRE-QUALIFICATIONS CRITERIA

A) The bidder should have an Average Annual Financial Turnover for **Construction Works not less than 30%** of the probable amount of contract during last 3 financial years.

Urban road project means up-gradation of existing road in urban area consisting of flexible or rigid pavement for a minimum width of 12 mts.

B) The bidder should have executed either of the following within last 7 years.

a. One Urban Road Work costing not less than 80% of the probable amount of contract; or
b. Two Urban Road Works costing not less than 50% of the probable amount of contract; or
c. Three Urban Road Works costing not less than 40% of the probable amount of contract.

The value of executed works shall be brought to current costing level by enhancing the actual Value of work at simple rate of 7% per annum; calculated from the date of completion to last date of receipt bid.

Note:

Bidders are required to submit the corresponding Work Order copies & Execution/Completion Certificates issued by the respective clients. The Certificates should be issued by respective authority (not below Executive Engineer) of client. GSCDCL may call for original certificates for verification.

Annexure – D

(See Clause 6 of Section 1 NIT)

SPECIAL ELIGIBILITY CRITERIA

The bidder shall have successfully executed:

A. A minimum of one urban transport (Roads, MRTS, BRTS or LRTS) project in last 7 years. The value of such work shall not be less than 50% of the probable amount of contract.

B. Bidder should have experience of successful completion/execution of minimum 1 successful installation and commissioning of HT & LT underground cabling works with installation of plinth mounted/ Transformers in urban area in last seven years
   Or
   Bidder can provide undertaking of involving partner having above experience post becoming successful bidder during the bidding stage

Annexure – E

(See clause 2 of Section 2-ITB & Clause 10 of GCC)

SPECIFICATIONS

The works in General shall be carried out as per latest MP-UADD Specifications, (updated with corrections slips issued upto last date of submission of tender) unless otherwise specified in the nomenclature of the individual item or in the particular specifications of concerned items of works.

For items not covered under MP-UADD specifications with correction slips or those specifications are not given in the technical specifications appended or not incorporated in the nomenclature of the individual item, the work shall be done as per latest relevant BIS Codes of Practice or as per approval of Engineer-in-charge.

All the works shall be executed as per the approved drawings / designs. The patterns shown in the tender drawings can be modified as per the site requirements by the Engineer-in-charge and nothing extra whatsoever shall be payable over and above the quoted rates.

Material should be of the best approved quality obtainable and they shall comply to the respective Indian Standard Specifications. Samples of all materials shall be got approved before placing order and the approved sample shall be deposited with the Client/Engineer In-Charge.

Only ISI mark 43/53 grade Ordinary Portland Cement of relevant I.S. specifications shall be used for the work. Any lot of cement brought to site by the Contractor would be permitted to be used in the work only after the satisfactory results are received, of the requisite tests under the supervision of the Engineer-In-Charge or his authorized representative.

Crushing Unit and Batching plant- The crushing unit should be capable of producing particles which are equi-dimensional or cubicle in shape conforming to the grading requirement. For this purpose, typical two stage crusher configuration of jaw primary crusher and a cone secondary crusher will be obligatory. In the batching plant, as per the applicable specifications, the aggregates shall pass through screening unit to separate them into different sized fractions and deposit them on bins as per specifications.

GSB & CRM: Disintegrated rock (Moorum) for the items of GSB and Crusher run Macadam shall not be used by the Contractor.

The Contractor shall submit test certificate in the Performa prescribed / approved by B.I.S. from the manufacturer for every batch of steel brought to the work site.

The surface regularity of the completed sub-grade, sub-base, base course and widening of surfaces in longitudinal and transverse direction shall be within the tolerance limit indicated in Table 900-1, Clause 902.

CHAPTER1: GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS:

The specifications contained herein are general in nature and as such only the specifications relating to execution of work shall hold good. The contractor shall bear in mind the instructions given in the tender documents while referring these specifications.

1.1.1 Abbreviations:

In the Technical Specifications as well as the Schedule of Quantities, the following abbreviations have been used.

The abbreviation	-	Shall mean
Cum/Cu.M	-	Cubic Meters
Sqm/Sq.M	-	Square Meters
Rmtr/Rmt/Rm	-	Running Meters
Nos/Each	-	For Each
Qtl	-	Quintal

1.1.2 Terminology:

The terms	-	Shall mean
Approval or approved	-	Approval by GSCDCL
As directed	-	As directed by GSCDCL

1.1.3 Rates:

The rates quoted, shall be for all the works shown on drawings and described in Schedule of Quantities, and covered under the battery limit for individual item for entire quantity (inclusive of total deviations during execution) required for the successful completion of the Project, irrespective of fact whether they are specifically mentioned or otherwise. Quantities given in Schedule of Quantity are indicative in nature.

The rates quoted shall be inclusive of all works whether specified or otherwise and which is required for satisfactory execution of the Item. In case of doubt it should be got clarified before quoting.

In case there are any details of construction or requirement of materials, which have not been reflected to in the specifications, detailed description of items, the Schedule of Quantities, or on the drawings, but which are useful or essential in true completion of the work, then the same shall be deemed to have been included in the rate/s quoted by the contractor.

Any claim from contractors on any or all of the above will not be entertained.

Site Clearance:

Before starting the work, the site shall be cleared of all shrubs, grass and other vegetation including large and small bushes, all tree stumps, removal of roots, cutting and disposal of trees up to 300mm girth etc. (The girth shall be measured at a height of 1.5 metres above GL). The site if found uneven, up to a height difference of 1.00m, shall be levelled to a plain topography.

The contractor shall make himself familiar with the local rules and regulations pertaining to

land clearance environmental aspects including special requirements of forest areas, wherever applicable and the work shall be carried out in strict accordance therewith.

Specific Instructions:

The contractor shall independently survey the entire work area and ascertain the dimensions and levels of the area and submit and take approval from the Consultant before commencement of actual setting at Contractor‟s own cost. The contractor shall maintain and provide on the site at all times, high precision surveying instruments like Dumpy level, theodolite (one or two second theodolite) and total station and carry out the survey of entire area and setting out of works, building lines & levels, etc., with the help of high precision instruments only.

The contractor shall provide at his own cost all labour, pegs, strings and other materials as may be required for line out and setting out the work. All levels referred to in connection with these works shall be based on local Benchmarks. The contractor shall protect and preserve all Benchmarks used in setting out the works till the Consultant directs its removal.

The contractor shall be responsible for the accurate setting out of the works in relation to original points, lines and levels of reference given by the Consultant. The checking of any line or level by the Consultant shall not in any way relieve the contractor of his responsibility for the accuracy thereof.

If, at any time during the execution of the works, any error appears in the position, levels, dimensions or alignment of any part of the works on being required so to do by the Consultant, the contractor shall at his own cost rectify such error to the satisfaction of the Consultant.

All the works shall be carried out as per UADD specifications.In case anything is not available in this specification, CPWD specifications shall be followed. Latest IS codes practices shall be adopted.

1.1.4 These specifications shall be read in conjunction with the particular specifications for various items of work. The Contractor shall carefully acquaint himself with the general specifications, co-ordinate the same with any other specifications forming a part of the Contract Document and determine his contractual obligations for the execution of various items of work in accordance with good engineering practice.

1.1.5 Reference to the Standard Codes of Practice :

All Standards, tentative specifications, Specifications, Codes of practice referred to shall be the latest editions including all applicable official amendments and revisions. The contractor shall make available at his own cost, at site all relevant Indian Standard Codes of practice as applicable

In case of discrepancy between standards, Codes of practice, tentative specifications, specification referred to and this specification, this specification shall govern.

1.1.6 Contractor to provide :

The Contractor shall provide and maintain at site throughout the period of works the following at his own cost and without extra charge, the cost being held to be included in the Contract Rates:

1. All labour, materials, plant, equipment and temporary works required to complete and maintain the works to the satisfaction of the Engineer.
2. Lighting for night work, and also whenever and where ever required by the Engineer.
3. Temporary fences, guards, lights and protective work necessary for protection of workmen, supervisors, engineers or any other persons permitted access to the site.
4. All equipment, instruments and labour required by the Engineer for measurement of the Works.
5. All testing equipment and facilities related with the assigned works.

6 Trained staff for testing and testing Lab.
7 All tests shall be carried by the Contractor on his own cost.
8 Contractor shall submit QA and QC document before start of work to the client for approval and on the basis of approved document all tests shall be carried out and quality control of the work will be assured.
9 All tests shall be witnessed by Client's representative and observation shall be signed by both parties.
10 Any of equipment required which can reasonably be held necessary for the completion and maintenance of the works to the satisfaction of the Engineer shall be made available by the Contractor.

1.1.7 Dimensions :

i. Figured dimensions on drawings shall supersede measurements by scale and drawings to a large scale shall take precedence over those to a smaller scale. Special dimensions or directions in the specifications shall supersede all others. All dimensions shall be checked on site prior to execution.
ii. The dimensions where stated do not allow for waste, laps, joints, etc. but the Contractor shall provide at his own cost sufficient labour and materials to cover such waste, laps, joints, etc.
iii. The levels, measurements and other information concerning the existing site as shown on the drawings are believed to be correct, but the Contractor should verify them for himself and also examine the nature of the ground as no claim or allowance whatsoever will be entertained on account of any errors or omissions in the levels or the description of the ground levels or strata turning out different from what was expected or shown on the drawings.

Setting out of Works :

The Contractor shall set out the Works indicated in the Conditions of Contract. The Contractor shall provide suitable stones with flat tops and build the same in concrete for temporary bench marks. All the pegs for setting out the Works and fixing the levels required for the execution thereof shall, if desired by the Engineer, likewise be built in masonry at such places and in such a manner as the Engineer may direct. The Contractor shall carefully protect and preserve all bench marks and other marks used in setting out the works.

1.1.9 Materials :

I. Quality

All materials used in the works shall be of the best quality of their respective kinds as specified herein, obtained from sources and suppliers approved by the Engineer and shall comply strictly with the tests prescribed hereafter, or where tests are not laid down in the specifications, with the requirements of the latest issues of the relevant Indian Standards.

II. Sampling and Testing :

All materials used in the works shall be subjected to inspection and test in addition to test certificates. Samples of all materials proposed to be employed in the permanent works shall be submitted to the Engineer for approval before they are brought to the site.

Samples provided to the Engineer for their retention are to be labelled in boxes suitable for storage. Materials or workmanship not corresponding in character and quality with approved samples will be rejected by the Engineer.

Samples required for approval and testing must be supplied sufficiently in advance to allow for testing and approval, due allowance being made for the fact that if the first samples are rejected further samples may be required. Delay to the works arising from the late submission of samples

will not be acceptable as a reason for delay in completion of the works.
Materials shall be tested before leaving the manufacturer‟s premises, quarry or resource, wherever possible. Materials shall also be tested on the site and they may be rejected if not found suitable or in accordance with the specification, notwithstanding the results of the tests at the manufacturer‟s works or elsewhere or test certificates or any approval given earlier.
The contractor will bear all expenses for sampling and testing, whether at the manufacturer‟s premises at source, at site or at any testing laboratory or institution as directed by the Engineer. No extra payment shall be made on this account.

III. Dispatch of materials :
Materials shall not be dispatched from the manufacturer‟s works to the site without written authority from the Engineer.

IV Test certificates :
All manufacturer‟s certificates of test, proof sheets, etc showing that the materials have been tested in accordance with the requirement of this specification and of the appropriate Indian Standard are to be supplied free of charge on request to the Engineer.

V Rejection :
Any materials that have not been found to conform to the specifications will be rejected forthwith and shall be removed from the site by the Contractor at his own cost.

VI The Engineer shall have power to cause the Contractors to purchase and use such materials from any particular source, as may in his opinion be necessary for the proper execution of the work.

1.1.10 Storing of Materials at site :
All materials used in the works shall be stored on racks, supports, in bins, under cover etc as appropriate to prevent deterioration or damage from any cause whatsoever to the entire satisfaction of the Engineer.
The storage of materials shall be in accordance with IS 4082 “Recommendation on stacking and storage or construction materials on site” and as per IS 7969 “Safety code for handling and storage of building materials”.
The materials shall be stored in a proper manner at places at site approved by the Engineer. Should the place where material is stored by the Contractor be required by the Employer for any other purpose, the Contractor shall forthwith remove the material from that place at his own cost and clear the place for the use of the Employer.

1.1.11 Water :

i. Water from approved source :
Clean fresh water only shall be used for the works. The water shall be free from any deleterious matter in solution or in suspension and be obtained from an approved source. The quality of water shall conform to IS 456.

ii. Storage :
The Contractor shall make his own arrangements for storing water, if necessary, in drums or tanks or cisterns, to the approval of the Engineer. Care shall be exercised to see that water is not contaminated in any way.

1.1.12 Workmanship :

i. All works shall be true to level, plumb and square and the corners, edges and arises in all

cases shall be unbroken and neat.

ii. Any work not to the satisfaction of the Engineer or his representative will be rejected and the same shall be rectified, or removed and replaced with work of the required standard of workmanship at no extra cost.

1.1.13 Loading Tests :

I. The Engineer shall during the progress of the works or the period of maintenance, instruct the Contractor that a loading test or tests be made on the works or any part thereof if, in his opinion, such a test or tests be deemed necessary for one or more of the reasons herein below specified :
   i. The site made concrete test cubes failing to attain the specified strength;
   ii. The shuttering for concrete works being prematurely removed;
   iii. Overloading during construction of the Works or part thereof;
   iv. Concrete improperly cured;
   v. If any portion of the work is carried out without prior approval in writing of the Engineer or his representative to proceed with such work;
   vi. If Concrete is honey combed or damaged or in the opinion of the Engineer particularly weak in where weakened concrete will affect the ability of the structure to carry design loads;
   vii. Any other circumstances attributed to alleged negligence on the part of the Contractor which, in the opinion of the Engineer, results in the Works or any part thereof being of less than the expected strength;
   viii. Any reason other than the foregoing.

II. If the loading tests be instructed to be made solely or in part for the reasons I.10.1.1 to 7 the tests shall be made at the Contractor‟s own cost whether the results of such tests be satisfactory or otherwise. If the tests be instructed to be made for the reasons I.11.1.8 herein before specified, the Contractor shall make the tests and shall be reimbursed for all costs relating thereto irrespective of the result of the tests.

III. All the loading tests will be carried out strictly in accordance with the instructions of the Engineer. Load testing will generally follow the procedure set out in Indian Standard Codes of Practice, but the Engineer is not bound to follow the Indian Standard Codes of Practice and in his absolute discretion may issue instructions differing from the procedure set out in the Indian Standard Codes of Practice.

IV. If in the opinion of the Engineer, the result of the loading tests is not satisfactory the Engineer shall instruct that such parts of the works as he specifies shall be taken down or cut out and reconstructed to comply with the specifications, or other remedial measures shall be taken to make Works secure to the satisfaction of the Engineer. The Contractor shall take down, or cut out and reconstruct the defective work or shall take the remedial measures instructed at his own cost.

CHAPTER 2: TECHNICAL SPECIFICATIONS

SECTION – A

DEMOLITION AND DISMANTLING

Contractor shall have to submit detailed step by step Method Statement indicating procedure of demolition, what machinery to be used where, machinery / equipment list and its number, technical staff, mechanic for repair the machinery, Location of dumping the debris, Occupational health and safety

A.1 DEMOLITION, DISMANTLING AND REMOVAL

GENERAL:

Contractors shall take all precautions to see that the demolition is done in such a sequence and manner as to prevent all avoidable damage to unusable and any damage to nearby property or injury to life. To this effect the Contractor may be required to erect suitable barricades around the works as directed for which no claims for extra payment will be allowed.

A register shall be opened by the contractor on the work site to show a day-to-day account of the turnout of salvaged materials. This register should also show whether dismantled material is properly stacked or wasted. It shall be signed by the representative of the contractor and by the Engineer-in-charge on site.

The structure shall be dismantled carefully, and the materials removed without causing damage to the serviceable materials, and the part of the structure to be retained, and any properties or structure nearby. Any damage to nearby property or structure shall be made good by the contractor without extra claims. The contractor shall be responsible for any injury to the workers or the public. Removal of overlaying adjacent materials if required for dismantling of the structure, shall be included in the item.

Before demolishing any part of the structure, the contractor shall provide supports and struts to the existing structure as and when directed by the Consultants. All struts and support shall not be removed by the Contractor until written permission is obtained from the architect or structural engineer. No extra claims for such skirting or supports shall be paid for, it shall be included in the tender under respective items for demolishing. All scaffolding will be in steel and will have rubber ends, so as to not damage any part of the structure.

All the materials obtained from the removal of the structure shall be the property of the owner. Serviceable materials shall be stacked neatly in such a manner as to avoid deterioration and in place directed by the Consultant within a distance of 100 m. Different categories of materials shall be stacked separately. Materials which are to be reused, shall be numbered before dismantling, carefully dismantled to avoid any damages and stacked in an order which facilitates the re-use.

Unless otherwise provided, excavated materials shall be used in back filling the excavation made in removing the structure, in leveling ground or otherwise disposed off, as directed free of cost. Serviceable materials may be issued to the contractor for use in the new work or elsewhere at the rates and as per conditions provided in the tender. No material shall be disposed off by the contractor without the specific instruction of the Consultants.
Serviceable materials may be issued to the contractor for use in the new work or elsewhere at the rates and as per conditions provided in the tender.

No material shall be disposed off by the contractor without the specific instructions of the Consultants.

Extent and Methods of Demolition:

Demolish, remove for salvage, or remove and reinstall as applicable, all, or parts of, as indicated: site work interfering with new construction, masonry, concrete, walls and partitions, floor and roof construction, roofing, parapet construction, doors, frames, finish hardware, plaster, gypsum board, acoustical ceilings, suspension systems, furring, lathing, finished, cabinetry, ventilation items, plumbing fixtures, mechanical and electrical equipment, piping, lighting, and other materials and items as necessary to do the Work under this Contract and, in

addition, where removal is indicated.
Use methods required to complete Work within limitations of governing regulations.
Proceed systematically.
Demolish concrete and masonry in small sections.
Also demolish or remove walls and partitions in small sections whatever the materials of construction.
Remove materials so as to not impose excessive loads to supporting walls, floors, or framing.
Where necessary to avoid collapse, install temporary struts, bracing, or shoring; leave in place until new Work provides adequate bracing and support.
Remove structural framing members and lower to ground by suitable methods. Do not allow to free fall.

Where existing equipment, cabinets, lockers, etc., having concrete curbs or bases are removed, also remove the concrete curbs and bases to a depth not less than 1/4 inch below the top of the adjacent concrete left in place.

When removing existing walls and partitions resting on the structural slab, also remove traces of mortar and other materials to expose structural slab beneath the location of partition or wall.

Except where Contract documents permit leaving existing flooring in place completely remove existing finish flooring from locations where new finished are scheduled. Leave top of exposed substrate completely free from materials.

Also remove toppings where necessary to install structural unit covered bases and other products. In such cases, remove topping sufficiently to properly accommodate new and reused products.

In addition to other removal of existing topping, also remove such amounts of topping as is necessary to allow finishing of floor surfaces level to a tolerance of 1/8 inch in each 6 feet.

When partly removing existing topping and when removing existing floor finished, completely remove loose materials and damaged substrate materials.

Completely remove existing carpet from areas to receive new toppings. Also remove carpet cushions and all traces of adhesives.
Where Contract requires removing existing concrete slabs, also remove reinforcement.
When filling openings with concrete, prepare slab edges as shown. Leave 6 inches of reinforcement exposed when filling openings with concrete.

Remove supports for existing finishes removed under this Contract or earlier.

Other Materials and Items: Remove where shown to be removed or where removal is necessary to permit Work under this Contract. Remove such items and materials only to extent necessary of miscellaneous items and materials, refer to the specifications sections where such item or material is specified.

Pollution Controls:

Use water sprinkling, temporary enclosures, and other suitable methods to limit airborne dust and dirt to lowest practical level. Comply with governing environmental protection regulations.

i. Sprinkling is subject to Owner's approval. Cease immediately upon Owner's approval. Cease immediately upon Owner's objection. Do not use water when it may create hazardous or objectionable conditions such as flooding, or pollution.
ii. Clean adjacent facilities to remove of dust, dirt, and debris due to demolition operations: comply with applicable requirements of governing authorities. Except where new Work is to occur, return adjacent areas to condition existing before start of Work.

Satisfactorily and promptly repair damage to existing materials and equipment to remain, or provide new equal approved products at no additional cost.
Remove carefully and protect items indicated to be reused. Store carefully in a safe location until reinstalled. Assume responsibility for safe storage and handling.
Remove carefully and protect materials and items to remain Owner's property. Move and sore in a space in the building designated by Owner.
Cutting and Drilling: Cut and drill existing construction to permit the Work under this Contract. Include cutting holes and other openings for plumbing, mechanical, and electrical Work.
Cut by hand or with small power tools when possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work. Cut round holes in concrete using core drills. Cut square and rectangular holes by line drilling and using chipping hammers to remove material between drill holes. Do not use large air hammers.
Do not drill or cut structural supporting elements without specific approval in each case, unless the element is shown on structural drawings to be drilled or cut. Do not cut existing concrete slab reinforcement. Cover openings temporarily when not in use, and patch as soon as work is installed.

Following points shall form inherent the part of offer

Insurance

Demolition Contractor should arrange suitable insurance before commencement of work and the copy shall be issued to the Employer.

Services

The demolition contractor shall be responsible for arranging disconnection of all water, and electricity service prior to work commencing.
The demolition contractor shall give at least forty-eight hours' notice of intention to remove, disconnect drain in or under the building to be demolished.
At least twenty four hours' notice must be given before making good the surface of the ground disturbed by the removal or sealing of any sewer or drain under this section.

Hoardings and Scaffolding

Suitable hoarding may be required to be erected to enclose the site during demolition and Scaffold erected along the frontage abutting the road (up to 4-5 mt high) and residential building (up to second floor roof of the residential building) and other such places as may be required.
When required by notice any variation must be sanctioned in writing by the PMC prior to commencement of demolition works.

Dangerous Practices

Overloading of any part of the structure by debris or materials should be avoided.

5) Fire Risk

All precautions should be taken to prevent the risk of fire or explosion caused by gas or vapour. Oxygen, acetylene and liquefied petroleum gas containers should be handled with care and

stored and used away from source of heat.

6) Open drain crossing the Site
Protective measures are to be taken to protect open drain from damage. Any demolition, debris must be removed to the satisfaction of the PMC
The demolition contractor shall give at least forty-eight hours' notice of intention to remove, disconnect drain in or under the building to be demolished.
At least twenty four hours notice must be given before making good the surface of the ground disturbed by the removal of drain under this section

7) Explosives
Use of explosive shall not be allowed.

8) Safety
A person carrying on demolition operations should make sure that any building which is Partly demolished (and the site thereof) is so far as is reasonably practicable, properly Secured or closed against entry at all times when demolition operations are not in progress and that the building or structure is left in a safe condition at the close of each days work.
(If this clause is not complied with, action may be taken by PMC as per the Contract clause)

9) Dust
The demolition works should be periodically sprayed with water to reduce the amount of dust and the contractor shall take all reasonable steps to prevent any nuisance occurring.

10) Noise
Noise should be minimized as far as possible by the fitting and use of devices wherever practicable. The stated hours of working and use of equipment may also be determined and got approved

11) Fire and Smoke
No burning will be permitted on site

12) Storage
Gas cylinders and similar containers, whether empty, in use, or spare, should be stored in a safe place since if they become involved in a fire any resulting explosion may cause injury to persons and damage property.

13) Maintenance of Access
Regard should be had to the need to maintain convenient and safe access to the adjacent properties. Accessible public road should be maintain clean and tidy by regular brooming and cleaning by water

14) Demolition Ball
The use of the demolition ball is prohibited.

15) Notice of Commencement
Twenty four hours notice of actual commencement or re-commencement should be given to PMC.

16) Completion of Work and Site Treatment
On completion of demolition, the site shall be cleared, levelled (fenced when necessary) to the

satisfaction of PMC

17) Trees;
Existing trees shall be protected as per the instruction.

18) Working Hours: Working hours shall be 8.00 am to 6 pm. However, working hours shall be approved considering site constraint. The Contractor shall ensure that noise is not generated outside approved working hours.

19) Foundation
Where grubbing out foundations or reducing to new levels adjacent to existing buildings not being demolished, care must be taken to ensure that the support to the remaining foundations or land is not disturbed.

20) Operatives and Supervisor
All operatives engaged in demolition and supervision should be technically competent and adequately trained and familiar with the guidance and Code of Practice for demolition and their responsibilities under the Health and Safety at Work Act 1974.

21) Site Plan
Site Plan showing location and the extent of work of demolition shall be provided. Work shall be carried out in accordance with the drawings.

22) Disposal
Rate quoted by the contractor cover handling, transportation and disposal of entire debris generated by demolition work. All debris removed and drive out from the Site premises shall be the property of the Contractor.

23) Joinery & Fixtures: The Contractor shall stack in proper order at indicated area, all joinery, fixtures and useable material removed from the buildings to be demolished. The rate quoted for demolition shall cover this work and no separate payment shall be made for such work.

SITE CLEARING AND GRUBBING

1 Uprooting and leveling
Bush clearance shall comprise uprooting of vegetation grass, brushwood shrubs, stumps, and trees. The roots of the trees and saplings shall be removed to a depth 60cm below ground level or 30cm below the formation level. All holes and hollows so formed due to removing of roots shall be filled up with earth rammed and leveled. Trees, posts, poles, stumps, other minor structures etc. within or adjacent to the Site which are not required to disturb during jungle clearance shall be properly protected by the Contractor at his own cost. Nothing extra shall be payable. Site cleaning and uprooting of trees etc. shall be for area of construction up to 25mts. Beyond the external edge of the building to ensure prevention of any growth of up-rooted vegetation.

2 Stacking / Disposal
All useful material obtained from the Site cleaning and grubbing operation shall be stacked in the manner as directed by Engineer-in-Charge. This material shall be property of the Employer. All useless material shall be disposed at a place indicated by Engineer-in-Charge.

SECTION – B
EARTHWORK & METAL PACKING AND SUBSURFACE DRAINAGE

B.1 Excavation for all works and of materials required for filling shall be to the exact width, length and depth shown on the drawings or as directed by the Engineer. If excavation is carried out to greater width, length, depth than required, the Contractor shall make good, at his own cost, the extra depth by sound masonry or concrete filling and extra length or width filled in by well consolidated earth or if the Engineer thinks it necessary for the stability of the work, by masonry or concrete as he may direct.

B.2 Excavation material required for filling shall be stacked or dumped where indicated by the Engineer. Excavated material not required for filling and any surplus material shall be removed and spread on the site anywhere within the premises and as directed by the Engineer or carted away from the site as directed by the Engineer. Dumping of this surplus material shall be in an orderly manner and according to the levels/grades as indicated by the Engineer. The cost of such removal and spreading shall be borne by the Contractor and held to be included in the Contract Rates.

B.3 The Contractor shall, at the contract rates make provision for all shoring, pumping, dredging, bailing out or draining water whether subsoil or rain or other water and the excavation shall be kept free of water while the masonry work or concrete work is in progress and until the Engineer considers the work well set (Refer IS:3764 Safety Code for Excavation Work). The sides of trenches shall be kept vertical and the bottom horizontal and shall be run level throughout or properly stepped as directed by the Engineer. The Contractor shall erect and maintain during progress of works temporary fences around dangerous excavations.

B.4 Excavation in ordinary soil means excavation in ordinary hard soil including stiff heavy clay, hard shale, or compact soil or any material, which can be removed by the ordinary application of spades, shovels, picks and pick axes. This shall also include removal of isolated boulders each having a volume not more than 0.50 cu.m.

B.5 Excavation in soft rock includes limestone, sandstone, laterite, etc. or other rock which can be quarried or by mechanical equipment like JCB, Poclain, or compressed air equipment like breaker, etc. This shall also include excavation of tarred pavements, masonry work and rock boulders each having a volume of not more than 0.75 cu.m.

B.6 Excavation in hard rock includes any rock bound in ledges or masses in its original form or cement concrete, excavation of which in the opinion of the Engineer requires the use of compressed air, equipment, chiseling sledge hammer and blasting or any other method. Blasting shall be carried out through authorized agencies and all statutory laws, regulations shall be observed.

B.7 Excavation in marshy soil include soils like soft clays and peats excavated below the original ground level of marshes and swamps and soils excavated from other areas requiring continuous pumping or bailing out of water.

B.8 In case of any difficulty concerning the interpretation of Clauses B.4, B.5, B.6 and B.7 above, the Engineer shall decide whether the excavation in a particular material is in ordinary soil, soft rock or hard rock and his decision in this matter shall be final and binding on the Contractor and without appeal. Merely the use of higher category equipment on explosive in excavation will not be considered as a reason for higher classification unless same are clearly

necessary in the opinion of the Engineer.

B.9 The foundation trenches shall be inspected and passed by the Engineer before concrete or masonry work is commenced and the Contractor shall hold an order in writing to this effect, otherwise the Contractor shall be liable to have this work removed for inspection.

B.10 The earth for backfilling in foundation and plinth shall be got approved by the Engineer. In the foundation the backfilling shall be done in layers not more than 200mm thick and shall be thoroughly watered and consolidated by approved method. The rate for backfilling in foundation is deemed to have been included in the excavation rate.

B.11 The backfilling in plinth and other places which are required for leveling shall be done in layers not more than 300 mm thick except minimum of top three layers shall be done in layers not more than 150 mm thick. Each layer shall be watered and thoroughly consolidated by power driven roller/pan vibrator/vibratory roller of approved capacity. The process shall be repeated till the required level is achieved. After the backfilling is completed the surface shall be uniformly dressed and leveled.
For large area or for deep filling or instructed by Engineer, the degree of compaction for filling will be measured as follows:

Top layer of filling 98% modified Proctor Dry density at OMC
Lower two layers below top layer 95% modified

Treatment of Soil Surrounding Pipes, Waste and Conduits Special care shall be taken at the points where pipes and conduits enter the building and the soil shall be treated for a distance of 150 mm and a depth of 75 mm at the point where they enter the building.

B.14 Measurements :
Measurements of excavation shall be solid measurements or actual volume of the materials prior to its removal. Measurements shall be of the exact length, width as indicated in the drawings and depth, measured vertically according to the Engineer's drawing or his instruction.
The measurement for backfilling shall be based on actual difference of levels before filling and after leveling.
The rate for metal packing shall be based on final compacted thickness and shall include all labour, materials and the cost of rolling with road roller or other equivalent method to obtain full compaction, application of screening, watering etc. complete. It shall be measured in square meters.

SECTION – C :
MASONRY WORK BRICKWORK

C.1 Flyash Bricks :

i. All bricks used on the works shall be pulvarized fly ash bricks of class designation having minimum crushing strength of 40 kg/cm2 and shall conform to IS:12894 latest. The size required for the works is 230x110x80mm. All bricks shall be uniform in quality and size. The bricks shall be got tested as per IS:3495 latest at the contractor's cost.
ii. Bricks shall be unloaded by hand and carefully stacked and all broken bricks shall be removed from site.
iii. All bricks shall be subject to inspection on the site and shall be to the approval of the

Engineer who may reject such consignments as are considered by him to be inferior to the quality specified.

C.2 Mortar :

1 All mortar shall be prepared in accordance with IS:2250 latest. The sand used shall conform to IS:2116 latest and the water shall conform to relevant clauses of Section B (Concrete) of this specification. Restamping of set mortar will not be permitted.

2 Unless otherwise specified in the Schedule of Quantities, the cement mortar proportion shall be as follows :

For Fly ash Brick

i) 115 thk brickwork 1:4

(ii) 230 thk brickwork 1:5

C.3 Construction :

i. All masonry work shall comply with the requirements of IS:2212 latest. It shall be of English bond. All closure bricks, etc necessary to comply with the requirements of the bond specified or to break joints effectively shall be procured by the Contractor and used for the work.

ii. Ordinarily there shall be four courses per 0.3m height or in other words, the horizontal bed joints shall be on average 10mm thick, and the vertical joints 6mm wide. The mortar shall be worked up to all joints and no hollow space shall be left in any portion of the work. All joints shall be laid truly horizontal and all vertical joints shall be truly vertical. Masonry work shall be raised in a uniform manner so that no one portion is being raised more than 1.0m above another portion at one time.

iii. For half brickwalls (115mm thk) which exceed 2.0m in height, a reinforced concrete band 75mm thick (concrete band M-15/10) shall be provided at intervals not exceeding 1.5m. The reinforcement in these bands shall consist of 2 Nos 6mm mild steel rounders with 3mm binders spaced at 150mm centres. Such band shall also be provided at the free edge of all masonry work including window sills and top of free standing walls.

iv. All bricks shall be thoroughly soaked by keeping them under water for at least 12 hours before use; the practice of dipping bricks in water just before use will not be allowed. All necessary water cisterns for this purpose shall be constructed or tubs brought by the contractor to the satisfaction of the Engineer to ensure proper soaking of bricks.

v. No bats or broken bricks are to be used otherwise than as closures. No under burnt or over burnt bricks shall be used.

C.4 Fixtures:

Fixtures, plugs, frames for doors and windows, etc shall be placed in position while laying the course and not later by removing bricks/blocks already laid.

C.5 Scaffolding :

Scaffolding consisting of timber ballies, bamboos or steel tubular scaffolding adequately braced to resist all construction loads shall be provided as required by the working stages. Any holes made in the walls for tying the scaffolding shall be made good by filling solidly with M-

10/10 grade concrete.

C.6 Watering :

The brickwork shall be kept wet for a period of at least 14 days after laying. The mortar shall not be allowed to dry at any time. For blockwork the walls shall not be allowed to become excessively wet.

C.7 Joints :

i. All unfinished work shall be raked back in courses, unless otherwise directed. When new work is to be joined to unfinished work, the surface of the unfinished work shall be cleaned and thoroughly wetted.

ii. The finished work shall be true in line and level. All uneven irregular and disturbed brickwork shall be pulled down and rebuilt with fresh brickwork at the contractor's expense.

iii. Joints in brickwork shall be well raked out. Raking out of each day's work shall be done on the same day.

iv. Masonry work shall not be raised by more than 8 single courses per day.

C.8 Tolerances :

The permissible tolerance in brickwork shall be as follows :

Sr No	Description	Tolerances
1	Deviation from position shown on plan of any brickwork more than one storey in height	10 mm
2	Deviation from vertical within a storey	5 mm per 3m height
3	Deviation from vertical in total height of building	10 mm
4	Relative displacement between load bearing walls in adjacent storeys intended to be in vertical alignment	5 mm
5	Deviation from line in plan upto 12.0m	5 mm
	In any length over 12.0m	10 mm
6	Deviation of bed joint from horizontal	
	In any length upto 12.0m	5 mm
	In any length over 12.0m	10 mm

RUBBLE MASONRY & RUBBLE SOLING

C.9 The Stone for the works except where otherwise described shall be of the best quality procurable complying with IS:1805 latest. No stone with flaws, or traversed with seams of perishable materials or quarry faced, or otherwise in any way defective shall be allowed to be used and the Engineer may reject and refuse to permit the use of any stone which, in his opinion, is unfit for the work.

C.10 Stone masonry, wherever required, shall conform to the requirements of IS:1597 latest and shall be composed generally of large stone weighing about 25 kgs. The face stones to be squared on all joints and beds shall be hammered and chisel dressed, true and square for at least 75mm back from the face, and the joints for at least 40mm (IS:1127 latest and IS:1129). The face of the stone is to be hammer dressed and "bushing" shall not project more than 40mm. The stone shall be clean flat bedded properly selected for their places and carefully laid with a suitable proportion of smaller stones and chips to fill up the interstices. The mortar including the constituents shall conform to the requirements of IS:2250 latest and IS:1625 latest.

C.11 The whole masonry shall be hand set and solidly bedded in and surrounded with mortar on every side except the face. There shall be no hollows or dry portions in work nor pinning in the face and no joint shall be more than 10mm. The face stone shall be flat bedded, shall tail back and be bound well into the body of the wall and shall not be of a height greater than either the breadth on face or length of the tail. Through stones covering the whole width or thickness of the walls, or 600mm long where the walls are thicker than 600mm, shall be inserted at every 1000mm measured horizontally and vertically. The rate for stone masonry shall include the extra cost of the through stones. The faces of the walls shall be strictly straight. The masonry shall be shaded from the sun, and kept wet for not less than 14 days after completion.

C.12 All fixtures, plugs, frames shall be placed securely as the work proceeds and not after completion of the masonry. Iron holdfasts shall be given a coating of bitumen to avoid rusting.
C.13 Scaffolding as described in clause F.17 above shall be provided as required.

LATERITE STONE MASONRY
The Laterite Stone should be quite hard and all the four sides of the stones should be chiseled properly before use for construction.

C.14 Laterite Stone:

i. All Laterite bricks used on the works shall be building bricks of first class quality having minimum crushing strength of 40 kg/cm2 st. The size required for the works is 230x230x150mm. All bricks shall be uniform in quality and size. The bricks shall be got tested at the contractor's cost.
ii. Bricks shall be unloaded by hand and carefully stacked and all broken bricks shall be removed from site.

All bricks shall be subject to inspection on the site and shall be to the approval of the Engineer who may reject such consignments as are considered by him to be inferior to the quality specified.

C.15 Mortar:

i. All mortar shall be prepared in accordance with IS:2250 latest. The sand used shall conform to IS:2116 latest and the water shall conform to relevant clauses of Section B (Concrete) of this specification. Restamping of set mortar will not be permitted.
ii. Unless otherwise specified in the Schedule of Quantities, the cement mortar proportion shall be as follows :
    (i) 230 mm thk brickwork 1:5 for foundation
    (ii) 230 mm thk brickwork 1:4 for superstructure

C.16 Construction :

i. All masonry work shall comply with the requirements of . All closure bricks, etc necessary to comply with the requirements of the bond specified or to break joints effectively shall be procured by the Contractor and used for the work.
ii. The horizontal bed joints shall be on average 10mm thick, and the vertical joints 6mm wide. The mortar shall be worked up to all joints and no hollow space shall be left in any portion of the work. All joints shall be laid truly horizontal and all vertical joints shall be truly vertical. Masonry work shall be raised in a uniform manner so that no one portion is being raised more than 1.0m above another portion at one time.
iii. No bats or broken bricks are to be used otherwise than as closures. No under burnt or over burnt bricks shall be used.

C.17 Scaffolding :

Scaffolding consisting of timber ballies, bamboos or steel tubular scaffolding adequately braced to resist all construction loads shall be provided as required by the working stages. Any holes made in the walls for tying the scaffolding shall be made good by filling solidly with M-10/10 grade concrete.

C.18 Watering :

The brickwork shall be kept wet for a period of at least 14 days after laying. The mortar shall not be allowed to dry at any time. For block work the walls shall not be allowed to become excessively wet.

C.19 Joints :

i. All unfinished work shall be raked back in courses, unless otherwise directed. When new work is to be joined to unfinished work, the surface of the unfinished work shall be cleaned and thoroughly wetted.

ii. The finished work shall be true in line and level. All uneven irregular and disturbed brickwork shall be pulled down and rebuilt with fresh brickwork at the contractor's expense.

iii. Joints in brickwork shall be well raked out. Raking out of each day's work shall be done on the same day.

iv. Masonry work shall not be raised by more than 8 single courses per day.

C.20 Tolerances :The permissible tolerance in brickwork shall be as follows

TOLERANCES

Sr No	Description	Tolerances
1	Deviation from position shown on plan of any brickwork more than one storey in height	10 mm
2	Deviation from vertical within a storey	5 mm per 3m height
3	Deviation from vertical in total height of building	10 mm
4	Relative displacement between load bearing walls in adjacent storeys intended to be in vertical alignment	5 mm
5	Deviation from line in plan upto 12.0m	5 mm
	In any length over 12.0m	10 mm
6	Deviation of bed joint from horizontal	
	In any length upto 12.0m	5 mm
	In any length over 12.0m	10 mm

SECTION – D
CONCRETE : PLAIN & REINFORCED

D.1 Cement :

The Cement used shall be any of the following in which the fly ash constituent shall be 30 percent by mass of cement with the prior approval of the Engineer:

1	Portland Pozzolana Cement	IS: 1489 (Part 1) amendment no. 3 - July 2000

2	Ordinary Portland Cement	IS:269
3	Rapid hardening Portland Cement	IS:8041
4	Portland Slag Cement	IS:455
5	High Strength Ordinary Cement (Grade 53)	IS:8112
6	Hydrophobic Cement	IS:8043
7	Ordinary Portland Cement	IS:12269
8	High Sulphate resisting Cement	IS:4027-1980

Use :Cement shall be used in the order in which it is received. Cement in bags in storage for more than 3 months shall be retested before use.

Testing :A sample taken once for every 1000 bags shall be tested. Tests shall be carried out for fineness, initial and final setting time, and compressive strength (IS:4031) and the results approved by the Engineer before use of the cement in permanent works. Samples shall be taken immediately on receipt of cement at site. The methods and procedure of sampling shall be in accordance with IS:3535. The Engineer may specify other forms of sampling and tests including chemical analysis, (IS:4032) if in his opinion the cement is of doubtful quality; the costs of such additional tests shall be borne by the Contractor.

D.2 Fine Aggregates (Sand) :

i. 1 It shall be river or pit sand conforming to IS:383, obtained from sources approved by the Engineer. If permitted by the Engineer, crushed stone sand produced from stones, suitable for concrete aggregates, and manufactured in special sand producing crushers such as impactors, hammer mills and processed through stone on stone, vertical shaft crushers such as Barmac / Svedala for particle shaping and excess fines removed by suitable dust extractors. The particle shape shall be nearly cubical. If crushed stone sand contains high percentage of fines, the sand will be separated in two fractions viz 0 – 2.36 mm and 2.36 - 4.75 mm size. These two fractions will be suitably blended to obtain desired grading of sand. In case of crushed stone sand the fines i.e. (-) 0.15 mm shall be less than 5 %. The crushed stone sand shall be tested for flow time and voids as per ASTM 1252, and if found suitable shall only be used. The sand shall not contain silt more than a total of 2% by weight and shale, clay, silt and other structurally weak particles a total of 5%.

ii. If considered by the Engineer as necessary, the sand shall be washed in screw type mechanical washers in potable water to remove silt, clay and chlorides. This shall be done at least one day before using it in concrete. The washed sand shall be stored on a sloping concrete platform and in such a manner as to avoid contamination. Such sand washing, storing, etc. shall be at the Contractor‟s cost.

iii. If grading of fine aggregates can be improved by mixing two sands, the Engineer may at his discretion specify such mixing, and may permit the use of crushed sand as one of the two sands forming the mixture. The provision of two types of sand and their mixing in the specified proportions shall be at the Contractor's cost.

iv. The sand shall be screened on 4.75 mm size screen to eliminate over size particles. The cost of screening is deemed to be included in Contractor‟s rates.

v. The aggregate shall be subjected to tests in accordance with IS 2386 as may be ordered by the Engineer.

D.3 Coarse Aggregates:

i. Coarse aggregates for the Works shall be river gravel or crushed stone conforming to

IS:383, obtained from sources approved by the Engineer. Aggregates shall be properly screened and if necessary washed clean before use.

ii. Coarse aggregates containing flat or flaky pieces or mica shall be rejected.

iii. Coarse aggregates shall be supplied in the following sizes :

Nominal size	Maximum size	Minimum size
10mm	12mm	5mm
0mm	25mm	10mm
40mm	40mm	20mm

iv. The aggregates shall be subjected to tests in accordance with IS 2386 as may be ordered by the Engineer.

v. Aggregate shall be stored in such a way as to prevent segregation of sizes and avoid contamination with fines.

D.4 Mixers and Vibrators :

i. If specified in the schedule of items, for all structural concreting work the Contractor shall provide automatic weigh-batching plant of suitable capacity. The plant used shall conform to IS:4925.

ii. The Contractor shall provide concrete mixers (IS:1791 - Batch type concrete mixers, IS:2439 - Roller Pan Mixer) and vibrators (IS:2505 - Concrete Vibrators Immersion Type, IS:2506 - Screed board concrete vibrators, IS:4656 - Form Vibrators for Concrete) supplied by recognised manufacturers.

D.5 Grade of Concrete :

The concrete is designated as follows : Concrete M30/ 20

- The letter M refers to the mix
- The number 30 represents the characteristic compressive strength of 15cm cubes at 28 days in MPa (Mega Pascals : 1 MPa : 10 kg/cm2 approximately). M30 concrete thus has a characteristic strength of 300 kg/cm2.
- The number /20 represents the maximum nominal size of aggregate in the mix, in this case 20mm.

D.6 Minimum Cement Content :

For all structural concrete work, minimum cement content shall not be less than 320 kg/m3 of concrete for durability considerations.

D.7 Trial mixes :

i. The Contractor is entirely responsible for the design of the concrete mixes. The design is however to be approved by the Engineer at least 4 weeks before commencing any concreting in the Works, the Contractor shall make trial mixes using samples of coarse aggregates, sand, water and cement, typical of those to be used in the Works, and which have been tested in an approved laboratory. A clean dry mixer shall be used and the first

batch discarded.

ii. For each grade a total of 18 cubes shall be made. Of these 18 cubes made not more than 6 may be made on any day and further, of the 6 cubes made in one day not more than 2 cubes may be made from any single batch. 9 of these cubes, each representing a different batch of concrete shall be tested at the age of 7 days and the remaining 9 cubes shall be tested at the age of 28 days. The making of the cubes, their curing, storing, transporting and testing shall be in accordance with Indian Standards IS: 516. The test shall be carried out in a laboratory approved by the Engineer.

iii. If the average strength of the concrete cubes falls below the required strength fresh preliminary mixes for that grade shall be made as before, until the trial mixes yield cubes of compressive strength at 28 days greater than the required average strength at that age.

iv. Whenever there is a significant change in the quality of any of the ingredients for concrete, the Engineer may at his discretion order the carrying out of fresh trial mixes. All costs for trial mixes and tests shall be to the Contractor's account and held to be included in the contract rates.

v. Before commencing the Works the Contractors shall submit to the Engineer, for approval full details of all preliminary trial mixes and tests.

vi. When the proportions of a concrete mix have been approved by the Engineer, the Contractor shall not vary the quality or source of the materials or the mix without the written approval of the Engineer.

D.8 Concrete Cube Tests :

The quality of hardened concrete will be verified by the following procedure :

i. The Engineer shall select random batches of concrete for examination without warning the Contractor and sampling will generally be done at the point of discharge from the mixer.

ii. From the batches thus selected 6 concrete cubes shall be made in accordance with Indian Standards. However not more than 2 cubes may be made from any single batch. Of these 6 cubes thus made 3 cubes (each cube representing concrete of different batches) shall be tested at 7 days and the remaining 3 cubes shall be tested at 28 days.

iii. All cubes shall be made, cured, stored, transported and tested in accordance with Indian Standards. The tests shall be carried out in a laboratory approved by the Engineer.

iv. At least 6 cubes shall be made on each day's concreting until 60 cubes have been made for each grade of concrete. This is the initial period.

v. After the initial period, subject to the acceptance of the Engineer, the frequency at which the cubes shall be made may be reduced as follows :
(1 set = 6 cubes, each pair of cubes representing concrete from a different batch.)

At least 1 set for each day's concreting consisting of :

a. 1 set for every 10 m3 or part thereof of concrete for critical structural elements like columns, masts, larger cantilever, plus.
b. 1 set for every 40 m3 or part thereof for all other elements.

If concrete is batched at more than one point simultaneously the above frequency of making cubes shall be followed at each point of batching. 3 of the cubes of each set shall be tested at 7 days and the remaining 3 cubes shall be tested at 28 days from the day of casting the cubes.

D.9 Permeability Test :

The concrete will be verified for permeability by the following procedure and shall

confirm to IS:3085-1965 – „Permeability of Cement Mortar & Concrete".

D.10 Mix Design:
It is the complete responsibility of the Contractor to design the concrete mixes by approved standard methods and to produce the required concrete conforming to the specifications and the strength requirements approved by the Engineer. It is expected that the Contractor will have competent staff to carry out this work.

D.11 Failure to meet specified Requirements:
If from the cube test results it appears that some portion of the Works has not attained the required strength, the Engineer may order that portion of the structure be subjected to further testing of any kind whatsoever as desired by the Engineer, including, if so desired by him, full load testing of the suspected as well as adjacent portions; of the structure as specified in the Conditions of Contract. Such testing shall be at the Contractor's cost. The Engineer may also reject the work and order its demolition and reconstruction at the Contractor's cost.
If the strength of concrete in any portion of the structure is lower than the required strength, but is considered nevertheless adequate by the Engineer so that demolition is not necessary, the
Contractor shall be paid a lower rate for such lower strength concrete as determined by the Engineer.

D.13 Site Testing:
As frequently as the Engineer may require, testing shall be carried out in the field for:

1. Moisture content, absorption and density of sand and aggregates
2. Silt content of sand
3. Grading of sand and aggregates
4. Slump test of concrete
5. Concrete cube test
6. Permeability test for concrete as per IS:3085-1965
7. Density and pH value of Plasticizer

The Contractor shall provide and maintain at all times, until the Works are completed, equipment and staff required for carrying out these tests. The Contractor shall grant the Engineer or his representative full access to this laboratory at all times and shall produce on demand complete records of all tests carried out on site.
Before concreting commences on any section of the Works the Contractor shall obtain approval of the Engineer or his representative as regards the form and reinforcement conforming to the drawings. He shall also indicate to the Engineer in writing and obtain his approval for positions of construction joints. The Engineer or his representative's approval shall not relieve the Contractor of any of his obligations to comply with the provisions of this specification or contract.

D.14 Admixtures :
Approved admixtures and air entraining agents may be permitted by the Engineer at his discretion provided that the strength requirements are not affected by their use. Any cement saving due to their use will be to the benefit of the Contractor. The admixture will not be paid for separately.
D.15 Volume Batching with Weight Control :
Where volume batching with weight control is specified by the Engineer, all measurements of coarse aggregates and water shall be by volume and of cement by the bag, controlled by regular periodic weighings. In order to ensure correct proportioning the following precautions shall be

taken:

i. The Contractor shall provide the mixer operator with standard measures for measuring the water to be used in the mix.
ii. The quantity of water to be added to the mix shall be approved by the Engineer or his representative and may be adjusted by them as frequently as necessary in order to allow for the moisture content of the sand or coarse aggregate and workability desired. On no account shall the Contractor allow more water to be added to the mix than that specified by the Engineer or his representative. Concrete containing water in excess of that specified shall be rejected and not allowed for use in the Works.
iii. Sand and coarse aggregates shall be measured by volume. The size of measuring boxes or the depth to which they are filled or both shall be adjusted to obtain the correct weight of each material specified by the Engineer for that mix.
iv. Every fifth or tenth measuring box of sand or of coarse aggregate shall be weighed on the balance to ensure that filling of boxes is being uniformly done. Adjustment shall be made from time to time in the amount of each box filled to take into account variations in moisture content and consequent bulking of sand.
v. More frequent weighing of boxes, particularly of sand if found to vary considerably in moisture content and bulking, may be required by the Engineer and shall be done by the Contractor without additional cost.

D.16 Weigh Batching:
All structural concrete shall be weigh batched. All concrete ingredients except shall be batched by weight using a weigh batcher of an approved make (IS: 2722 - Portable swing weigh batchers for concrete). Batching shall be to an accuracy of not less than 1/2 kg and the batcher shall be tested for accuracy of calibration before commencement of the Works and at least once a week thereafter or more frequently if so required by the Engineer.

D.17 Water shall be batched by weight or by volume measures as approved by the Engineer. The method of batching shall be such as will ensure accuracy to 0.5 litres or better.

D.18 Placing temperatures:
During extreme hot or cold weather, the concreting shall be done as per procedures set out in IS:7861, Parts I & II. Fine and coarse aggregates for concreting shall be kept shaded and the concrete aggregates sprinkled with water for a sufficient time before concreting in order to ensure that the temperature of these ingredients is as low as possible prior to batching. The mixer and batching equipment shall be also shaded and if necessary painted white in order to keep their temperatures as low as possible. The placing temperature of concrete shall be as low as possible in warm weather and care shall be taken to protect freshly placed concrete from overheating by sunlight in the first few hours of its laying. The time of day selected for concreting shall also be chosen so as to minimise placing temperatures. In case of concreting in exceptionally hot weather the Engineer may in his discretion specify the use of ice either flaked and used directly in the mix or blocks used for chilling the mixing water. In either case, the Contractor shall be paid only the cost of such ice delivered on site and nothing extra for additional labour involved in weighing and mixing.

D.19 Transporting, placing, compacting and curing :
Transporting, placing, compacting and curing of concrete shall be in accordance with IS:456.

Transporting :
The mix after discharging from the mixer shall be transported by wheel barrows, buckets, pimps etc.

without causing segregation and loss of cement slurry and without altering its desired properties with regard to water cement ratio, slump, air content, cohesion and homogeneity. It should be ensured that the concrete is moved to its final destination before it attains an initial set.

Placing :

The height of any single lift of concrete shall not exceed 1.5m for walls or 3.0m for columns. The thickness of horizontal layers shall not exceed 300mm. High velocity discharge of concrete causing segregation of mix shall be avoided. The concrete shall be placed in the forms gently and not dropped from a height exceeding 1.5m except in columns where the maximum allowed will be 2.0m. Each layer of concrete shall be compacted fully before the succeeding layer is placed and separate batches shall follow each other so closely that the succeeding layer shall be placed and fully compacted before the layer immediately below has taken initial set. The method of placing shall also be such as to prevent segregation.

Concreting of any portion or section of the work shall be carried out in one continuous operation and no interruption of concreting work will be allowed without approval of the Engineer.

Compaction :

Internal (needle) and surface (screed board) vibrators of approved make shall be used for compaction of concrete. Internal vibrators shall be used for compaction of concrete in foundations, columns, buttresses arch section etc. For sections such as slabs, the concrete shall be compacted by surface type vibrators. Depending on the thickness of layer to be compacted, 25 mm, 40 mm, and 60 mm dia internal vibrators will be used. The concrete shall be compacted by use of appropriate diameter vibrator by holding the vibrator in position until:

Air bubbles cease to come to surface.

Resumption of steady frequency of vibrator after the initial short period of drop in the frequency, when the vibrator is first inserted.

The tone of the vibrated concrete becomes uniform.

Flattened, glistening surface, with coarse aggregates particles blended into it appears on the surface.

After the compaction is completed, the vibrator should be withdrawn slowly from the concrete so that concrete can flow in to the space previously occupied by the vibrator. To avoid segregation during vibration the vibrator shall not be dragged through the concrete nor used to spread the concrete. The vibrator shall be made to penetrate, into the layer of fresh concrete below if any for a depth of about 150mm. The vibrator shall be made to operate at a regular pattern of spacing. The effective radii of action will overlap approximately half a radius to ensure complete compaction.

To secure even and dense surfaces free from aggregate pockets, vibration shall be supplemented by tamping or rodding by hand in the corners of forms and along the form surfaces while the concrete is plastic.

vi) A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate vibration in case of breakdown of those in use.

vii) Form vibrators whenever used shall be clamped to the sides of formwork and shall not be fixed more than 450 mm above the base of the new formwork and concrete shall be filled not higher than 230mm above the vibrator. The formwork must be made specially strong and

watertight where this type of vibrator is used. Care must be taken to guard against over vibration especially where the workability of the concrete mix is high since this will encourage segregation of the concrete.

viii) Plain concrete in foundations shall be placed in direct contact with the bottom of the excavation, the concrete being deposited in such a manner as not to be fixed with the earth. Plain concrete also shall be vibrated to achieve full compaction.

4. Concrete placed below the ground shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances shall be kept free from contact with such ground and with water draining there from during placing and for a period of seven days or as otherwise instructed thereafter. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, abrasion, vibrations, deleterious ground water, mixing with earth or other materials, and other influences that may impair the strength and durability of the concrete.

D.20 Construction Joints :

Construction joints in all concrete work shall be made as directed by the Engineer. Where vertical joints are required, these shall be shuttered as directed and not allowed to take the natural slope of the concrete.

Before fresh concrete is placed against a vertical joint, the old concrete shall be chipped, cleaned and moistened. Where required, suitable expansion joints shall also be provided as directed by the Engineer.

No separate payment shall be allowed to the Contractor for forming joints or chipping and cleaning them. When a horizontal construction joint is formed, provision shall be made for interlocking with the succeeding layer by the embedment of saturated wooden blocks or strips beveled on four sides to facilitate their removal. Prior to the next pour the wooden pieces shall be loosened and removed in such a manner as to avoid injury to the concrete.

Construction joints in concrete walls and slabs for liquid retaining structures shall be prepared in a similar manner to normal construction joints and metal, rubber or plastic water stops shall be cast into joints. Measures shall be taken by the Contractor to ensure that no displacement or distortion of water stops takes place during placing of concrete.

D.21 Cracks:

If cracks, which in the opinion of the Engineer may be detrimental to the strength of the construction, develop in concrete construction, the Contractor at his own expense shall test the slab or other construction as specified in Special Conditions. If under such test loads the cracks develop further, the Contractor shall dismantle the construction, carry away the debris, replace the construction and carry out all consequential work thereto.

If any cracks develop in the concrete construction, which in the opinion of the Engineer, are not detrimental to the stability of the construction, the Contractor at his own expense shall grout the cracks with neat cement grout and also at his own expense and risk shall make good to the satisfaction of the Engineer all other building works such as plaster, moulding, surface finish of floors, roofs, ceilings, etD. which in the opinion of the Engineer have suffered damage either in appearance or stability owing to such cracks. The Engineer's decision as to the extent of the liability of the Contractor in the above matter shall be final and binding.

D.22 Defective Concrete:

Should any concrete be found honeycombed or in any way defective, such concrete shall on the instruction of the Engineer be cut out by the Contractor and made good at his own expense.

D.23 Exposed Faces, Holes and Fixtures:

On no account shall concrete surfaces be patched or covered up or damaged concrete rectified or replaced until the Engineer or his representative has inspected the works and issued written instructions for rectification. Failure to observe this procedure will render that portion of the works liable to rejection; in which case it will be treated as rejection which has failed to meet specified strength requirements and dealt with according to Clause D.11.

Holes for foundation or other bolts or for any other purposes shall be moulded, and steel angles, holdfasts or other fixtures shall be embedded, according to the drawing or as instructed by the Engineer.

D.24 Finishes:

Unless otherwise instructed the face of exposed concrete placed against formwork shall be rubbed down immediately on removal of the formwork to remove irregularities. The face of concrete for which formwork is not provided other than slabs shall be smoothed with a float to give a finish equal to that of the rubbed down face, where formwork is provided. The top face of a slab which is not intended to be covered with other materials shall be levelled and floated to a smooth finish at the levels or falls shown on the drawings or as directed. The floating shall be done so as not to bring an excess of mortar to the surface of the concrete. The top face of a slab intended to be surfaced with other material shall be left with a spaded finish. Faces of concrete intended to be plastered shall be roughened by approved means to form of a key.

D.25 Other applicable codes of practice for in-situ reinforced construction:

All other requirements not covered by the above clauses shall be governed by relevant clauses of IS 456, IS 3370, IS 2571 and other relevant standards as may be applicable.

D.27 Grouting of base plates & bolt holes:

i Mixing :

Dry grout should be mixed in a mechanical mixer: the conventional 200/400-litre capacity concrete mixer can be used to mix four bags of dry grout; alternatively, paddle type mortar mixers can be used. The quantity of grout to be mixed at one time should not exceed that amount which can be placed in approximately 10 to 15 minutes.

ii Batching :

Batching of grout by fraction of a bag is not allowed. The quantity of mixing water should be the minimum commensurate with workability, compaction, and filling of the grout in all corners and crevices. Mixing should be done for a minimum of three minutes to obtain a fluid grout of uniform consistency.

iii Cleaning and preparation of the surface:

The base concrete should be clean and strong, and its surface should be properly hacked; all dust should be removed suction or compressed air. The surface should be thoroughly wetted with water for several hours. Before the grout is poured, all free water should be removed and the flat surfaces coated with a thin cement slurry.

iv Restraint :

Heavy back-up blocks of timber or concrete should be fixed on all sided of the base plate to prevent escape of the grout, when poured through the openings provided in the base plate. Adequate restraint must be ensured on all the sides for a period of 7 days to obtain effective expansion and shrinkage compensation.

v Curing :

The grout should not dry out where external restraint is provided in the form of form-work, the top opening and all stray openings should be covered with wet sack for at least 7 days.

vi Placing and compaction :

The grout should be placed quickly and continuously either through the holes in the base plates or from one side only to ensure complete filling without entrapment of air. Grout should be properly spread and compacted by rodding. Excessive vibration should be avoided.

Below the bed plates the grout should be compacted using long pieces of doubled-over flexible steel strapping or chains. The forward and backward movement of the strap or chain will assist in the flow of the grout into place. Steps must be taken to keep the grout in full contact with the underside of the bed plate until the grout sets; maintaining a small head of fresh grout in the forms.

vii Shrinkage Compensated Grout:

Shrinkage compensated grout of Associated Cement Companies Limited or any other approved manufacturer should be used. The batching shall be as per the manufacturer's specifications, other procedures being as above.

D.28 Precast Concrete :

The provision in this section shall be considered supplementary to general provisions for reinforced concrete works.

Handling Storage :

The precast units shall be stored as directed by the Engineer. The area intended for the storage of precast units should be surfaced in such a way that no unequal settlement can occur.

To prevent deformation of slender units, they should be provided with supports at fairly close intervals and should also be safeguarded against tilting. Lifting and handling positions should conform to the Engineer's directions and drawings. In addition, location and orientation marks should be put on the members, as and where necessary. During erection the precast units should be protected against damage caused by local crushing and chafing effects of lifting and transport equipment.

Tolerances :

The following tolerances apply to finished precast products at the time of placement in the structure. The forms must be constructed to give a casting well within these limits :

1 Overall dimensions of members should not vary more than
+ 6 mm per 3 m length with a maximum variation of + 20mm.

2 Cross-sectional dimensions should not vary more than the following :
+ 3 mm for sections less than 150 mm thick
+ 4 mm for sections over 150 mm & less than 450 mm
+ 6 mm for sections over 450 mm to 1000 mm
+ 10 mm for sections over 1000 mm

3 Deviation from straight line in long sections should not be more than + 6 mm up to 3m, + 10mm for 3m to 6m, + 12mm for 6m to 12m.

D.30 Ready Mix Concrete and Pumping :

i. Ready-mixed concrete may be manufactured in a central automatic weigh Batching

plant and transported to the job in agitating transit mixers.

The maximum size of coarse aggregate shall be limited to one-third of the smallest inside diameter of the hose or pipe used for pumping. Provision shall be made for elimination of over-sized particles by screening or by careful selection of aggregates. To obtain proper gradation it may be necessary to combine and blend certain fractional sizes of aggregates. Uniformity of gradation throughout the entire job shall be maintained. The quantity of coarse aggregate shall be such that the concrete can be pumped, compacted and finished without difficulty.

ii. Fine aggregates :

The gradation of fine aggregate shall be such that 15 to 30 percent should pass the 0.30 mm screen and 5 to 10 percent should pass 0.15 mm screen so as to obtain a pumpable concrete. Sands which are deficient in either of these two sizes should be blended with selected finer sands to produce these desired percentages. With this gradation, sands having a fineness modulus between 2.4 and 2.8 are generally satisfactory. However, for uniformity, the fineness modulus of the sand should not vary more than 0.2 from the average value used in proportioning.

iii. Water, Admixtures and slump :

The amount of water required for proper concrete consistency shall take into account the rate of mixing, length of haul, time of unloading, and ambient temperature conditions.

Additions of water to compensate for slump loss should not be resorted to nor should the design maximum water-cement ratio be exceeded. Additional dose of be retarder be used to compensate the loss of slump at contractor‟s cost. Retempering water shall not be allowed to be added to mixed batches to obtain desired slump.

iv. Transportation :

The method of transportation used should efficiently deliver the concrete to the point of placement without significantly altering its desired properties with regard to water-cement ratio, slump, and homogeneity.

The revolving-drum truck bodies of approved make shall be used for transporting the concrete. The number of revolutions at mixing speeds, during transportation, and prior to discharge shall be specified and agreed upon. Reliable counters shall be used on revolving-drum truck units. Standard mixer uniformity tests, conforming to ASTM standards C 94-69 “Standard Specifications for Ready Mix Concrete”, shall be carried out to determine whether mixing is being accomplished satisfactorily.

v. Pumping of concrete:

Only approved pumping equipment, in good working condition, shall be used for pumping of concrete. Concrete shall be pumped through a combination of rigid pipe and heavy-duty flexible hose of approved size and make. The couplings used to connect both rigid and flexible pipe sections shall be adequate in strength to withstand handling loads during erection of pipe system, misalignment, and poor support along the lines.

They should be nominally rated for at least 3.5 MPa pressure and greater for rising runs over 30 m. Couplings should be designed to allow replacement of any section without moving other pipe sections, and should provide full cross section with no construction or crevices to disrupt the smooth flow of concrete.

All necessary accessories such as curved sections of rigid pipe, swivel joints and rotary distributors, pin and gate valves to prevent backflow in the pipe line, switch valves to direct the flow into another pipe line, connection devices to fill forms from the bottom up, extra strong couplings for vertical runs, transitions for connecting different sizes of pipe, air vents for downhill pumping, clean-out equipment etc, shall be provided as and where required. Suitable power controlled booms or specialized crane shall be used for supporting the pipe line.

vi. Field control:
Sampling at both truck discharge and point of final placement shall be employed to determine if any changes in the slump and other significant mix characteristics occur. However, for determining strength of concrete, cubes shall be taken from the placement end of line.

vii. Planning:
Proper planning of concrete supply, pump locations, line layout, placing sequence, and the entire pumping operation shall be made and got approved. The pump should be as near the placing area as practicable, and the entire surrounding area shall have adequate bearing strength to support concrete delivery pipes. Lines from pump to the placing area should be laid out with a minimum of bends. For large placing areas , alternate lines should be installed for rapid connection when required. Standby power and pumping equipment should be provided to replace initial equipment, should breakdown occur.
The placing rate should be estimated so that concrete can be ordered at an appropriate delivery rate. As a final check, the pump should be started and operated without concrete to be certain that all moving parts are operating properly. A grout mortar should be pumped into the lines to provide lubrication for the concrete, but this mortar shall not be used in the placement. When the form is nearly full, and there is enough concrete in the line to complete the placement, the pump shall be stopped and a go-devil inserted and shall be forced through the line by water under pressure to clean it out. The go-devil should be stopped at a safe distance from the end of the line so that the water in the line will not spill into the placement area. At the end of placing operation, the line shall be cleaned in the reverse direction.

D.31 Measurement:
Concrete, formwork and reinforcement shall be paid separately unless otherwise specified.
The volume of concrete measured shall include that occupied by:

i. Reinforcement and other metal sections.
ii. Cast in components each less than 0.01 m3 in volume.
iii. Rebates fillets or internal splays each less than 0.005 m2 in cross sectional area.
iv. Pockets and holes not exceeding 0.01 m3 in volume.
v. For M-10 concrete no payment shall be made for any shuttering used.
vi. For concrete for flooring on grade or for roadwork no payment shall be made for any shuttering used. Stone metalling however shall be paid separately.
vii. Rates for precast concrete shall include demoulding, handling, storing, transporting and erecting at site, including all clamping, bracing that may be required during erection including erection equipment.

FORM WORK

D.01.1 Definition :
The term "Formwork" or "Shuttering" shall include all forms, moulds, sheeting, shuttering planks, walers, poles, posts, shores, struts and strutting, ties, uprights, wallings, steel rods, bolts, wedges and all other temporary supports to the concrete during the process of setting.

D.01.2 Materials :

i. All facing formwork to come in contact with concrete in different elements of the structure shall be of such material and size as specified on drawings or as instructed by the Engineer.
ii. Timber facing formwork to come in contact with concrete for "Exposed Concrete

Surfaces" shall consist of lap-jointed or tongue and grooved planks as directed by the Engineer and no joint shall permit leakage of mortar at all from cast-in-situ concrete.

iii. The materials for other backing and supporting formwork and their sizes shall be selected by the Contractor and shall be subject to the approval of the Engineer.

D.01.3 Design :

The formwork shall be designed and constructed so that the concrete can be properly placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. It is the responsibility of the Contractor to obtain the results required by the Engineer, whether or not some of the work is sub-contracteD.01. Approval of the proposed formwork by the Engineer will not diminish the Contractor's responsibility for the satisfactory performance of the formwork, nor for the safety and co-ordination of all operations.

D.01.4 Formwork for Exposed Concrete Surfaces

The facing formwork, unless indicated otherwise on drawings, or specifically approved by the Engineer in writing, shall generally be made with materials not less than the thickness mentioned below for different elements of the structure:

i. Plain slab soffits, and sides of beams, girders, joists and ribs and side of walls, fins, parapets, pardis, sun-breakers, etc shall be made with :
   - Steel plates not less than 3mm thick of specified sizes stiffened with a suitable structural framework, fabricated true to plane with a tolerance of +/- 2mm within the plate,
   - Timber planks of 20mm actual thickness and of specified surface finish, width and reasonable length,
   - Plywood plates not less than 12mm thick (IS:4990 - Specification for Plywood for Concrete Shuttering Work) or 3mm thick with a 20mm timber plank backing, of specified sizes stiffened with a suitable timber framework.

ii. Bottoms of beams, girders and ribs, sides of columns shall be made with :
   - Steel plates not less than 5mm thick of specified sizes stiffened with a suitable structural framework, fabricated true to plane with a tolerance of +/- 2mm within the plate,
   - Timber planks of 35mm actual thickness and of specified surface finish, width and reasonable length,
   - Plywood plates not less than 12mm thick, of specified sizes stiffened with a suitable timber framework.

D.01.5 Erection of Formwork :

The following shall apply to all formwork :

i. To avoid delay and unnecessary rejection of the Contractor shall obtain the approval of the Engineer for the design of forms and the type of material used before fabricating the forms. (ref. ACI 347 Formwork for Concrete or equivalent I.S. Code).

ii. All shutter planks and plates shall be adequately backed to the satisfaction of the Engineer by a sufficient number and size of walers or framework to ensure rigidity during concreting. All shutters shall be adequately strutted, braced and propped to the satisfaction of the Engineer to prevent deflection under deadweight of concrete and superimposed live load of workmen, materials and plant, and to withstand vibration. No joints in props shall be allowed.

iii. Vertical props shall be supported on wedges or other measures shall be taken where the props can be gently lowered vertically during removal of the formwork. Props for an upper story shall be placed directly over those in the storey immediately below, and the lowest props shall bear on a sufficiently strong area. Care shall be taken that all

formwork is set plumb and true to line and level or camber or better where required and as specified by the Engineer.

iv. Provision shall be made for adjustment of supporting struts where necessary. When reinforcement passes through the formwork care should be taken to ensure close fitting joints against the steel bars so as to avoid loss of fines during the compaction of concrete.

v. If the formwork is held together by bolts or wires, these shall be so fixed that no iron will be exposed on surfaces against which concrete is to be laid. In any case wires shall not be used with exposed concrete formwork. The Engineer may at his discretion allow the Contractor to use tie-bolts running through the concrete and the Contractor shall decide the location and size of such tie-bolts in consultation with the Engineer. Holes left in the concrete by these tie-bolts shall be filled as specified by the Engineer at no extra cost.

vi. Provision shall be made in the shuttering for beams, columns, and walls for a port hole of convenient size so that all extraneous materials that may be collected could be removed just prior to concreting.

vii. Formwork shall be so arranged as to permit removal of forms without jarring the concrete. Wedges, clamps and bolts shall be used wherever practicable instead of nails.

viii. The formwork for beams and slabs shall be so erected so that forms on the sides of the beams and the soffit of slabs can be removed without disturbing the beam bottoms or props under beams.

ix. Surfaces of forms in contact with concrete shall be oiled with a mould oil of approved quality or clean diesel oil. If required by the Engineer the contractor shall execute different parts of the work with different mould oils to enable the Engineer to select the most suitable. The use of oil which results in blemishes of the surface of the concrete shall not be allowed. Oil shall be applied before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during concreting and the whole time that it is left in place.

x. Immediately before concreting is commenced, the formwork shall be carefully examined to ensure the following :

- Removal of all dirt, shavings, sawdust and other refuse by brushing and washing.
- The tightness of joints between panels of sheathing and between these and any hardened core.
- The correct location of tie bars, bracing and spacers, and especially connections of bracing. That all wedges are secured and firm in position. That provision is made for traffic on formwork not to bear directly on Reinforcing steel.

xi. The Contractor shall obtain the Engineer's approval for dimensional accuracies of the work and for the general arrangement of propping and bracing. (IS:3696 - Safety Code of Scaffolds and Ladders, IS:4014 Steel Tubular Scaffolding I & II) It is imperative that for scaffolding heights of 3.6m and above timber posts or steel scaffolding be used with adequate bracings at several levels in each perpendicular direction connecting each prop. In addition to this diagonal bracing should be provided in elevation ideally at 45 degrees on between 30 and 60 degree. Bracings with bamboos will not be permitted. When timber posts are used the bracings shall consist of minimum 25mm thick wooden planks fixed to each post with at least two nails. The contractor shall be entirely responsible for the adequacy of propping, and for keeping the wedges and other locking arrangements undisturbed through the decentering period. (IS 8989 safety code for erection of concrete framed structures).

xii. Formwork shall be continuously watched during the process of concreting. If during concreting any weakness develops and formwork shows any distress the work shall be stopped and remedial action taken.

D.01.6 Exposed Concrete Work :

Exposed concrete surfaces shall be smooth and even, originally as stripped without any finishing or rendering. Where directed by the Engineer, the surface shall be rubbed with carborundum stone immediately on striking the forms. The Contractor shall exercise special care and supervision of formwork and concreting to ensure that the cast members are made true to their sizes, shapes and positions and to produce the surface patterns desired. No honeycombing shall be allowed. Honeycombed parts of the concrete shall be removed by the Contractor as directed by the Engineer and fresh concrete placed without extra cost, as instructed by the Engineer. All materials, sizes and layouts of formwork including the locations for their joints shall have are prior approval of the Engineer or the Architect.

D.01.7 Camber :

Forms and false work shall be generally cambered as indicated in the drawings or as instructed by the Engineer.

D.01.8 Tolerances :

In accordance with IS:456.

D.01.9 Age of Concrete at Removal of Formwork

In accordance with IS:456.

The Engineer may vary the periods specified in IS: 456 if he considers it necessary. Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush.

D.01.10 Stripping of Formwork:

Formwork shall be removed carefully without jarring the concrete, and curing of the concrete shall be commenced immediately. Concrete surfaces to be exposed shall, where required by the Engineer, be rubbed down with carborundum stone to obtain a smooth and even finish. Where the concrete requires plastering or other finish later the concrete surface shall be immediately hacked lightly all over as directed by the Engineer. No extra charge will be allowed to the Contractor for such work on concrete surfaces after removal of forms.

D.01.12 Reuse of Forms :

The Contractor shall not be permitted reuse of timber facing formwork brought new on the works more than 5 times for exposed concrete formwork and 8 times for ordinary formwork. 5 or 8 uses shall be permitted only if forms are properly cared for, stored and repaired after each use. The Engineer may in his absolute discretion order rejection of any forms he considers unfit for use for a particular item, and order removal from the site of any forms he considers unfit for use in the Works. Used forms brought on the site will be allowed proportionately fewer uses as decided by the Engineer. Use of different quality boards or the use of old and new boards in the same formwork shall not be allowed.

D.01.13 Hacking-Out :

Immediately after removal of forms, the concrete surfaces to be plastered shall be roughened with a bush-hammer or with chisel and hammer as directed by the Engineer to make the surfaces sufficiently coarse and rough to provide a key for plaster.

D.01.15 Measurements :

i. Where formwork is paid for separately, measurements shall be of the area of finally exposed surface requiring shuttering including curves, angles, splays, mitres, bevels, etc. for which no special rate shall be allowed. The rates shall be inclusive of all work

connected with provision of formwork, its erection and removal and treatment of the concrete surface immediately after removal of the formwork.

ii. No extra payment shall be made for holes to be made in formwork for inserting electrical conduits, hooks for fans, for plumbing work.

iii. Where boxes or pockets are required to be formed in the concrete, they will be paid for separately at the Contract Rates, but in measuring the area of concrete surfaces shuttered, no deduction will be made for openings up to 0.4m2. For voids larger than 0.4m2 the surface of formwork forming the voids shall be paid at rates of formwork set out in the Schedule and the area of voids deducted from the face area of shuttering.

iv. No deductions shall be made from formwork of main beams where the secondary beam intersects it. Formwork to secondary beams shall be measured up to sides of the main beams. No deduction shall be made from the formwork to stanchion or column casings at intersections of beam.

v. No payment shall be made for temporary formwork used in concreting, nor for formwork required for joints or bulkheads, in floors, or elsewhere, whether such joints are to be covered later with concrete or mastic or other material.

REINFORCEMENT

D.02.1 Steel :

Steel used in the works shall be either rounds conforming to IS:432, hot rolled deformed bars conforming to IS:1139, could twisted bars conforming to IS:1566 – 1977, or rolled steel made from structural steel conforming to IS:226. Any other steel specified for reinforcement shall conform in every respect to the latest relevant Indian Standard Specifications and shall be of tested quality under the ISI Certification Scheme.

All reinforcement work shall be executed in conformity with the drawings supplied and instructions given by the Engineer and shall generally be carried out in accordance with the relevant Indian Standard Specification (IS:2502). The steel grade Min. shall be TMT Fe500.

The Contractor shall procure TMT bars of Fe500 / Fe550 grade from primary producers such as SAIL or TISCO or RINL as approved by Ministry of Steel.

In case of non-availability of steel from primary producers such as SAIL / TISCO /RINL, the NIT approving authority may permit secondary producers of TMT reinforcement bars provided the secondary producers satisfy the following conditions :

The secondary producers must have valid BIS licence to produce HYSD bars conforming to IS 1786 : 2008. In addition to BIS licence, the secondary producer must have valid licence from either of the firms Tempcore, Thermex, Evcon Turbo & Turbo Quench to produce TMT Bars and shall conform to the specifications as laid by Tempcore, Thermex, Evcon Turbo & Turbo Quench as the case may be.

The TMT bars produced from primary producers shall conform to manufacturer‟s specifications.

TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008 pertaining to FE 500D or Fe 550D grade of steel as specified in the tender.

D.02.2 Inspection & Testing :

Samples shall be taken and got tested by the Engineer as per the provisions in this regard in relevant BIS codes. The test results of the steel arranged and tested by the Contractor shall conform to the specifications as mentioned below:

- The TMT bars procured from Secondary Producers shall conform to the specifications as laid by Tempcore, Thermex, Evcon Turbo & Turbo Quench as the case may be.
- TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008 pertaining to FE 500D or Fe

550D grade of steel as specified in the tender.

- In case the test results does not conform to the above mentioned specifications, the said steel shall stand rejected, and it shall be removed from the site of work by the Contractor at his cost within a week time or written orders from the Engineer to do so.

D.02.3 Lapping & Welding :

i. As far as possible bars of the maximum length available shall be used. Laps shown on drawings or otherwise specified by the Engineer will be based on the use by the Contractor of bars of maximum length. In case the Contractor wishes to use shorter bars, laps shall be provided at the Contractor's cost in the manner and at the locations approved by the Engineer.
ii. As and when necessary welded laps shall be provided as specified by the Engineer.

D.02.4 Spacing, Supporting and Cleaning :

i. All reinforcement shall be placed and maintained in the positions shown on the drawings.
ii. The Contractor shall provide approved types of supports as specified on the drawings for maintaining the top bars of the slab in position during concreting. All cover blocks shall be of concrete (not sand cement mortar) and of the same strength as that of the surrounding concrete and properly compacted. They shall be circular in shape and not square.
iii. Bars must be cleaned before concreting commences of all scale, rust or partially set concrete which may have been deposited there during placing of previous lift of concrete.
iv. The bars shall be cleaned with dry gunny bags if they are coated lightly with rust or other impurities. On no account shall the bars be oiled or painted nor shall mould oil used on the formwork be allowed to come in contact with the bars. Cement wash to bars shall not be permitted.

D.02.5 Welding :

i. Wherever specified all welding shall be carried in accordance with IS:2571. Only qualified welders shall be permitted to carry out such welding.
ii. For cold twisted reinforcement welding operations must be controlled to prevent a supply of large amounts of heat larger than that can be dissipated. The extreme non twisted end portion shall be cut off before welding. Electrodes with rutile coating should be used.
iii. The welding procedure shall be approved by the Engineer and tests shall be made to prove the soundness of the welded connection.

D.02.6 Measurements :

i. The weight of steel to be paid for at the contract rates shall be the weight of bars as mentioned on the drawings or as instructed by the Engineer including stirrups, ties, spacer bars, chairs and any other steel works specified as reinforcement but excluding binding wire and cover blocks. Laps as specified on the drawings shall be paid for. Laps required because of the contractor's use of shorter bars will not be paid for.
ii. The weight of any stirrup, tie bar shall be computed from the dimensions given on the drawings or bending schedules. The weight in kg/metre shall be taken as 0.785 kg/metre per 100mm2 of cross section. The rate shall take into account the rolling margin.

SECTION-E - Interlocking Block Paving Works

- Quality:

The block for the paving works shall be of approved quality and make. The blocks shall be of the specified size, thickness and type.

- Sub-base & Base:

Over the prepared and consolidated subgrade a layer of sub-base using crushed aggregate shall be laid to falls and slopes to a compacted thickness of 100 mm or as per item detail and compacted with C-10 tonne roller. Over the prepared sub-base, a layer of 3 mm and down fine sand shall be laid to a thickness of 50 mm or as per item detail and accurately screed and leveled and compacted to 38 mm in thickness and to required falls and slope to the satisfaction of the Engineer.

- Layers

The block shall be laid on top of the prepared base in required pattern as directed by the Engineer. On completion of the laying work, approved fine screened sand/ cement concrete shall be spread over the paving and the joints filled with fine sand/cement concrete and compacted as directed by the Engineer. When required, edge blocks shall be cut clean and sharp with approved tools and as per manufacturer's instructions. The cut edges shall be rubbed smooth before laying. Compaction with a power vibrating plate (wacker model VPH 70) shall be used suitably as recommended by the approved proprietary manufacturer. Any blocks damaged during laying shall be replaced. The entire work of the installation and materials shall meet the approval of the Engineer.

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

The following Technical Specifications are made applicable for the stated job and shall be rigidly adhered to while supplying and installing the materials at site.

Codes and Standards:
The following Codes and Standards shall be applicable for continuous performance of all electrical equipments to be supplied, delivered at site, erected, tested and commissioned. The Electrical equipments offered shall comply with the relevant Indian Standard Specifications, Fire Insurance Regulations, Tariff Advisory Committee‟s Regulations, and in particular to Indian Electricity Rules in all respects with all its latest amendments up - to - date.
For guidelines to the tenderer, few of the Indian Standards are indicated below:-

IS 8084 / 1976	Interconnecting bus-bars for A.C. voltage above 1 KV up to & including 36 KV.
IS 13032 / 1991	A.C. miniature circuit breaker board for voltage not exceeding 1000V specification.
IS 3043 / 1987	Code of practice for earthing.
IS: 3427 / 1997	A. C. metal enclosed switchgear & control gears for rated voltage above 1KV up to & including 52 KV.
IS 3837 / 1977	Accessories for rigid steel conduits for electrical wiring.
IS 13947 / Part3 / 1993	Specification for low voltage switchgear & control gear.
IS 4615 / 1968	Switch socket outlets (Non – Interlocked type).
IS 5216 / Part1, 2 / 1982	Guide for safety procedure & practices in electric work.
IS 5578 / 1984	Guide for marking of insulated conductors.
IS 5820 / 1970	Specification for pre cast concrete cable covers.
IS 6381 / 1972	Specifications for construction & testing of electrical apparatus with type of protection‟s‟.
IS 10322 / Part1, 2 / 1982	Specification of luminaries.
IS 103222 / Part3, 4 /1984	Specification of luminaries.
IS 10322 / Part5 (Sec 1, 2) / 1985	Specification of luminaries.
IS 13022 / Part 5 (Sec3 to 5) / 1987	Specification of luminaries.
IS 13947 / Part1 / 1993	Specification for low-voltage switchgear & control gear.
IS 13703 / Part4 / 1993	Specification for low voltage fuses for voltages not exceeding 1000V AC or 1500 V DC.

IS 2551 / 1982	Danger notice plates.
IS 732 / 1989	Code of practice for electrical wiring installation.
IS 3854 / 1997	Switches for domestic & similar purpose.
IS 2309 / 1989	Code of practice for lightning protection
IS 2418 / Part 1 to 3 / 1977	Tubular florescent lamps for general lighting service.
IS 13032 /1991	AC miniature circuit breaker board for voltage not exceeding 1000V.
IS 2706 / Part 1 to 5 / 1992	Current transformers.
IS 15086 / Part1 / 2001	Surge arresters.
IS 13925 / Part1 / 1998	Shunt capacitors for AC power systems having a rated voltage above 1000V.
IS 13118 / 1991	Specification for HVAC circuit breakers.
IS 374 / 1979	Ceiling fans.
IS 5578 / 1984	Guide for marking for insulated conductors.
IS 418 / 1978	Tungsten filament general service electrical lamp.
IS 694 / 1990	PVC insulated cable & cords for power / lighting.
IS 13010 / 2002	A.C. watt –hour meters.
IS 732 / 1989	Electrical wiring installation (up to 650V).
IS 10870 / 1984	Code of safety for hexane.
IS 1248 / Part 1 / 1993	Direct acting indicating instruments & their accessories.
IS 1248 / Part 2 / 1983	Direct acting indicating instruments & their accessories.
IS 1248 / Part 7 / 1984	Direct acting indicating instruments & their accessories.
IS 1248 / Part 9 / 1983	Direct acting indicating instruments & their accessories.
IS 1293 / 1988	3 pin plugs & socket outlets.
IS 1554 / Part1 to 3/1988	PVC insulated cables – heavy duty.
IS 13947/Part 1 to 5 /1993	Low voltage switchgear & control gear.
IS 1651 / 1991	Lead acid cell batteries.
IS 9537 / Part 5 / 2000	Conduits for electrical installation.

CABLES

Standards: - Cables shall conform to the following standards except where specifically stated otherwise.

- IS : 1554

- IS : 692
- IS : 7098
- IS : 502

The cables shall be of any company which is from approved list attached with the Tender. If there is any doubt about the authenticity of the cables supplied, the Engineer in Charge will send a sample of the cable to a Government approved laboratory for testing and all expenses incurred for this purpose will have to be borne by the contractor. The Engineer in Charge may also send for verification a sample of the cable along with the test certificates and excise duty gate passes, to the Company claimed to have manufactured the cable.

The cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, specifications, relevant standard specifications and cable manufacturer"s instructions.

The 11 KV cables shall be XLPE insulated aluminium conductor round wired armoured PVC sheathed and as specified.

The 33 KV cables shall be XLPE insulated aluminium conductor round wired armoured PVC sheathed and as specified.

The LT cables shall be XLPE insulated aluminium conductor round wired armoured PVC sheathed and as specified.

All cables shall be inspected upon receipt at site and checked for any damage during transit. The contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoidance of cable jointing. This apportioning shall be got approved by Engineer in Charge before the cables are cut to lengths.

Where joints are unavoidable the location of such joints shall be got approved.

Cable straight joints shall be heat shrinkable type and used only to join the cables where the manufacturer's delivery lengths of cables is less than the required length and where existing cables are to be extended as directed. Individual connectors shall be insulated by shrinkable types providing high level of Insulation eliminating the need to stagger the cores. Galvanized steel casing shall be provided for protection against mechanical damages. Sleeves shall be provided for abrasion resistance, corrosion protection and water tightness.

TABLE 1

EARTHING

1. Earthing system shall generally conform to IS: 3043 and in accordance with the I.E. rules "as per tender drawings".

2. Bare copper wire or flat shall be used as earth continuity conductor, unless otherwise specified.

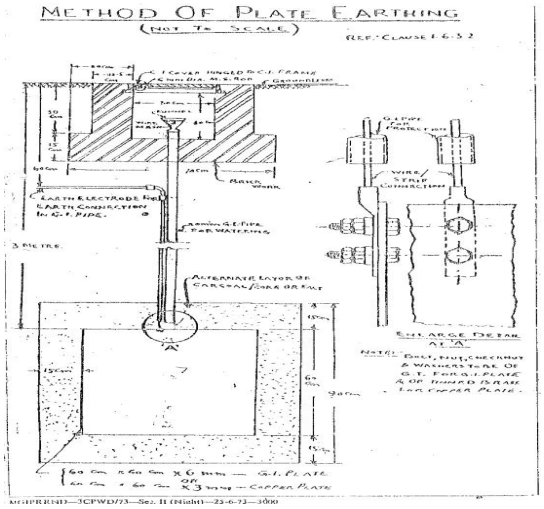
3. Armour of armoured cables shall be effectively earthed to the body. All metal part excluding

current carrying electrical conductors shall be effectively earthed.

4. The earth pin of 3 pin sockets shall be earthed.

5. All earthing terminals shall be earthed.

6. G.I. strip shall be welded for jointing and shall be connected to apparatus/electrodes



by suitable bolted pieces. For rust protection the welds shall be treated with barium chromate. Welded surface shall be painted with red lead and afterwards coated with bitumen.

APPLICABLE STANDARDS AND SPECIFICATIONS:

In general latest rules/regulations shall apply and entire installation shall conform to the applicable regulation of the following:

a) Indian Electricity Act modified 1952 (Act IX of 1910)
b) Indian Electricity Rules 1956
c) IS 732 of practice for wiring installation.
d) IS 3043 code of practice for earthing.
e) Regulation of Electricity Department / supply company authorities.
f) Regulations of Electrical Inspector.
g) Fire Insurance Association regulation/Rules, and IS 1646 as applicable.

LAYING OF CABLES IN GROUND:

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks. The relative position of the cables laid in HDPE pipes shall be preserved and the cables shall not cross each other at all changes in direction in horizontal and vertical planes. The cable shall be bent smooth with a radius of bend not less than 12 times the diameter of cable. Distinguishing markers shall be fixed on the cable on every floor and at ends in red, yellow and blue colours shall be wrapped just below for identification insulating tapes of appropriate voltage and the sockets for phase identification.

The minimum depth of trench for laying cables shall be as per enclosed drawing. The cables shall be laid in 200 mm dia HDPE pipes. 11 KV, 33 KV and LT cables shall be laid in separate HDPE pipes.

The trenches shall be excavated in reasonably straight lines. Wherever there is a change in direction, suitable curvature shall be provided. Where gradients and changes in depth are unavoidable these shall be gradual. Excavation should be done by any suitable means manual or mechanical. The excavated soil should be stacked firmly by the side of the trench such that it may not fall back into the trench. The bottom of the trench shall be level and free from stones brick bats etc. The trench shall than be provided with a layer of clean, dry sand cushion of not less than 150 mm in depth. At the time of issue of cables for laying, the cores shall be tested for continuity and insulation resistance. The cable drum be properly mounted on jacks or on a cable wheel at a suitable location, making sure that the spindle, jack etc. are strong enough to carry the weight of the drum without failure and that the spindle is horizontal in the bearings so as to prevent the drum creeping to one side while rotating. The cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains. The entire cable length shall as far as possible be paved off in one stretch. However, where this is not possible, the remainder of the cable may be removed by “Flaking” i.e. by making one long loop in the reverse direction. After the cable has been uncoiled and laid into the HDPE pipe over the rollers, the cable shall be lifted slightly over the rollers beginning from one end by helpers standing about 10 meters apart and drawn straight. The cable should then be taken off the rollers by additional helpers lifting the cable and then laid in a reasonably straight line. HDPE pipes laid in trenches shall have a covering of clean, dry sand of not less than 150 mm above the base cushion of sand before the protective cover is laid. In case of vertical multi-tier formation after the first HDPE pipe has been laid, a sand cushion of 100 mm. shall be provided over the initial bed before the second tier is laid. If additional tiers are formed, each of the subsequent tiers also shall have cushion of 100 mm. as stated above i.e. centre to centre distance between HDPE pipes in horizontal and vertical direction shall be 300 mm.

The trenches shall be back-filled with excavated earth free from stones or other sharp edged debris and shall be rammed.

TECHNICAL SPECIFICATION FOR CABLE, LUG, GLAND AND ACCESSORIES

Armoured Cables (HT & L T)

General

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list.

Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook.

Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

Cables: (Round wired Armoured Aluminium)

The following list records those Indian Standards in force, which are acceptable as Good practice, and accepted standards.

SP 30: 1984 National Electrical Code
SP 7 (Group 4): 2005 National Building Code
IS 1255: 1983 Code of practice of Installation & Maintenance of armored Cables up to 33 kV.
IS 3961: PART 2: 1967 Recommended current ratings of PVC cables.
IS 1554: PART 1: 1988 PVC Insulated (Heavy duty) Electric Cables; Part 1
For working voltages up to and including 1100 Volts.
IS 1554: PART 2: 1988 PVC Insulated (Heavy duty) Electric Cables; Part 1
For working voltages up to and including 3.1 kV to 11 kV.
IS 10810: PART 63: 1993 Method for Test of cables, Part 63 Smoke density of electric cables under Fire condition.
IS 7098: Cross linked polyethylene insulated PVC sheathed cables

Scope: (Round wired Armoured cables)
Specification no; (CB-LT/AL, CB-LT/CU, CB-HT)

Providing armoured cable of specified voltage level, size & .specified conducting material (Aluminum I Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

Material:
Cables*:*

Cables shall be XLPE for HT & LT as per Table no. 7/3 and of required construction, Colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed I screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No. 7/1.

Glands: As per specification (CB-GL)
Lugs: As per specification (CB-CL/Al, CB-CL/CU)

Saddles: Saddles fabricate from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.
G I Strip: 22 g x 25 mm width G I Strip.
Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden I resin cast grip for holding the cable.
Identification tags: For identifying root, connection position GI strip with identification mark / Name embossed / painted' with arrangement to tie should be fixing on cable or arrangement of ferrules to be done.
Hardware: Sheet Metal screws of required sizes, plugs / wooden gut ties, etc.

Method of Construction*:*

General:
a) Irrespective of method of construction the cable ends shall be terminated with appropriate Size & type of glands with lugs duly crimped, as directed by Site engineer.

Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2. Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged / ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

1. Erection of Cable on Surface:
Erection shall be done as per the routes and layout finalized, in perfect level and in plumb.
Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

2) Erection of Cable on Trusses:
Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 25 mm width of required length fixed to truss with nuts and bolts.

3) Erection of Cable on Pole:
Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden 1 epoxy resin cast grips, clamped with 25 x 3 mm or50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

4) Laying of Cable in provided Trench/Pole:
While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above GL). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

5) Erecting cable in constructed Trench 1 duct:
Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255. Erection of cable/s on trays:
Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation cable.

6) Mode if Measurement:
Executed quantity shall be measured on the basis of. Running meter per run of cable.

SPECIFICATION FOR END TERMINATION KIT

Specification Nos (CB-JT/LT/HT)
Providing straight through cable jointing kit of approved make and jointing cable as per the manufacturer's instructions and duly marking name of jointer and date.

Material:
Joint kit: Kit manufactured by reputed manufacturer with PVC moulds made in two parts, with epoxy compound, earth continuity lead of appropriate cross section having lugs at both ends, aluminum ferrules of the size of the cable, cross shaped epoxy spacer, MS clips for holding the moulds, adhesive for pasting the moulds.

Method of Construction:
Straight through joint Kit: L T/HT Cables
Before providing joint to the cable, the cable ends of the equivalent length of the joint moulds, shall be prepared by removing the outer insulation along with the steel armoring. The ferrule shall then be inserted over the bare core of the cable, and shall be crimped with hydraulic (mechanical type heavy duty crimping tool. The crimped portion shall be wrapped first with the PVC insulation tape and then with the insulation tape used for wrapping HT conductor. The above method shall be carried out for all the cores strictly following the Colour code. The leads of the both the cables now shall be placed into the mould by using the epoxy spacer, for having sufficient gap in-between the leads. The earth continuity lead shall be clamped to the both ends; of the cable. After covering the cable leads with the PVC moulds, the edges shall be clipped after applying the adhesive on the inside face of the moulds. The pasting of moulds shall be rigid and as far as possible leak proof, so that the epoxy compound shall not spill out. Now the duly stirred epoxy compound shall be poured and fill till the compound rises through the risers provided on the moulds.
After completing the above procedure, the joint shall be allowed to dry out for at least 8 to 10 hours (for epoxy compound to get hardened) depending upon the size of cable. Before connecting to supply, the dry and hardened joint shall be tested for its insulation level with 1000 VI 5000 V Meggar.

The cable should be fixed or laid in such manner that there should not be pressure on end of moulds or on jointing position of cables. (Refer drawing no. CB-JT -1)

Outdoor/Indoor and termination Kit: L T/HT Cables
Before providing end termination kit to the cable, the cable end of the equivalent length of the moulds, shall be prepared by removing the outer PVC insulation along with the steel armouring. The ferrule shall then be inserted over the bare core of the cable, and shall be crimped with hydraulic I mechanical type heavy duty crimping tool. The crimping shall be done in such a manner that there shall be no air gap. Then the crimped portion shall be wrapped first with the

PVC insulation tape and then with the insulation tape used for wrapping HT conductor. The above method shall be carried out for all the cores strictly following the Colour code. The leads of the cable now shall be placed into the mould by using the epoxy spacer, for having sufficient gap in-between the leads. The earth continuity lead shall be clamped to the ends of the cable. After covering the cable leads with the PVC moulds, the edges shall be clipped after applying the adhesive on the inside face of the moulds. The pasting of moulds shall be rigid and as far as possible leak proof, so that till epoxy compound shall not spill out. Now the
duly stirred epoxy compound shall be poured and 111 till the compound rises through the risers provided on the moulds. (Refer drawing no. CB-JT-1).
After completing the above procedure, the joint shall be allowed to dry out for at least 8 h, 10 hours (for epoxy compound to get hardened) depending upon the size of cable. Before connecting to supply, the dry and hardened joint shall be tested for its insulation level will 1000 VI 5000 V Meggar.

Mode of Measurement:
Executed quantity will be measured on number basis. (i.e. each).

Specification for Cable Gland
Specification Nose (CB-GL)
Termination of cable ends with cable glands for preparing and fixing the cable leads for connection. Cable glands shall be of Flange type.

Material:
Cable glands: Flange type heavy duty. Made of high purity brass metal, with brass washers, rubber rings, threaded stud with washers and nuts.

Method of Construction
Before erection of gland, the cable end shall be prepared by removing the outer insulation up to the point where gland to be fixed, by assessing the length of leads required. Bottom portion of gland shall be inserted over the steel armoring, and then Armour strips shall be bent for the length of collar of gland, remaining length of armoring shall be cut. The cable end shall then be, inserted through the entry of plate where the cable is to be terminated. The top portion of gland with washer shall be-then inserted in such a manner that the bent Armour strip should be touching the surface of the entry. The nuts shall be tightened with spring washers over the projected stud portion. Fixing of gland shall be at right angle to the gland plate. Tightening shall assure continuity of earth. Hole to the gland plate shall be punched / knocked out, of correct diameter with respect to gland size.

Mode of Measurement:
Executed quantity will be measured on number basis. (i.e. each):

Specification for Cable Lug
Specification Nos (CB-CL/AL, CB-CL/CU)
Crimping of lugs, and fixing to the terminals with nuts and bolts, etc.

Material:
Lug: Lug shall be of high purity aluminum /copper bimetallic of required type, with required size of hole and smooth finished both from inside and outside.
Hardware: Brass or Cadmium plated mild steel nuts and bolts, bimetallic washers. Anti-Oxide paste: Paste of superior quality manufactured by reputed manufacturer.

Method of Construction:

Before fixing of lugs to the cable end, the cable end to the equivalent length of the lug shall be prepared by removing the outer insulation along with the steel armoring and then, the inner insulation. The paste shall be applied to the cable lead and inside the lug prior to the inserting of lug on the cable lead. The lug shall then be crimped with hydraulic I mechanical type heavy duty crimping tool. The crimping shall be done in such a manner that there shall be no air gap. Then the crimped portion shall be wrapped with the insulation tape. (Colour of tape shall be of that of cable lead)

The above method shall be carried out for all the cores. The cable end with lug shall then be terminated into the terminal and then be tightened with either brass nuts or Cadmium plated nuts as directed by Engineer in-charge.

Mode of Measurement:

Executed quantity will be measured on number basis. (i.e. each).

Technical Specifications of 11kV, Compact Sub-Station

1.0.0 CODE & STANDARDS:

1.1.0 All equipment and material shall be designed manufactured and tested in accordance with the latest applicable Indian Standard / IEC standard.

1.2.0 Equipment and material confirming to any other standard which ensures equal or better quality may be accepted. In such case copies of English version of the standard adopted shall be submitted.

1.3.0 The electrical installation shall meet the requirement of Indian Electricity Rules as amended up to date relevant IS code of practice and Indian electricity act.

1.4.0 The Unitized Sub-station offered shall in general comply with the latest issues including amendments of the following standards but not restricted to it.

TITLE	INDIAN & IEC STANDARDS
HIGH VOLTAGE LOW VOLTAGE PRE-FABRICATED SUBSTATION	**IEC:62271-202**
11 KV, SWITCHGEAR CUBICLES	**IS: 13118, IS: 3427, IEC:60694. IEC:60298**
RING MAIN UNIT 11 KV GRADE,	**IS:9920, IEC:60265**
CODE OF PRACTICE FOR SELECTION, INSTALLATION AND MAINTENANCE OF SWITCHGEAR	**IS:10118**
DISTRIBUTION TRANSFORMER	**IS: 1180**
INDIAN ELECTRICITY RULES	**1956**
INDIAN ELECTRICITY ACT	**1910**

2.0.0 DESIGN CRITERIA

2.1.0 Compact Sub-station shall consist of **11KV SF6 Insulated compact switchgear with SF6 / Vacuum Circuit Breaker as protection to transformer + Transformer + L.T. Switchgear** with all connection accessories, fitting & auxiliary equipment in an pre-fabricated Enclosure to supply Low-voltage energy from high-voltage system as detailed in this specification. The complete unit shall be installed on a substation plinth (base) as **Outdoor substation**. 11KV Load Break Cable Switches controls incoming-outgoing feeder cables of the 11KV ring distribution system. The Vacuum Circuit Breaker shall be

used to control and isolate the 11kV/433V Distribution transformer. The transformer's L.T. side shall be connected to L.T. switchgear by means of Aluminum busbar. The connection cables to consumer shall be taken out from the L.T. switchgear. The pre-fabricated unitized substation shall be designed for :

a) Compactness,
b) Fast installation,
c) Maintenance free operation,
d) Safety for worker/operator & public
e) Integration with SCADA for monitoring and control

2.2.0 The Switchgear and component thereof shall be capable of withstanding the mechanical and thermal stresses of short circuit listed in ratings and requirements clause without any damage or deterioration of the materials.

2.3.0 For continuous operation at specified ratings temperature rise of the various switchgear components shall be limited to permissible values stipulated in the relevant standard and / or this specification.

2.4.0 Service Conditions:

2.5.1 The equipment offered shall be suitable for continuous satisfactory operation in tropical area of Installation.

The Enclosure consisting of High Voltage switchgear-control gear, Low Voltage switchgear-control gear & Transformer of the Unitized substation shall be designed to be used under **normal outdoor service condition**. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside. The enclosure construction shall be such that it fully protects ingress of rain water, dust & rusting.

3.0.0 SPECIFIC REQUIREMENT

3.1.0 The main components of a prefabricated-unitized substation are Transformer, High-voltage switchgear-control gear, Low-voltage switchgear-control gear, corresponding interconnections (cable, busbars) & auxiliary equipment. The components shall be enclosed, by common enclosure. All the components shall comply with their relevant IS/IEC standards.

3.1.1 Ratings:

Description	Unit	Value
Rated Voltage / Operating Voltage	kV rms	11
Rated frequency & Number of phases	Hz & nos.	50 & 3
Rated maximum power of substation	kVA	**315/500/630 KVA, (Oil Type Hermetically sealed Transformer)** **CSS shall be rated for 100% Loading Capacity.**
Rated Ingress protection class of Enclosure	IP:	IP: 54 for LT Switchgear & HT Switchgear compartments and IP-34 for Transformer compartment. Suitable for outdoor mounting on road side.
HV Network & Busbar		
RMU		3 WAY (2Nos.Isolators+1No. Breaker)

Rated current	Amp	630A for 11kV
Rated short time withstand current	kA rms / 1 secs	25 for 11 kV,
LV Network		
As per BOQ		

3.2.0 OUTDOOR ENCLOSURE:

3.2.1 The enclosure shall be made of 2.0 mm thickness Galvanized Sheet Steel tropicalized to meet Indian weather conditions including all the partition sheets & doors.

3.2.2 The base of the enclosure shall be of 4.0 mm thickness Hot Dip Galvanized Sheet Steel to ensure rigidity for easy transport & installation. The entire Package Substation shall be Factory Assemble & Factory Fitted.

3.2.3 The structure of the substation shall be capable of supporting the gross weight of all the equipment & the roof of the substation compartment shall be designed to support adequate loads. Incase of relocation of the Package Substation, the entire substation should be capable of getting lifted and placed as a Single Unit without dismantling of any of the major equipments inside. The lifting arrangement should be from the bottom of the enclosure & not from the top.

3.2.4 There shall be proper / adequate ventilation inside the enclosure so that hot air inside enclosure are directed out by help of duct. Louvers apertures shall be provided so that there is circulation of natural air inside the enclosure. The Package Substation should be designed & engineering to have natural cooling & ventilation instead of forced cooling / ventilation as the same would derate the Transformer further and shall be an additional load on the Transformer.

3.2.5 The complete design shall be compartmentalized.

3.2.6 **Interconnection:** The connection of HT switchgear to Transformer shall be with the help of suitable size of cables from Transformer to LT switchgear with the help of suitable size of Aluminum busbars.

3.2.7 **Internal Fault**: Failure within the unitized substation due either to a defect, an exceptional service condition or mal-operation may initiate an internal arc. Such an event may lead to the risk of injury, if persons are present. It is desirable that the unit shall be tested for Internal Arc fault test to the tune of at least 25KA for 1 second adhering to as per latest IEC 62271-202.

3.2.8 **Covers & Doors**: Covers & doors are part of the enclosure. When they are closed, they shall provide the degree of protection specified for the enclosure. All covers, doors or roof shall be provided with locking facility or it shall not be possible to open or remove them before doors used for normal operation have been opened. The doors shall open outward at an angle of at least 90degrees & be equipped with a device able to maintain them in an open position. Proper padlocking facility shall be provided for doors of each compartment. Transformer compartment doors must be open from both the sides & should not have access from outside.

3.2.9 **Earthing**: All metallic components shall be earthed to a common earthing point. It shall be terminated by an adequate terminal intended for connection to the earth system of the installation, by way of flexible jumpers/strips & Lug arrangement. The continuity of the earth system shall be ensured taking into account the thermal & mechanical stresses

caused by the current it may have to carry. The components to be connected to the earth system shall include :

a) The enclosure of Unitized / prefabricated substation,
b) The enclosure of High voltage switchgear & control gear from the terminal provided for the purpose.
c) The metal screen & the high voltage cable earth conductor,
d) The transformer tank or metal frame of transformer,
e) The frame &/or enclosure of low voltage switchgear,

3.2.10 **Internal Illumination**: There shall be arrangement for internal lighting activated by associated switch on doors for HV & LV compartments separately.

3.2.11 **Labels:** Labels for warning, manufacturer's operating instructions etc. & those according to local standards & regulations shall be pasted / provided inside and shall be durable & clearly legible.

3.2.12 **Painting and Fabrication process :**

A) <u>THE PAINTS SHALL BE CAREFULLY SELECTED TO WITHSTAND TROPICAL HEAT RAIN. THE PAINT SHALL NOT SCALE OFF OR CRINKLE OR BE REMOVED BY ABRASION DUE TO NORMAL HANDLING. FOR THIS PURPOSE POWDER COATING SHALL BE USED.</u>

B) <u>SPECIAL CARE SHALL BE TAKEN BY THE MANUFACTURER TO ENSURE AGAINST RUSTING OF NUTS, BOLTS AND FITTINGS DURING OPERATION. ALL BUSHINGS AND CURRENT CARRYING PARTS SHALL BE CLEANED PROPERLY AFTER FINAL PAINTING.</u>

C) <u>THE FABRICATION PROCESS SHALL ENSURE THAT THERE ARE NO SHARP EDGES ON THE GI SHEETS USED.</u>

3.2.14 Enclosure GTP:

1)	**<u>Ambient Temperature</u>**	50° C
2)	Type of Ventilation for a) Normal Condition b) Hot Condition	 - Natural - Natural
3)	Compartmentalized	Yes
4)	Rated temperature enclosure class	K10
5)	Degree of protection for external enclosure	IP34 Transformer Compartment. IP54 MV & LV Compartment Suitable for outdoor mounting
6)	Applicable Standard	IEC 62271 / 61330
7)	Enclosure material	Galvanized sheet Steel
8)	Thickness of sheet (GI only)	2mm for enclosure. 4mm for PSS Base.

Note: No capacity de-ration of equipment / components upto 50°C ambient temperature.

3.3.0 11kV Switchgear – Ring Main Unit

The RMU offered shall be compact, maintenance free, easy to install reliable, safe and easy to operate and complete with all parts necessary for their effective and trouble-free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in the commercial order or not.
It is not the intent to specify herein complete details of design and construction. The offered equipment shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. In actual practice, not withstanding any anomalies, discrepancies, omissions, in-completeness, etc. in these specifications, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulations in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, Electricity Act-2003 and other statutory provisions. The switchgear and component thereof shall be capable of withstanding the mechanical and thermal stresses of short circuit listed in ratings and requirements clause without any damage or deterioration of the materials.
The equipment offered shall be suitable for continuous satisfactory operation as per site condition. For this purpose the design shall be such that it shall be able to withstand the /humid/moist climatic conditions.

SERVICE CONDITIONS:

System Particulars:
Nominal system voltage ... 11 kV Corresponding highest system voltage ... 12 kV Frequency ... 50 Hz ± 3%

Number of phases ... 3
Neutral earthing ... Solidly grounded
Fault level (minimum) ... 25 kA for 3 sec for 11kV
Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions:-

1. Max. ambient air temperature : 50 Deg. C
2. Max. relative humidity : 100 %
3. Max. annual rainfall : 1450 mm
4. Max. wind pressure : 150 kg/sq.m.
5. Max. altitude above mean sea level : 1000 mtrs.
6. Isoceraunic level : 50
7. Seismic level (Horizontal acceleration): 0.3 g.
8. Climatic Condition: Moderately hot and humid tropical climate conducive to rust and fungus growth.

Note: The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

3.3.1 Non-extensible SF6 Insulated Compact Switchgear as required shall consist of following items:

3.3.2 Load Break Cable Switch with integral earth switch having full making capacity shall be used for Incoming cables.

3.3.3 Vacuum Circuit Breaker shall be used for distribution network of HT switchgear. Circuit Breaker complete with operating mechanism, self powered, Microprocessor based numeric type O/C,E/F protection relay with associated Current Transformers shall be used for control and protection of Transformer. An integral cable earthing switch with full making capacity shall be provided.

3.3.4 The above Load Break Cable Switch, Vacuum circuit breaker, Bus bars should be mounted inside a sealed for life, stainless steel tank. The operating mechanism of the switches and breakers shall be outside the SF6 tank and accessible from front. The tank should be filled with SF6 gas at an adequate pressure. The degree of protection for gas tank should be IP67**.** There shall be provision for filling the SF6 gas at site. Moreover the Stainless Steel Gas Tank shall confirm to the sealed pressure system as per IEC and ensure the gas leakage to 0.1 % per year as per IEC.

3.3.5 The Circuit Breaker is required to control 11 kV/433 volts distribution Transformer of rating as per BOM and relay settings and Current Transformers shall be selected accordingly.

3.3.6 **General Finish:** Totally enclosed, metal enclosed, vermin and dust proof suitable for tropical climate use as detailed in the specification.

3.3.7 **Ratings**: The bus bars shall have continuous rating of 630 Amps. The isolator shall have a continuous rating of 630 Amps. Vacuum Circuit Breaker shall have a continuous rating of 200 Amps. in accordance with relevant IS / IEC standard

3.3.8 **Breaking & Making Capacity**: The Load Break Cable Switches shall be capable for breaking rated full load current. The same along with its earthing switch shall also be suitable for full making capacity of the system as specified. The complete switchgear shall be suitable for breaking capacity of 25kA symmetrical at 11000 volts three phase for 11kV system for 3 sec

3.3.9 **Busbar**: Switchgear shall be complete with all connection, bus-bars etc. Copper busbars continuous rating shall be 630 Amps. The busbars should be fully encapsulated by SF6 gas inside the tank.

3.3.10 **Remote Operation**: All isolator & Breakers shall be there for remote operation of the switchgear's Isolator & Breaker shall be possible using Motors fitted to the operating mechanism.

3.3.11 **Protection**: The circuit breaker shall be fitted with Microprocessor based numeric type self powered relay inside the front cover to avoid any tampering. The same shall be used in conjunction with suitable CT's and Tripping Coil for fault tripping of the Circuit Breakers. CT's shall be mounted on bushing of breaker. CT's mounted on cable inside cable compartment are also acceptable.

3.3.12 **Cable Termination**: Each Cable compartment shall be provided with three bushings of adequate sizes to terminate the incoming outgoing 11kV, 3 Core cables as the case may be. There shall be enough height from the base of the mounted switchgear so that the cables can be bent and taken vertically up to the bushings. The Cable termination shall be done by Heat shrinkable Termination method so that adequate clearances shall be maintained between phases for Termination. Cable Termination boots shall be supplied by the switchgear manufacturer. The bushings should be in front only. Side/rear cable connection is not permitted.

Locking Arrangement: Suitable padlocking arrangements shall be provided as stated below:

a) Circuit Breaker motorized operating handle in the "OFF" position.
b) Each feeder Panel operating handle in 'Closed' 'Open" or 'Earth' position.
c) Each isolator operating handle in 'Closed', ' Open', or 'Earth' position.

Ratings :

Non-Extensible Ring Main Unit with Vacuum Circuit breaker		
3.4.1	**Switchgear Data**	**11kV**
a)	Service	Indoor
b)	Type	Metal clad
c)	Number of phases	3
d)	Voltage	1100V
e)	Rated Frequency	50 Hz
f)	Rated Current	630 Amp (isolator)
g)	Short Circuit rating	
	i) Breaking	25kA rms for Breaker
	ii) Short time withstand for 3 Sec.	25 kA rms
	iii) Rated S/c making	62.5 kA peak for Breaker
h)	Rated insulation level kV rms	28 kV
i)	Rated Level kV impulse	75 kV
j)	System earthing	Solidly earthed at substation

3.4.2	**Breaker**	
a)	Type	Vacuum Breaker in SF6 tank
b)	Rated voltage	11kV
c)	Breaking current	
	i) Load breaking	25 KA rms.
d)	Making current	62.5 KA peak
e)	Rated current	630 Amps.
f)	No. of poles	3
g)	Operating mechanism.	Trip free & free handle type with mechanically operated indication & pad locking.
3.4.3	**Isolators**	
a)	Type	Load breaking and fault making in SF6 tank
b)	Rated current	630 Amps.
d)	Rated breaking capacity	630 Amps.
e)	Fault making capacity	62.5 KA peak
f)	No. of poles	3
g)	Operating mechanism	Operating handle with ON, OFF, Earth positions with arrangement for padlocking in each position.
3.4.4	**Busbars:**	
a)	Material	Copper
b)	Type	SF6 insulated
c)	Rated Current	630 Amps

3.5 Isolator:

3.5.1 The Isolators offered shall conform to IS: 4710/9920 as amended to date. The isolator shall be triple pole, spring assisted, hand operated, non-automatic type with quick break contacts. The operating handle shall have three positions 'ON', 'OFF' and 'EARTH'

which shall be clearly marked with suitable arrangement to padlock in any position. A safety arrangement for locking shall be provided by which the isolator operation shall be prevented from 'ON' position to 'EARTH' position or vice versa.

Switchgear:

Sealed for life, the enclosure shall meet the "sealed pressure system" criteria in accordance with IEC: 298 (a system for which no handling of gas is required throughout service life of approximate 30 years.) There shall be no requirement to 'top up' the SF6 gas. In addition, manufacturer shall confirm that maximum leakage rate is lower than 0.1% per year. It shall provide full insulation, making the switchgear insensitive to the environment. Thus assembled, the active parts of the switchgear unit shall be maintenance free.

The switchgear & switchboard shall be designed so that the position of different devices is visible to the operator on the front of the switchboard & operations are visible as well. The switchboard shall be designed so as to prevent access to all live parts during operation without the use of tools.

RMU tank and cable box should be tested for internal arc fault test for 25 KA for 1 Sec.

Circuit Breaker:

The Unit shall consist of Tee-off spring assisted, three pole SF6/VCB breaker, with integral fault making / dead breaking earth switch. The function shall be naturally interlocked to prevent the main & earth switch from being switched 'ON' at the same time & the circuit breaker not allowed to trip in 'Earth On' position. The selection of the main/earth switch lever on the panel, which is allowed to move only if the main or earth switches in the off position. The lever shall be able to pad locked in either the main or earth position.

Protection:

Protection Relays: The Circuit breaker shall be fitted with Microprocessor based numeric type self powered relay inside the front cover to avoid any tampering.

FAULT PASSAGE INDICATORS / Earth Fault Indicators (FPI / EFI):

These shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The unit should be self-contained requiring no auxiliary power supply. The FPI shall be integral part of RMU.

TROPICALISATION:

Due regard should be given to the climatic conditions under which the equipment is to work. Ambient temperature normally varies between 25 C and 50 C. The climate is very humid and rapid variations occur, relative humidity between 90% and 100% being frequently recorded, but these values generally correspond to the lower ambient temperatures. The equipment should also be designed to prevent ingress of vermin, accidental contact with live parts and to minimize the ingress of dust and dirt. The use of materials, which may be liable to attack by termites and other insects, should be avoided.

NAME PLATE:

Each RMU and its associated equipments shall be provided with a nameplate legible and indelibly marked with at least the following information.

(a) Name of manufacturer
(a) Type,
(b) serial number
(c) Voltage
(d) Current

(f) Frequency
(g) Symmetrical breaking capacity

(h) Making capacity
(i) Short time current and its duration
(j) Purchase Order number and date
(k) Month and Year of supply
(l) Rated lighting impulse withstand voltage

TECHNICAL REQUIREMENTS OF FRTU

2.0 General

The Feeder Remote Terminal Unit (FRTU) shall be installed in Ring Main Units (RMUs). FRTU shall be used for control of switching devices such as breaker, isolator inside RMU.

2.1 Design Standards

The FRTUs shall be designed in accordance with applicable International Electro-technical Commission (IEC), Institute of Electrical and Electronics Engineer (IEEE), American National Standards Institute (ANSI), and National Equipment Manufacturers association (NEMA) standards, unless otherwise specified in this Technical specification. In all cases the provisions of the latest edition or revision of the applicable standards in effect shall apply.

2.2 FRTU Functions

As a minimum, the FRTU shall be capable of performing the following functions:
(a) FRTU should be a DIN rail mount. FRTU should have a Head end unit to communicate with upstream control centre and to downstream DI/DO modules (DI-DO module is Acquires Hardwired Digital Input, hardwired Digital Output and Analog Input from MFT or alternatively through transducer- less modules). I/O modules can be placed in remote RMU/CSS panel and can be connected on Ethernet port with main FRTU so as to reduce / avoid the control cable. These I/O modules should be of DIN rail mounted strictly so as to get easily mounted in the panel.
(b) Receiving and processing digital commands from the master station(s)
(c) Data transmission rates - 300 to 19200 bps for Serial ports for MODBUS. and 10/100 mbps for TCP/IP Ethernet ports
(d) Use of IEC 60870-5-101/104 protocol to communicate with the Master station(s)
(e) Use of MODBUS protocol over RS485 interface to communicate with MFTs.
(f) Have required number of communication ports for simultaneous communication with Master station(s), MFTs and FRTU configuration & maintenance tool.
(g) FRTU shall have the capability of automatic start-up and initialization following restoration of power after an outage without need of manual intervention. All restarts shall be reported to the connected master stations.
(h) Remote database downloading of FRTU from master station from SCADA/DMS control centre.

(i) As the SCADA/DMS system will use public domain such GPRS/CDMA etc, therefore it mandatory to guard the data/ equipment from intrusion/damage/breach of security & shall have adequate cyber security features.
j) An inbuilt wifi communication modem shall be offered in FRTU for local access via hand held devices (Tablet / smart phone / etc).
k) The FRTU must support IEC 61131-3 PLC programming for future automation design.

2.3 Communication ports
The FRTUs shall have following communication ports to communicate with master station MFTs and configuration & maintenance terminal.

- FRTU shall have one TCP/IP Ethernet port for communication with Master station(s) using IEC 60870-5-104 protocol or serial port in case IEC60870-101.

- FRTU shall have one TCP/IP Ethernet port for communication with third party field devices.
- FRTU shall have one RS 485 ports for communication with MFT's to be connected in daisy chain using MODBUS protocol.
- FRTU shall have one port (USB) for connecting the portable configuration and maintenance tool for FRTU.

2.3.1 Master Station Communication Protocol

FRTU shall use IEC 60870-5-104/101, DNP3 as a communication protocol for communicating to master station. The FRTU shall support Secure Authentication according to IEC 62351-5.

2.3.2 Communication Protocol between FRTU & MFTs

The FRTU shall acquire data from the MFTs using the MODBUS protocol.

2.3.3 Wifi Connectivity for local access

An inbuilt wifi communication modem shall be offered in FRTU for local access via hand held devices (Tablet / smart phone / etc). It shall be secured by means of

- Activation/deactivation from the SCADA
- SSID visibility configurable
- Passphrase
- Automatic disconnection by timeout

2.4 Cyber Security

In order to secure all controls and data acquisition, the FRTU shall be designed to be compliant with NERC and IEC62351 requirements. The FRTU shall support secure access based on RBAC, with the possibility to configure the roles.
Local and remote access connection shall be secured for maintenance (locally and remotely) with HTTPS, SFTP, IPSEC and SSH protocols.
Authentication shall be based on a Radius server.

2.4.1 Future proof design

Remote firmware update

- The FRTU shall support remote firmware updates Centralised RBAC management
- The FRTU shall be evolutive in order to be compatible with a full centralised RBAC management in compliance with IEC 62351-8

2.4.2 Hardening

Device hardening

- Disabled or unused functionality shall not compromise security.
- Unnecessary services and programs shall be removed. If removal is not possible, the unnecessary services and programs shall be disabled.

Interface minimization

- Each interface shall support only the data types and protocols needed to meet the functional requirements.
- Unused interfaces and ports shall be removed. If removal is not possible, the unused interfaces and ports shall be disabled.
- A complete list of supported data types and supported communication protocols per interface shall be provided.
- All hardware interfaces that are used for programming or debugging shall be completely removed after production.

Account hardening

- The FRTU shall not contain active default, guest and anonymous accounts.
- All remote access to root accounts on the FRTU shall be disabled.
- All Vendor-owned accounts where feasible shall be removed.
- The list of all accounts on the FRTU shall be provided.

2.4.3 Communication

Compliance to security standards

The FRTU shall follow the IEC 62351 standards and at least:

- IEC 62351-5: 2013
- IEC 62351-3

Communication security

The FRTU shall support network and transport layer encryption using IPsec.

2.4.4 Configuration

- Access to the FRTU by configuration tool shall be possible only through secured connection: HTTPS for Webserver and SSH for console and configuration tool.

2.4.5 Access control

RBAC

- The FRTU shall support the implementation of Role-based Access Control in compliance with IEC 62351-8.
- It must be possible to configure the privileges of individual roles. It must be possible to carry out changes by configuration files through a secure way.
- It must be possible to define more roles for future applications.
- It shall be possible to assign each role individual security credentials.
- It shall be possible to bind roles to individual user accounts on the FRTU.

The minimum following function and data shall be controlled through RBAC:

- Configuration files
- Software update
- User management
- Executing program or shell command
- I/O on local maintenance access

A specific tool shall permit to configure the security policy, role and password.

Management of Security passwords

- The FRTU service application shall support individual user passwords.
- Passwords shall be stored together with a salt using an allowed cryptographic hash function.
- The FRTU service application shall enforce a high complexity of passwords.
- The FRTU shall lock the access after several password error.

User Authentication

- The FRTU shall authenticate the communication parties on the WAN interface using a challenge-response protocol based on message authentication codes The FRTU shall terminate the connection if the user authentication fails.
- The FRTU shall authenticate the communication parties on the Local Maintenance interface.
- It shall be possible to configure the FRTU so that it blocks authentication requests, either temporarily or permanently, from an account after a number of failed login attempts. The number of failed login attempts and the time the account is blocked shall be configurable.

Central management of user account

- The FRTU should allow to manage user authentication through a Radius server.

2.4.6 Security Log

- The FRTU shall provide a local audit trail for all security events that occur.
- Log files shall be produced in Syslog format.
- Security events shall be logged locally in a dedicated security log or/and on a SYSLOG server.

2.4.7 Security testing

2.4.8 Documentation

Secured Versioning

- All released versions (hardware, firmware, software) of a device or product shall be uniquely identifiable.
- Exchangeable hardware modules shall be versioned separately.

Design Documentation

- The Protocol Implementation Conformance Statement as in IEC 62351 and IEC 60870-5-7 shall be provided on request.

DI-DO Acquisition module details: -

2.5 Analog Inputs (4AI capability in Acquisition module)

The real time values like, Active power, Reactive Power, Apparent power three phase Current & Voltage and frequency, power factor & accumulated values of import /export energy values will be acquired FRTU from the following in the given manner:

i. MFTs installed in RMU/DTs
ii. RTU shall also take 4-20 mA, 0-20mA, 0- -10mA, 0-+10mA, 0-5V etc as analog inputs to acquire DC power supply voltage etc.

2.6 Status input (32 DI capability in Acquisition module)

FRTU shall be capable of accepting isolated dry (potential free) contact status inputs. The FRTU shall provide necessary sensing voltage, current, optical isolation and de-bounce filtering independently for each status input. The sensing voltage shall not exceed 24Vdc /48 Vdc/220VAC

2.7 Sequence of Events (SOE) feature

To analyse the chronology or sequence of events occurring in the power system, time tagging of data is required which shall be achieved through SOE feature of FRTU. The FRTU shall have an internal clock with the stability of 100ppm or better. The FRTU time shall be set from time synchronization messages received from master station using IEC 60870-5- 104 protocol. SOE time resolution shall be 10 ms or better

2.8 Control Outputs (16 DO capabilities in Acquisition module)

The FRTU shall provide the capability for a master station to select and change the state of digital output points. These control outputs shall be used to control power system devices such as Circuit breakers, isolator, reset, relay disable/enable and other two-state devices, which shall be supported by the FRTU. A set of control outputs shall be provided for each controllable device. On receipt of command from a master station using the select check-before-execute operate (SCBO) sequence, the appropriate control output shall be operated for a preset time period which is adjustable for each point from 0.1 to 2 seconds. Each control output shall consist of one set of potential free NO contact. The output contacts shall be rated for at least 0.2 Amp. at 24Vdc / 48 Vdc. These output contact shall be used to drive heavy duty relays. In case Control output module of FRTU does not provide potential free control output contact of this rating, then separate control output relays shall be provided by the contractor. These relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils & shall conform to the relevant IEC requirements.

2.8.1 Heavy duty control output relays

The control output contact from the FRTU shall be used for initiating heavy duty relays for trip/close of switching devices. The contractor shall provide heavy duty relays. Each control output relays shall consist of at least 2 NO contacts. The output contacts shall be rated for at least 8 Amps Continuous at 24Vdc and shall provide arc suppression to permit interruptions of an inductive load. Relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC255-1-00 and IEC 255-5 requirements.

2.8.2 Control Security and Safety Requirements

The FRTU shall include the following security and safety features as a minimum for control outputs:

(a) Select- check-before-operate operate (SCBO) sequence for control output.

(b) No more than one control point shall be selected / executed at any given time.

(c) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "control execute" command is not received within the set time period.

(d) No control command shall be generated during power up or power down of FRTU.

2.8.3 Dummy breaker latching relay

The Contractor shall provide a latching relay to be used to simulate and test supervisory control from the Master station. The latching relay shall accept the control signals from the FRTU to open and close, and shall provide the correct indication response through a single point status input.

2.9 Contact Multiplying Relays (CMRs)

Contact Multiplying Relays (CMRs) are required to multiply the contacts of breaker, isolators and protection relays etc. The contacts of these relays shall be used to provide status inputs to the FRTUs. The relays shall be DC operated, self reset type. The rated voltage for relay operation shall be on 24/48/110/220V DC depending on the station DC supply. The relay shall be able to operate for +/-20% variation from nominal voltage. The relay shall have a minimum of two change over contacts, out of which one shall be used for telemetry purposes. The contacts shall be rated to carry minimum current capacity of 5A. The relay shall conform to following requirement.

a) Power Frequency withstand voltage–2KV for 1 minute as per IEC 255-5.
b) Insulation Resistance of 100M ohms measured using 500V DC megger.
c) 5KV Impulse test as per IEC 255-5

The relays coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC 255-1-00 and IEC 255-5 requirements. The relays must be protected against the effects of humidity, corrosion & provide with a dust tight cover. The connecting terminals shall be screw type & legibly marked. The relays may optionally have a visual operation indicator. The relays are to be mounted in junction /termination box and therefore shall be equipped with suitable mounting arrangements. In case suitable space is not available in junction /termination box the same shall be mounted in FRTU panel.

2.10 Time facility

The internal FRTU time base shall have a stability of 100 ppm. The FRTU shall be synchronised through synchronisation message from master station at every 5 minutes (configurable from 5 minutes to 60 minutes) over IEC 60870-5-104/101/NTP/SNTP

2.11 Diagnostic Software

Diagnostic Software shall be provided to continuously monitor operation of the FRTU and report FRTU hardware errors to the connected master stations. The soft-ware shall check for memory, processor, and input/output ports errors and failures of other functional areas defined in the specification of the FRTU.

2.12 Input DC Power Supply

The FRTU will be powered from a 12Vdc / 24Vdc / 48 V DC power supply system. The FRTU shall not place additional ground on the input power source. The characteristics of the input DC power supply shall be Nominal voltage of 12Vdc / 24Vdc / 48 Vdc with variation between +20% & -15%

The FRTU shall have adequate protection against reversed polarity, over current and under voltage conditions, to prevent the RTU internal logic from being damaged and becoming unstable causing mal-operation.

2.13 Environmental Requirements

The FRTU will be installed in inside RMU Panel or in open environment with no temperature or humidity control. The FRTUs shall be capable of operating in ambient temperature from 0 to +55 degree C with rate of temperature change of 20 degree C/hour and relative humidity less than 95%, non-condensing. FRTUs to be installed in the hilly region with the history of snowfall, the same the lower ambient temperature limit shall be -5 degree C.

2.14 FRTU Size and Expandability

FRTU shall be equipped for the point counts defined in the BOQ (Basic+20% spare (wired & hardware). It shall be possible to expand the FRTU capability for additional 20 % of the basic point counts by way of addition of hardware such as modules, racks, panels, , however, FRTU software and database shall be sized to accommodate such growth without requiring software or database regeneration.

2.15 Type Test for FRTU

- EMC/EMI Immunity Test
  i. IEC 61000-4-2 Electrostatic discharge
  ii. IEC 61000-4-3 Radiated Field
  iii. IEC 61000-4-4 Electrical Fast transients
  iv. IEC 61000-4-5 Surge Immunity
  v. IEC 61000-4-8 Power Frequency Magnetic Field

- Environment Test
  i. IEC 60068-2-2 Dry Heat
  ii. IEC 60068-2-78 Damp Heat

- Insulation Test
  i. Power Frequency Voltage Withstand
  ii. 1.2/50 μs Impulse voltage withstand
  iii. Insulation resistance

Above mentioned Type Test shall be furnished by Bidder at time of Technical Offer and should be valid within last 7 years.

3.7.0 Transformer

3.7.1 11KV/ 433 volt Volts distribution transformer shall be a part of packaged substation which will be housed in the enclosure. The transformers shall be installed in hot, humid tropical atmosphere. All equipment accessories and wiring shall be provided with tropical finish to prevent fungus growth.

The transformers shall be capable of continuous operation of rated output under the operating conditions of voltage and frequency variations as per statutory limits governed by relevant Indian Standard and Indian Electricity Rules, 1956 / IEC with latest amendments in force.

Use of Prime Grade core, directly from reputed Manufacturers like Nippon / Posco/ AK steels ensures high endurance of core. Fully automated core cutting line that ensures uniform cutting of core resulting in low burr level and hence low core degradation ensures lower maintenance cost. Boltless, Steplap core design carried out automatically on Hydraulic Platform that avoids Multiple Handling thus ensuring low losses. Automated Foil Winding for LV coils that Make coil capable of withstanding higher thermal & mechanical stresses.

This specification covers design, engineering, manufacture; shop testing, inspection, painting, packing, and supply of Distribution Transformers complete with all accessories for efficient and trouble-free operation of the proposed Substation.

The design, manufacture and performance of equipment shall comply with all currently applicable statues, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility. The Quality of Raw material, Manufacturing process & design parameters should meet the requirement so as to ensure quality of transformers

The equipment shall conform to the latest edition of applicable standards as follows. In case of conflict between applicable standards and this specification, this specification shall govern.

- IS 1180, for Tests & tolerance on Guaranteed Particulars
- IS:3639 for Fittings and Accessories
- IS:2099 for Bushings > 1000 V
- IS:7421 for Bushings < 1000 V
- IS:1271 for Electrical Insulation classified by Thermal stability

REQUIREMENT: **11000/433 VOLT ONAN TRANSFORMER DOUBLE WOUND, DYN11, CORE TYPE WITH COPPER CONDUCTOR. OIL IMMERSED ONAN SUITABLE FOR PACKAGED SUBSTATION HOUSED IN A ENCLOSURE WITH CORRUGATED TANK ARRANGEMENT HERMETICALLY SEALED.**

3.7.2 VOLTAGE RATIO: **NO LOAD VOLTAGE 11000/433 VOLTS WITHIN TOLERANCE AS STIPULATED IN IS: 1180 (LEVEL-2)**

3.7.3 **INSULATING MATERIAL SHALL BE OF PROVEN DESIGN. THE INSULATING MATERIALS SHALL BE** CLASS "A" FOR ONAN

3.7.4 RATING: **THE TRANSFORMER SHALL HAVE A CONTINUOUS RATING AS SPECIFIED AT ANY OF THE SPECIFIED TAPPING POSITION AND WITH THE MAXIMUM TEMPERATURE RISE SPECIFIED. THE RATED KVA SHALL BE THE PRODUCT OF THE RATED VOLTAGE IN KV, THE CORRESPONDING RATED CURRENT AND THE PHASE FACTOR 1.73. WHEN THE TRANSFORMER IS OPERATED WITH THE RATED PRIMARY VOLTAGE APPLIED TO THE TERMINALS OF THE PRIMARY WINDING, THE APPARENT POWER (KVA) AT THE TERMINALS OF THE SECONDARY WINDING, WHEN CARRYING THE RATED SECONDARY CURRENT DIFFERS FROM RATED KVA BY AN AMOUNT CORRESPONDING TO THE REGULATION OF THE TRANSFORMER AND IS THE PRODUCT OF THE ACTUAL SECONDARY VOLTAGE, THE RATED SECONDARY CURRENT AND PHASE FACTOR 1.73.**

3.7.5 TEMPERATURE RISE: **THE MAXIMUM TEMPERATURE RISE AT THE SPECIFIED MAXIMUM CONTINUOUS OUTPUT SHALL NOT EXCEED 40°C BY THERMOMETER IN THE HOTTEST PORTION OF THE OIL OR 45°C MEASURED BY RESISTANCE OF WINDING ABOVE AMBIENT TEMPERATURE OF 50°C.**

3.7.6 TYPE OF LOAD: **THE TRANSFORMER SHALL BE SUITABLE FOR CARRYING LOAD WITHIN TEMPERATURE RISE INDICATED IN THE INDIAN STANDARD SPECIFICATION IS: 6600 'GUIDE FOR LOADING OF OIL IMMERSED TRANSFORMER'.**

3.7.7 OVERLOADS: **THE TRANSFORMERS SHALL BE SUITABLE FOR CARRYING OVERLOAD WITHIN TEMPERATURE RISE INDICATED IN IS: 6600 'GUIDE FOR LOADING OF OIL IMMERSED TRANSFORMER'.**

3.7.8 CONNECTIONS: **H.V. DELTA AND L.V STAR CONNECTED WITH NEUTRAL BROUGHT OUT ON THE SECONDARY SIDE FOR CONNECTION TO EARTH; VECTOR GROUP DYN11 OF IS: 1180**

3.7.9 Tapping: Each transformer shall be provided with off Load circuit **Rotary type tap Switch** so as to provided for a voltage adjustment on H.V. side in line with the steps defined as in IS1180.

3.7.10 Transformer Losses: Should be as per IS1180 **Level-2**.

List of Fittings:

1) OTI WITH ALARM & TRIP CONTACT FOR OIL TYPE TRANSFORMER ONLY

2) WTI WITH ALARM & TRIP CONTACT.

3.8.0 LT SYSTEM

The design should comply for the following standards.

1.	IEC-439-1, 1992	Low voltage Switch gear and Control gear assemblies Part-I, type tested and partially type tested assemblies.
2.	IEC-947-1, 1998	Low voltage Switch gear and Control gear Part-I general rules.
3.	IEC-1180-1, 1992	High voltage test techniques for low voltage equipment Part–I definition test and Procedure requirement
4.	IEC-529, 1989	Degree of protection provided by enclosures (IP code)

EQUIPMENT SPECIFICATION

Air Circuit breaker (ACB)

General:

1. ACB shall comply with standards IS/IEC 60947-1 & 2.
2. ACB shall have a rated operational voltage of 415V AC, rated insulation voltage of 1000 volts AC, rated impulse voltage of 12kV.
3. ACB shall be of 3pole or 4pole (as per BOQ), air break, molded case design for longer life along with less maintenance requirement
4. ACB shall have a Ready to close mechanism preferably having a ready to close mechanical indication on front of ACB. All EDO ACBs ready to close indication contact which shall be used to give a single indication via indicating lamps on panel.
5. ACB shall comply with the environmental directives like RoHS and WEEE.

Performance:

6. ACB shall have the breaking performance Ics = Icu = Icw (1sec) = 50kA
7. ACB shall have minimum Mechanical life of 20000 operations
8. The operating mechanism of ACB shall be of the Open/Closed/Open stored-energy spring type. The closing time shall be less than or equal to 70ms, and of fast opening type with break time of breaker should be <30ms to ensure higher life of distribution cables.

Accessories & Auxiliaries:

9. Shunt trip and closing coil (having common AC/DC supply upto 250V) shall be continuous rated. For Incomer ACBs delayed type under voltage release shall be used to avoid nuisance tripping during voltage surges.
10. ACBs shall have minimum 4 change-over auxiliary contacts, available to be used for indication and interlocking, rated at minimum 10A 240/380V 50 Hz and shall be wired on chassis/cradle. There should be facility to add one more set of 4 contacts if required
11. Pre wired Fault trip contact should be provided with Release as standard.

Interlocks:

12. The racking handle shall be stored on the air circuit breaker in such a manner as to be accessible without defeating the door interlocking.

Terminations:

13. All air circuit breaker shall be fully tropicalized as standard & suitable for terminating copper or aluminium bus bars. Both fixed & draw-out circuit breakers shall have single pole-pitch. ACBs shall be provided with both side terminal adaptor.

Protections:

14. Air circuit breaker shall be provided with micro-processor release, which should be self-powered type without the need of any auxiliary power supply during normal operation of the breaker.
15. The circuit breaker control unit shall measure the true r.m.s value of the current
16. Circuit breaker trip unit shall have a display for measurement of current, voltage and energy. It shall be possible to view last 10 trip cause on trip unit.
17. All trip units provided shall have thermal memory as standard
18. All trip units shall be EMC/EMI tested
19. The protection release shall have following protections as standard: -
    a. Adjustable over load current (Ir) settings from 40% to 100% of rating of ACB (In). Over load time setting (tr) from 0.5s, 1s, 2s, 4s…….24s as field selectable curves.
    b. Short circuit setting (Isd) from 1.5 to 10 times of Ir setting, Short circuit time delay adjustable from 0 to 400 msec.
    c. Instantaneous (Ii) protection with an adjustable pick-up and an OFF position.
    d. Earth fault setting adjustable in absolute Ampere with time delay settings from 0 to 400ms.
20. Separately powered, individual fault trip indication LEDs (For overload, short circuit, earth fault and trip unit failure) shall be available on the trip unit which shall function even if the display fails.
21. The trip unit shall have integral test facility to verify the healthiness and to avoid external calibration.
22. It shall be possible to change the protection settings on line and the circuit breaker need not be switched off while adjusting the settings.
23. All ACBs in main LT panel shall be provided with zone selective interlocking which helps in reducing the thermal and dynamic stress on installation during short circuit and ground faults. The releases shall be suitable to communicate between incomer breaker and outgoing breakers enabling zone selective interlocking. The manufacturer shall supply all equipment like ZSI module, power supply and wiring connectors to implement ZSI.
24. It shall be possible to view the percentage loading of three phases at once on trip unit via LEDs or LCD display to help the user in identifying the current load balancing of the network. This will help in preventing the deterioration of loads affected by load balancing by identification of the balancing related issue.
25. All 4 Pole ACBs shall have fully rated neutral equal to rating of the breaker & shall be protected against over-load faults with provisions for settings neutral unprotected, neutral protection at 0.5In and neutral protection at 1.0 In to ensure precise neutral protection.

MOULDED CASE CIRCUIT BREAKERS:

General

- The circuit breakers shall comply with the requirement of IEC 60947 / IS 13947: 1993. MCCBs shall be suitable for nominal voltage of 3 phase 415 Volts AC 50 HZ supply.
- The circuit breaker shall comply with the isolation function requirement of IEC 60 947-2 section 7.1.2 to be marked as suitable for isolation / disconnection to facilitate safety of operating personnel while the breaker is in use.
- The circuit breaker shall provide class II insulation between the front cover and internal power circuits to avoid any accidental contact with the live main current carrying path with the front cover open.
- The MCCBs shall be have double break type rotary contact mechanism for quick break operations.

Constructional features

- The MCCBs shall be made of halogen free high strength heat resisting and flame retardant thermo setting insulating material.
- Three phase MCCBs shall have a common handle for simultaneous operation and tripping of all the three phases.
- MCCB shall comply with RoHS & WEEE norms.

Sr. No.	DESCRIPTION	REQUIREMENT	
1	Type of MCCB	Drawout type Manually Operated	
2	Type of Releases	Thermal Magnetic Type	Microprocessor Type
3	Rating (A)	100, 160 , 250	400 & 630
4	Over Load Release setting	0.7-1 In	0.5-1 In
5	No. of Poles	Three	Three
6	Rated Operational Voltage	415V	415V
7	Rated ultimate short circuit breaking capacity (Icu)	50kA rms	50kA rms
8	Rated service short circuit breaking capacity (Ics)	100% of Icu	100% of Icu
9	Utilization Category	A	
10	Rated Insulation Voltage	690 V	
11	Rated Impulse withstand voltage	8 kVP	

Operating mechanism

- The operating handle of the MCCBs shall be quick make / break, trip free type.
- The operating handle of the MCCBs shall have suitable, ON, OFF and TRIPPED indicators.

- The operating handle and mechanical trip push button shall be at the front of and integral with the circuit breaker
- MCCBs shall be capable of limiting the fault currents. The maximum thermal I^2 t shall be indicated by the manufacturer.
- MCCBs shall comprise of the mechanism designed to trip the circuit breaker in the event of high value short circuit currents.

- Earth fault protection if required shall be provided with modular earth fault module ,it should have adjustable time delay and earth fault sensitivity , there should be fault differentiation of over current and earth fault on panel door.
- All MCCBs used should be of the same family.
- MCCBs shall have termination where bus bars or cable lugs can be terminated by crossing the bolt between the lugs/bus bars and MCCB connections, to enhance safety and reliability of the terminations.

Metering System at LV Side

All meter shall be flush mounted with standard 96x96 dimensions and shall be enclosed in dust tight housing.

Meter shall have universal power supply, 90-415 VAC $\pm$ 10% and 120-300 VDC $\pm$ 10%.

- Operating temperature range: -25 to 50 deg C
- Humidity: 5% to 95% non-condensing
- Meter shall able to measure Total Harmonic Distortion (THD) in Voltage and Current with certified accuracy as per IEC 61557-12 .
- Meter shall have Mod bus RS485 communication port.

Multifunction meter at incomer side shall have additional information as stated below.

- Meter shall have accuracy class 0.5s as per IEC 62053-22 and sampling rate of 64sample/cycle.
- Meter shall have LCD display and measure per phase and average of all the basic electrical parameters like voltage, current, Power Factor, Hz, KW, KVA, KVAR
- Neutral current through a separate CT (not calculated value)
- Present and Predictive Demand monitoring with maximum values for KW, KVA and KVAR
- At least 2 selectable parameters from KWH, KVAH & KVARH with configurable interval and duration (e.g. 2 parameters at 15 minute interval for 60 days)
- Meter shall have provision to integrate additional Input/ Output signal as option.
- Meter shall able to measure and display individual harmonics up to 15th level.

Multifunction meter at outgoing feeders Level shall have additional information as stated below.

- Meter shall have accuracy class 1.0 as per IEC 62053-21 and sampling rate of 64sample/cycle
- Meter shall have LED display and measure per phase and average of all the basic electrical parameters like voltage, current, Power Factor, Hz, KW, KVA, KVAR, Demand monitoring
- Meter shall able to capture and communicate individual harmonics up to 15th level.
- Calibration LED and Heart beat LED status for network communication status.

i. Circuit breaker number of operation measurement
ii. Circuit breaker control (ON/OFF)
iii. Email notifications for undesired events like circuit breaker tripping on electrical fault, circuit breaker tripping on overload/short circuit/earth fault/trip unit failure etc.
iv. It shall be possible to send the energy consumption daily reports by Email or FTP directly from inbuilt web-pages
v. Circuit breaker ready to close and spring charge status
vi. Circuit breaker settings
vii. Circuit breaker last 10 trip and event history

3.8.3. HT & LT METERING:

SHALL BE AS PER SCHEDULE OF QUANTITIES

4.0 Package Substation – Configuration

HV Side	Transformer	LV Side
Options	Options	Options
3 Way RMU Comprising: Two ON load break SF 6 insulated switches and a VCB circuit breaker for transformer	Hermetically sealed oil type (ONAN) transformer	4P ACB **Note:** Ics=Icu=Icw for 1 Sec for ACB's

5.0 VOLTAGE CONFIGURATIONS OF PACKAGE SUBSTATION

a. 11 kV / 433 V

6.0 TYPE TESTS

11 kV / 433 V Compact substations HT switchgear must be type tested for 25 kA/1sec. Enclosure must be type tested for IAC 25ka/1sec.Enclosure must be type tested for Ingress protection on each compartment. It is mandatory to have temperature rise test on enclosure for K10class. PSS manufacturer should use all components of their own make like: HT, Transformer, LV and FRTU

THE SPECIFIC PARAMETER OF HT AND LT CABLES:

HT XLPE POWER CABLES NOMINAL VOLTAGE Standards:
Unless otherwise specified elsewhere in this specification, the rating as well as performance & testing of the HT XLPE power cables shall conform to the latest revisions available at the time of placement of order of all the relevant standards as listed in, but not limited to the below Annexure -I

Annexure-I
List of standards
(all amended up to date)

Sr No.	Standard No.	Title	
1.	IS:8130-1984	Conductors for insulated electric cables & flexible cords.	
2.	IS:7098(Part 2)-1985	XLPE PVC sheathed cable for working	voltages from
		3.3KV up to & including 33KV.	
3.	IS:5831 -1984	PVC insulation & sheath of electric cables.	
4.	IS:3975 - 1988	Mild steel wires, formed wires & tapes for armouring of cables.	
5.	IS:10462(Part I)-1983	Fictitious calculation method for determination of dimensions of protective coverings of cables	

General Technical requirements
6.35/11KV, 19/33KV earthed, multi core power cables shall normally be with stranded compacted H2/H4 grade aluminium conductor as per IS: 8130-1984, provided with conductor screening (of extruded semi-conducting cross link material) & shall be insulated with XLPE of natural color. Identification of cores shall be by color, as per provision of clause 13.1 of IS: 7098 (part 2)-1985.
The Insulation (XLPE) screening shall be provided consisting of extruded semi-conducting cross link material in combination with a metallic layer of copper tapes. Three such screened cores shall be laid up together with fillers and/or binder tapes where necessary & provided with extruded inner sheathing of heat resistant PVC conforming to type ST-2 of IS:5831-1984.
Maximum inner sheathing of heat resistant PVC conforming to type ST-2 of IS: 5831-1984.
Armouring shall be provided consisting of galvanized round wires (in case of single core cable armouring shall be of non-magnetic material) conforming to IS: 3975-1988 (amended up to date) & over the armoring a tough outer sheath of PVC compound shall be extruded. The PVC compound for the outer sheath shall conform to type ST-2 of IS: 5831-1084 (amended up to date). The color of the outer sheath shall be black. The cable shall be manufactured strictly conforming to IS: 7098(part 2)-1985 amended up to date & shall bear ISI mark.
Sequential marking of length on cable:
Non erasable sequential marking of length shall be provided by embossing on outer sheath of the cable for each meter length.
The quality of insulation should be good & insulation should not be deteriorated when exposed to the climatic conditions.
Discharge free construction:
Inner conductor shielding, XLPE insulation & outer shielding shall be extruded in one operation by special process (viz. triple extrusion process) to ensure that the insulation is free from contamination & voids & perfect bonding of inner & outer shielding with insulation is achieved. The bidders are requested to elaborate the manufacturing technique adopted by their manufacturers to achieve this motive.
The company shall furnish attested documents for verification that the cable is manufactured

with triple extrusion process. If found that the firm is not manufacturing the cable with triple extrusions process the cable shall not be accepted.

Continuous A.C. current capacity:

Conductor sizes in mm2	Continuous a.c. current capacity in amps at maximum conductor temp. of 90ºC			
		When laid direct in the ground		When laid in air 40ºC
	30ºC			
		11KV	33KV	11 & 33KV
70	160	155	165	
95	190	175	200	
120	215	195	230	
150	240	225	265	
185	270	255	310	
240	315	290	345	
300	355	325	396	
400	405	385	460	
500	450	450	590	

Short Circuit Current:
Short circuit current of 11 & 33KV XLPE cable shall be as given below:

Duration of short circuit in sec t	Area of Al. Conductor mm2 A	Short Circuit in KA I=0.094 x A/√t
1	70	6.58
1	95	8.93
1	120	11.28
1	150	14.10
1	185	17.39
1	240	22.56
1	300	28.20
1	400	37.60
1	500	47.00
1	630	59.20

Tests & Testing facilities: Type tests:
All the type tests in accordance with IS: 7098(part 2)-1985, amended up to date, shall be performed on cable samples.
The certificate displaying that the Type tests have been successfully carried out by the manufacturer shall be furnished for any one size of cable ordered for each voltage grade.

Routine Tests:
All the routine tests as per IS: 7098(Part 2)-1985 amended up to date shall be carried out on each & every delivery length of cable. The result should be given in test report. Partial discharge test must be carried out in a fully screened test cell. It is therefore, absolutely essential that the manufacturer should have the appropriate type of facility to conduct this test which is routine test.

Acceptance Tests:
All acceptance tests as per IS: 7098(part 2)-1085 as modified up to date including the optional test as per above clause & flammability test shall be carried on sample taken from the delivery lot.

Short Circuit Test:
The contractor shall furnish the certificate for short circuit test as a type test carried out on any one size of each voltage grade shielded XLPE cables ordered at a recognized testing centre at the cost of the supplier.
The short circuit test shall be preceded & followed by the following tests so as to ensure that the characteristics of the cable remain within the permissible limits even after it is subjected to the required
short circuit rating.
a)Partial Discharge test, b) conductor resistance test & c) high voltage test.
The manufactured cable will be acceptable only after such a sample test is sucessfully carried out at CPRI.

Packing & Marking: Identification marks on cable:
The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter through out the lenght of the cable. The cables with poor & illegible embossing shall be liable for rejection.

a) Manufacturer's name & or Trade name
b) Voltage grade
c) Year of manufacture
d) Successive length
e) size of cable
f) ISI mark

The cable shall be supplied in continuous standard length of minimum 250 running meters with plus minus 5% tolerance wound on non returnable wooden drum of good quality & non-standard lengths not less than 100 mtrs upto 5% of the ordered quantity shall be accepted. Alternately cable can be supplied wound on non returnable steel drum without any extra cost to the purchaser. Packing & marking shall be as per clause no.21 of IS:7098(Part 2)-1985 ammended up to date.

Supplier should provide statistical data regarding cables of all sizes viz.:--
1) Weight of one meter of finished product of cable of orders sizes & ratings.
2) Weight of one meter of bare conductor used for cables of orders sizes & grade.

ERECTION OF CABLES
The power cables shall be buried directly in the ground in trenches of size specified as per bidding schedule. The rate for laying of cables shall include laying of cable in trench & storing

of the cables. The rates for laying of cables shall also include provision of necessary cable markers made of concrete blocks which shall be placed over ground indicating location of cable. Cable markers shall be provided every 25 meters apart & along the length of the cable. The markers shall protrude 400mm above ground & grouted at least 600 mm depth in plumb masonry & shall be painted with enameled yellow color background & with black letters indicating "11/33KV Power Cables". An extra marker inscribed "BEND" in addition to displaying "11/33KV Power Cables" should be provided at all bends.

The rate for excavation, provision of sand cushions of 150 mm above and below the HDPE/cables, protective laying of HDPE pipe, back filling, etc. is a separate item in the bidding schedule. This item also includes provision of cables markers.

The cable shall be laid / executed as per code of practice IS 1255 / 1967. The cable spacing shall be as per IS 1255 / 1967 amended up to date. Cables should be laid on cable trays, on racks, in ducts, in cable trenches, on walls / columns with suitable clamps, saddles, etc. as applicable and the rates for cable laying should include clamps, saddles, hardware, etc. Cables should be reeled / released out from their drums in such a way that no kinks are formed; and damage, twists, excess band of the cables is not allowed. The drums should be mounted on a rollers / jack, which is supported on two ends in such a way, that the drum is lifted off the ground and is free to rotate. Where lengths of more than 10 mtrs are being rolled off a drum, cable runners (roller assemblies) should be used to prevent abrasion damage to the cables.

The cables across road ways / carriage ways crossings shall be laid in 150mm diameter GI pipe.

Cables shall be laid with slight slack in the trench to allow for the settlement of earth. Jointing kits shall be provided to the ends of the H.T. cables.

The XLPE armored cable of specified size shall be crimped with suitable lugs. Supply & crimping of suitable lugs is in the scope of the contract & shall be provided at the contractors cost.

JOINTING AND TERMINATION:

The jointing and termination of cables shall be in accordance with relevant I.S. amended up to date. TEE/Straight Joint shall be made for XLPE cables as per the instructions of the engineer – in charge. Crimping lugs shall be utilized for terminating purpose. Brass glands of suitable sizes shall be / provided the ends with proper earthing continuity.

HT /LT cable termination: i.e. end / straights through & end termination & shall be as specified in schedule of makes, heat shrinkable / push on type and conforming to relevant IS standard.

TECHNICAL SPECIFICATION FOR 3-PHASE 11KV OUTDOOR/INDOOR CABLE TERMINATION (Heat Shrinkable) KITS.

a. Scope:-

This specification is for heat shrinkable cable (outdoor/indoor) termination kits complete, confirming to ESI 0913 and IS/13573:1992 including amendment no. 1, March 1996 for use on both effectively earthed and/or non-effectively earthed 11KV electrical systems.

B. General:-

The term 'heat shrinkable' refers to extruded or moulded polymeric materials which are cross-linked to develop elastic memory and supplied in an expanded or otherwise deformed size and shape. Subsequent heating in an unconstrained state to a temperature above the shrink temperature results in the material recovering or shrinking to its original shape

C. Class of termination:-

The heat shrinkable cable termination shall be of class 1 termination as declined in IS:13573 and as amended upto date. Class 1 high voltage cable termination provides:

i. Electric stress control at cable insulation shield terminus by means of heat shrinkable stress control tubing.
ii. External leakage insulation between high voltage conductor and ground by means of non-tracking, corrosion and weather resistant tubing.
iii. A seal to prevent the entrance of external environment into the cable by means of hot melt, non tracking, weather resistant sealants to provide a flexible and efficient seal.

D. Stress Control in the termination and joints:-

The stress control function at the screen out back shall be provided by a heat shrinkable tubing having volume resistivity of minimum 10 ohmmeter for both terminations and joints. Also, the relative permittivity shall be minimum 25. This gives an optimum electrical stress control through defined impedance of 10 deg ohm-cm. Impedance of stress control tubing shall not change over a range of temperatures from 0°C to 125°C. The impedance shall also remain constant in spite of the differences in stress which will exist within the sleeve due to heating effect within the conductor and the temperature of environments The stress control tubing shall be void free. At the semi conducting screen cut-back, conducting paint, yellow void filling mastic shall be used for extending the semi conducting screen on to the insulation. The bidder shall adequately establish this fact in his bid by way of the graph illustrating the effects of stress temperature and ageing on the impedance of the stress control tubing

E. Non cracking: erosion and weather resistant protection to the cable insulation:- heat shrinkable flexible polymeric tubing preferably red coloured and possesing non- cracking , erosion and weather resistant properties shall be used as an external covering for the Cable cores for both indoor and outdoor terminations. It should withstand the long term weathering effects either die rains polluted atmosphere or by heavily industrial and saline polluted atmosphere

F. Environmental sealing:-

Adhesive and sealants shall be provided in the termination and jointing kits for environmental sealing against ingress of moisture and aggressive gases. These hot melt adhesives and sealants shall flow due

to heating of heat shrinkable components during installation and shall fill all voids and adhere to metal connectors and cable sheaths. Where such sealants and adhesives are exposed to high

electrical stress, they shall become crack resistant.

Sealing for terminations:-
At the lug end, sealing of the strands between the lug barrel and cable insulation shall be provided by:-

- Non cracking, erosion and weather resistant heat shrinkable tubing precoated with non cracking sealant.
- Non cracking sealant strips.
- The adhesives and sealants shall be of non-cracking type.

G. Provision of additional creepage for outdoor termination:-
Single piece, heat shrinkable weather sheds having non cracking crosion and weather resistant properties shall be supplied with the kits for application over the non cracking tubing. The quantity of sheds to be supplied shall depend on voltage grade and application (outdoor). Three numbers weather sheds per phase for 11 KV shall be supplied for the outdoor terminations. Each shed shall give an additional creepage length of at least 100mm.

H. Packing of the Kit:
All components shall be sealed separately and marked clearly for the purpose of identification of each component. The components shall be supplied in a single package as a complete kit for one termination/joint and shall bear the manufacturers name and the cable size/sizes or kit size for which it can be used.

RAIL POLES 105 lb/yd 13 mts long
The poles shall be as specified in the schedule & should be of Rail /RCC design as specified in the drawing & of standard quality & dimensions. The RCC poles shall be of standard quality & dimensions. Transportation, loading & unloading of the poles are in the scope of the tender & shall be quoted in the Schedule for erection of poles as per the instructions of the Engineer-in-charge. The delivery challan in original are to be furnished during the supply of the above poles.

Erection of poles:-
The pole pit should be of size 60 cm x 60 cm x depth, where depth is equal to the 1/6th of the height of the respective pole in all types of soil laterite/hard rock. The pole is to be erected in alignment with utmost care and should be backfilled properly by ramming and concreting in the ratio 1:2:4(concreting is to be measured separately). The foundations shall be conforming to drawings enclosed. The RCC poles shall be utilized for the transformer Centre.

HDGI STAY SETS
The HDGI stay wire of size 7/10swg alongwith the break insulator of 88 KN to be used along with the HDGI stay clamps and turn buckle. The Stay wire shall comply with the specific requirements of IS:2141-1979, IS:4826-1979 & IS:6594-1974 or the latest versions thereof. The wires shall be of tensile grade 4 & having minimum tensile strength of 700 N/mm2 conforming to IS:2141. HDGI stay rod of 1200mm long and 16mm dia with an eye band of internal dia 40mm at one end and threaded up to length of 200mm at the other end galvanized. HDGI stay plate of 450x450x8mm size with a hole drilled at the centre to suit 16mm dia HDGI rod galvanized. HDGI stay wire standard of size 7/3.15mm (7/10SWG) wire should conform to ISS-2141/68 grade I and hot dipped galvanized as per IS 4826/1968 with up to date amendments. Two nos of HDGI square washer of size 40x40x6mm to suit the 16 mm dia GI rod. Two nos of HDGI hexagonal nut and bolt suitable for threaded portion of the stay rod mentioned above and conforming to IS-1365/67 with amendment No-1. All the GI materials shall conform to IS -226/75 with amendment No- 1 to 3 tested quality. The breaking load shall

be 63KN min proof load (40% of breaking load shall be performed on all the stay sets. These figures have been taken from IS-16/74 . One no. of turn buckle made out of 16mm dia HDGI rod and 50x50x6mm M.S. angle.

One eye bolt made out of 20mm dia HDGI rod with 40mm inner dia eye at one end threaded up to 300mm length from the other side. Two nos HDGI nuts suitable for the threaded portion of eye bolt material specification IS-226/77 (tested quality) The breaking load and proof load shall be as per BS16/64 with amendment No-1. HDGI wire with tensile strength 32Kg/mm to 55Kg/mm soft quality 4.00mm dia 8SWG wire should conform to ISS-280/1972 and galvanised to heavy type as per ISS-4826/1968 with up to date amendments.

ERECTION OF STAY SET:-

Includes excavation of pit size 0.6 x 0.6 x 1.0 mtr. in all kinds of soil laterite/hard rock and providing of stay set by using 7/10 swg HDGI. stay wire, 88 KN break insulator, Turn buckle, I hook and fixing the same to pole with set of stay clamps with G.I. bolts/nuts and embedding stay plate and rod by excavated soil with ramming and concreting in the ratio 1:2:4.

The stay rod should be hot dipped The entire stay rod leaving the top 10cm. with plate should be embedded in a the pit with an angle between 30 to 45 degrees of stay wire with the pole. The stay pit should be filled with PCC of ratio 1:2:4. The G.I. stay wire of size 7/10 SWG should be used with a break insulator of 8KN at a height of 5mtr above ground level with HDGI. turn buckle. All the Nut bolts shall be hot dipped I and of appropriate size with full thread.

H.T & L.T. BREAK INSULATORS

The strain insulators shall be sound, free from defects, thoroughly vitrified & smoothly glazed & shall comply with the IS:5300-1969 or the latest version thereof. The L.T. strain insulator shall have a minimum failing load of 44KN whereas the H.T. strain insulator shall have the minimum failing load of 88KN.

CEMENT CONCRETE:-

Cement concrete in the ratio 1:2:4 (1part of cement, 2 parts of sand and 4 parts of metal) is to be used for concreting of poles & muffing properly curved. The muffing is to be properly plastered with adequate ratio of cement concrete. The rate quoted for the item should also include cost of centering, shuttering watering, curing etc.

DANGER BOARDS

A similar one shall be made for L.T. line displaying 440/240volts & 11000Volts. The danger boards shall be as per the relevant IS for 11KV/33KV voltage & LT voltage and duly enameled and fixed with proper clamping arrangement.

H.D.G.I. TOP INSULATOR FITTING for L.T. & H.T.

11 KV PIN INSULATORS 10KN along with H.D.G.I

11 KV PIN INSULATORS 10KN along with H.D.G.I. Pin11KV Brown glazed pin insulator having minimum failing load of 10KN in transverse direction & 45KN applied axially. The minimum creepage distance shall be of 320 mm conforming to type B of IS:731/71 & IS:3188 as amended from time to time. The dimensions of the pin insulator will be as per drawing no. The insulator shall be sound, free from defects, thoroughly vitrified & smoothly glazed. The pin for the said insulator shall be HDGI. Small steel head type S 165 P as per IS: 2486 (Part-I & II) having stalk length of 165 mm and shank length of 150mm with a minimum failing load of 10KN with hexagonal nut & one spring washer. Details of the Pin are shown in the enclosed drawing. The pins shall be of good finish, free from flaws & other defects. All ferrous pins, nuts & washers, except those made of stainless steel shall be galvanized. The threads of nuts & taped holes, when cut after galvanizing shall be well oiled or greased. The pins shall comply with the

test requirements as per IS: 2486(Part-I)-1993 or latest version thereof.

HT/LT/ROAD CROSSING GAURDINGS

The Guarding shall consists of HDGI guard cross arm of length 6 ft. made out of 75 x 40 x 6 mm channel & shall be hot dipped galvanized generally conforming to IS-2633/72. The clamps shall also be hot dipped galvanized generally conforming to IS - 2633/72 & suitable for rail pole & for RCC Poles. Guarding shall be erected with ground & line clearances as per the I.E. rules. The guarding for 11KV line has been provided with G.I. wire 8 SWG, binding wire & suitable HDGI. I bolt & nut bolts for cross arm to cross arm including earthing with 50mm, 2.5mts. long HDGI. pipe etc.. two sets per span. The spacing between each guard loops between two poles shall be conforming to the relevant specifications as per the I.E. rules. Guard loops shall be provided 15-18 loops per span for road crossing & L.T. line crossing & 8-10 spans for along road & elsewhere.

`V' SHAPE CROSS ARM

X-arms shall be made out of 100 x 50 x 6 mm M.S. channel & shall be hot dipped galvanized generally conforming to IS - 2633/72. The X-arm should not be welded/joined at any place except as specified in the drg. and should be hot dipped galvanized generally conforming to IS - 2633/72.

Erection of cross arms:

The cross arms shall be fitted horizontally onto the top end of the poles, at a height conforming to the relevant I.E. rules & utilizing suitable size of HDG.I. clamps & HDG.I. nut bolts.

ERECTION OF CROSS ARMS:

The cross arms shall be fitted vertically onto the top end of the poles, at a height conforming to the relevant I.E. rules & utilizing suitable size of HDG clamps & HDG nut bolts.

HDGI. CLAMPS FOR VARIOUS SIZES:-

As per drawing enclosed, all clamps & suitable nut bolts shall be hot dipped galvanized generally conforming to IS - 2633/72.

ACSR RACOON CONDUCTOR:-

Hard drawn stranded aluminium conductor & conforming to IS: 398(Pt-I/76) with amendment no. 1,2 & 3 & of size **6/1/4.09 (nominal aluminium area 80mm²) (250amp max at 45°C)**. Regarding packing of the drum should be conforming as per IS:1778/80 with amendment no. 1. The conductor shall be wound with protective wrapping (Cl. 5.1) & also protective lagging (Cl. 5.2 of ISS). The wires shall be smooth & free from all imperfections, such as spills & splits. No joints shall be permitted in any wire.

Stringing of conductor:-

It includes spreading of specified conductor without any damage and stringing with proper tension without any kinks/damage including binding of conductor at pin points, jumpering at cut points etc. The ground & line clearances at road crossings, along roads, L.T. Crossings & other crossings shall be as the relevant I.E. Rules. Tree cutting wherever required is to be carried out before stringing of the Conductor with prior permission of the Engineer in charge. The rates for Stringing of conductor in Bidding Schedule shall include cost of tree cutting as well.

CHAPTER-3

LIST OF APPROVED MAKES OF EQUIPMENTS / MATERIAL

Sr. No.	Description	Makes
1	Compact Sub-Station	ABB / Siemens / Schneider
2	Ring Main Unit (SF6)	ABB / Siemens / Schneider
3	LV Inside the Compact Sub-Station	ABB / Siemens / Schneider
4	FRTU	ABB / Siemens / Schneider
5	Numerical Relays	ABB / Siemens / Schneider / C&S
6	ACB's	ABB / Siemens / Schneider
7	MCB / ELCB / RCCB / ISOLATORS / MCCB / DISTRIBUTION BOARDS	ABB / Siemens / Schneider / L&T
8	Transformer	ABB / Siemens / Schneider / Kirloskar
9	PVC pipes and accessories	Precision / Avonplast / AKG / Modi / Polycab
10	Copper multi-strand wires	Polycab / Finolex / Gloster / L&T / KEI / Indo Asian / HPL
11	Outdoor Boxes	Clipsal / Henzel / Hunter / Sintex / National
12	Industrial Sockets	Schneider / Legrand / Crompton / Cuttler Hammer / C & S
13	UG Cables	Polycab / Asian / Gloster / CCI / Finolex
14	Cable Jointing	Raychem / CCI – Xycon / Cabseal / M Seal
15	CT's / PT's	AE / Indcoil / Kappa / Pragati / ECS
16	Contactor / Timer / Starter	L&T / Schneider / Siemens / C&S
17	Trivector Meter / Energy Meter	L&T / Schneider / Siemens / C&S

Annexure – F

(See clause 3 of Section 2-ITB)

PROCEDURE FOR PARTICIPATION IN E-TENDERING

1. Procedure for participation in E-Tendering

1. Registration of Bidders on e-Tendering System

All the PWD registered bidders from Madhya Pradesh or any other State of India with relevant experience are already registered on the new e-procurement portal https://www,mpeproc.gov.in. The user id will be the Contractor ID provided to them by MP Online. The password for the new portal has been sent to the Bidders on registered email ID. For more details may contact M/s Tata consultancy Services Corporate Block, 5th floor, DB city Bhopal-462011, email id: eprochelpdesk@mpsdc.gov.in. Helpdesk phone numbers are available on website.

2. Digital Certificate:

The bids submitted online should be signed electronically with a class III Digital Certificate to establish the identity of the Bidder submitting the bid online. The Bidders may obtain class III digital certificate issued by an approved certifying authority authorized by the Controller of Certifying Authorities, Government of India. A class III digital certificate is issued upon receipt of the required proofs along with an application. Only upon the receipt of the required documents, a digital certificate can be issued. For details, please visit **http:cca.gov.in.**

Note:

i. It may take up to 7 (seven) working days for issuance of class III digital certificate; hence the Bidders are advised to obtain the certificate at the earliest. Those Bidders who already have valid class III digital certificate need not obtain another digital certificate for the same. The Bidders may obtain more information and the APPLICATION FORM REQUIRED TO BE SUBMITTED FOR THE ISSUANCE OF DIGITAL CERTIFICATE FROM **http:cca.gov.in.**

ii. Bids can be submitted till bid submission end date. Bidder will require digital signature for the bid submission. The digital certificate issued to the authorized user of a partnership firm/ private limited company/ public limited company and user for online bidding will be considered as equivalent to a no-objection certificate/ power of attorney to that user.

In case of partnership firm, majority of the partners have to authorize a specific individual through authority letter signed by majority of partners of the firm.

In case of private limited company, public limited company, the Managing Director may authorize a specific individual through an Authority Letter. Alternatively, a Board resolution may be passed authorizing such individual. Unless the authority letter or Board resolution is revoked, it will be assumed to represent adequate authority of the specific individual to bid on behalf of the organization for online bids as per The Information Technology Act, 2008. Information Technology Act 2008. This Authorized Representative/ User will be required to obtain a digital certificate. The Digital Signature executed through the use of the responsibility of Management/Partners of the concerned firm to inform the Certifying Authority, if the authorized user changes, and apply for a fresh Digital Certificate for the new Authorized user.

3. Set Up of Bidder's Computer System:

In order for a Bidder to operate on the e-tendering System, the computer system of the Bidder is required to be set up for Operating System, Internet Connectivity, Utilities, Fonts, etc. The details are available at https://www.mpeproc.gov.in.

4. Key Dates:

The Bidders are strictly advised to follow the Key Dates as mentioned in **Annexure - A** .

5. Preparation and Submission of Bids

The Bidders have to prepare the proposal online, encrypt their bid data in the Bid forms and submit Bid of all the envelopes and documents related to the Bid required to be uploaded as per the key schedule in adherence to the key dates of the NIT under the digital signature of the authorized representative.

6. Purchase of Bid Document

For purchasing of the bid document, Bidders have to pay applicable bid amount only through online mode as per Bid Data Sheet. The cost of Bid document is separately mentioned in the detailed NIT. The Bid Document shall be available for purchase to concerned eligible Bidders immediately after online release of the bids and up to scheduled time and date as set in the key dates. The payment for the cost of bid document shall be made online through Credit/ Debit/ Cash Card or via internet banking.

7. Withdrawal, Substitution and Modification of Bids

Bidder can withdraw and modify the bid before submission end date.

Note:

- Bidders are requested to visit our e-tendering website regularly for any clarifications and/or due date extension or corrigendum.
- Bidder must positively complete online e-tendering procedure at www.mpeproc.gov.in.
- GSCDCL shall not be responsible in any way for delay/ difficulties/ inaccessibility of the downloading facility from the website for any reason whatsoever.
- In case, due date for opening of bids happens to be a holiday, the due date shall be shifted to the next working day for which no prior intimation will be given.
- GSCDCL reserves the right for extension of due date of opening of technical and or financial bid.

ANNEXURE-G
(See clause 4 of Section 2-ITB)

Consortium Agreement

This Consortium Agreement (Agreement) entered into this day of [*Date*] [*Month*] 2018__ at [*Place*] between _____ _____ (hereinafter referred to as "_____") and having office at [*Address*], India, as Party of the First Part and _____ _____ (hereinafter referred as "_____") and having office at [*Address*], as Party of the Second Part and _____ _____(hereinafter referred as "____").

_____and _____ are individually referred to as a '**Party**' and collectively as the '**Parties**'.

WHEREAS Gwalior Smart City Development Corporation Limited (GSCDCL), has issued a RFP No. ___ dated _____("**RFP**") for Development of Smart Roads in ABD Area of Gwalior Smart City Mission (hereinafter referred to as the "**Project**")

AND WHEREAS the Parties have had discussions for formation of a Consortium for submitting the Bid for the Project and have reached an understanding on the following points with respect to each of the Parties' rights and obligations towards each other and their working relationship.

NOW THEREFORE, in consideration of the mutual promises, conditions and covenants set out herein, the Parties hereby agree as below:

i. The purpose of this Agreement is to define the principles of collaboration among the Parties to:
   a. jointly Bid for the "**Project"** as a Consortium.
   b. sign license Agreement with GSCDCL in case of award ("Contract").
   c. provide and perform the supplies and services which would be ordered by GSCDCL pursuant to the Contract.

ii. This Agreement shall not be construed as establishing or giving effect to any legal entity. It shall relate solely towards GSCDCL for the "**Project"** to be performed and shall not extend to any other activities.

iii. The Parties shall be jointly and severally responsible and bound towards GSCDCL for the Project in accordance with the terms and conditions of the RFP and the Contract.

iv. ---------- (Name of Party) shall act as Lead Bidder of the Consortium. As such, it shall act as the coordinator of the combined activities of the Consortium and shall carry out the following functions:

   a. to ensure the technical, commercial and administrative co-ordination of the Project;

   b. to lead the Contract negotiations with GSCDCL;

   c. to receive instructions and incur liabilities for and on behalf of all Parties; and

d. in case of an award, act as channel of communication between GSCDCL and the Parties for execution of the Contract.

v. That the Parties shall carry out all responsibilities in terms of the Project "_____"

vi. That the broad roles and the responsibilities of each Party as per each member's field of expertise at each stage of the bidding shall be as below:

Party A: _____

Party B: _____

vii. That the proposed administrative arrangements (organization chart) for the management and execution of the Project shall be as follows:

_____

viii. That the profit and loss sharing ratio shall be _____.

ix. That the Parties agree that all the members of the Consortium shall be jointly and severally liable for all obligations in relation to the Contract until the completion of the Project in accordance with the Contract.

x. The Parties affirm that they shall implement the Project in good faith and shall take all necessary steps to see the Project through expeditiously.

xi. That this Agreement shall be governed by and construed in accordance with the laws of India and courts in _____ shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

IN WITNESS WHEREOF the Parties affirm that the information provided is accurate and true and have caused the Agreement duly executed on the date and year above mentioned.

(Party of the First part) (Party of the Second part)

Witness:

_____ ___ ii_____ ___

I. *Draft Joint Venture Agreement*

(To Be Made On Stamp Paper of Requisite Value and Notarized)

This Joint Venture Agreement ("AGREEMENT") made at _____ on this __ day of _____, 2012

BY AND AMONGST

M/s _____ {*Lead Member (JV Member 1*)}, a _____ incorporated under _____ *(name of the relevant act/law of under which registered in the Country of Registration)* and having its registered office / a company incorporated under the Laws of _____ (hereinafter referred to as "_____", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors in interest, subsidiaries and assigns) of the **ONE PART**;

AND

M/s _____ (*JV Member 2*), a _____ incorporated under the _____ and having its registered office / a company incorporated under the Laws of _____ (hereinafter referred to as "_____", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors in interest, subsidiaries and assigns) of the **SECOND PART**;

AND

M/s _____ (JV *Member 3*), a company incorporated under the _____ and having its registered office / a company incorporated under the Laws of _____ (hereinafter referred to as "_____", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors in interest, subsidiaries and assigns) of the THIRD PART

(_____, _____ and _____ shall be individually referred to as a "Party" and jointly referred to as the "Parties" or "JV Members").

WHEREAS:

A. Gwalior Smart City Development Corporation Limited (GSCDCL), has issued a RFP No. ___ dated _____("**RFP**") for Development of Smart Roads in ABD Area of Gwalior Smart City Mission (hereinafter referred to as the "**Project**")

B. M/s _____, M/s. _____ and M/s. _____ have agreed to consolidate their resources and experience, and apply jointly as a Joint Venture (hereinafter referred to as the "Joint Venture"), vide this Joint Venture Agreement, for the purpose of implementing and completing the Project, within time frame stipulated in the Request for Proposal Document (hereinafter referred to as the "RFP document").

C. M/s _____, M/s. _____ and M/s. _____ have therefore agreed to enter into this Joint Venture Agreement in respect of the submission of the Bid/ Proposal for the Project on the terms set out below.

NOW THEREFORE IN CONSIDERATION OF THE PREMISES AND THE MUTUAL, CONDITIONS AND CONVENANTS HEREIN CONTAINED THE PARTIES HEREBY AGREE AS BELOW:

1. The recital herein contained shall constitute anintegral and operative part of this Agreement.

2. The Parties hereto agree to consolidate their resources and hereby form a Joint Venture to jointly prepare, submit and Bid for the Project, which has financing benefits, as detailed in the RFP document issued by GSCDCL for the implementation and completion of the Project.

3. The Parties hereto agree that _____ shall be the Lead Member and _____and _____ shall be the JV Members 2 & 3 respectively of the Joint Venture.

4. The Parties shall mutually and jointly take all the decisions in respect of the Project on behalf of the Joint Venture. _____ (*Lead Member*) shall be authorized to act on behalf of the Joint Venture as their representative for implementation and completion of the Project.

5. _____ undertakes that it has the necessary qualification to fulfill technical and financial capability criteria for the implementation and completion of the Project as detailed in the RFP Document {including the draft Concession Agreement (Section-II of the RFP document)}.

6. Special Purpose Company (SPC)

   For the purpose of execution of the Project, in the event of award of the Project to the Joint Venture, the Parties will set up a Special Purpose Company ("SPC"), formed under the Companies Act, 1956. The common equity shareholding pattern of the SPC shall consist of _____% shares to be held by _____, _____% shares to be held by _____, and _____% shares to be held by _____.
   _____ (*Lead Member*) shall individually and compulsorily hold at least 26% equity stake in the SPC till the end of the Concession Period. On successful award of the Project, the SPC shall enter into Concession Agreement ("Concession Agreement") with GSCDCL (as per the RFP Document), which shall specify the terms and conditions of the completion of the Project and shall carry out all the responsibilities in the terms of the RFP Document.
   The registered office of the Joint Venture/SPC shall be located at _____.

7. Operation & Maintenance (O & M)

   _____, _____ and _____ shall be jointly and severally liable for the implementation, operation, maintenance and management of the Project in accordance with the terms of the RFP Document. It is further unanimously agreed by the Parties that the Lead Member, along-with other JV Members 2 & 3 in the SPC shall:-

   a) coordinate the day to day activities of the Joint Venture/SPC;

   b) undertake to be jointly and severally liable/responsible for all the obligations and liabilities relating to the Project, in accordance with the terms of the RFP Document and the Concession Agreement with GSCDCL, till the end of the Concession Period;

   c) complete all works assigned under the RFP Document (including Concession Agreement) within the time period stipulated in the RFP document; and

   d) execute individual/independent Deed of Guarantee by all JV Members, towards the SPC, in favour of GSCDCL for the pledging / providing technical, financial and such other supports as may be necessary for the performance of works assigned under the RFP Document (including draft Concession Agreement) within the time period stipulated in the RFP document.

8. Role and Resposibility

The role and the responsibility of each Party for the implementation, operation & maintenance and execution of the Project shall be as follows:

Name of Member	Type of Member	Role & Responsibility
_____	JV Member 1 (Lead Member)	_____
_____	JV Member 2	_____
_____	JV Member 3	_____

9. _____

All the basic/fundamental terms and conditions of this Agreement shall be incorporated in the Article of Association of the SPC (to be incorporated by the Parties). Any other terms and conditions to the extent not agreed upon by the Parties in this Agreement (and which are not contradictory to the basic/fundamental provisions of this Agreement) shall be mutually agreed upon by the Parties and incorporated in the Article of Association of the SPC.

10. Confidentiality

All information, document, etc. exchanged between the Parties related to this agreement or the preparation of any Bid or the performance of the Project shall remain confidential and shall not be revealed to third parties for a certain time period to be agreed upon. Unless otherwise required by law, the Parties undertake not to disclose to any third party or any else and / or use any Information, without prior consent of the other Party.

11. Term and Duration

This Agreement shall come into effect on the date of submission of the Bid/Proposal for the development, implementation/execution and completion of the Project. This Agreement shall terminate upon the successful completion of the Project and may be extended further for such period as may be required by the GSCDCL. This Agreement can be terminated only upon Joint Venture's /SPC's Bid for the Project is conclusively rejected by the GSCDCL.

12. Costs/Expenses

All out-of-pocket expenses/costs of and incidental to this Agreement including stamp duty and registration fees, if any shall be borne and paid by the Parties in proportion to their shareholding in the SPC. Each Party shall pay and bear their own advocated/solicitors fees in the preparation of this Agreement.

13. Indemnity

The Second and the Third Part of this Agreement undertakes to indemnify the lead member from and against all direct and indirect damages, losses, liabilities, obligations, claims or proceedings of any kind, interest, penalties, cost, fee, or expenses (including, without limitation, reasonable attorneys' fees and expenses), suffered, incurred or paid, directly, as a result of, in connection with or arising from any breach of its covenants, obligations and responsibilities hereunder, including any act or omission or negligence, or of any Applicable Law, attributable to Second and the Third Party's negligence or wilful default in performance or non-performance under this Agreement.

14. Governing Law

This Agreement shall in all respect be governed, construed and interpreted in accordance with laws of Republic of India.

15. Settlement of Disputes

(a) Any disputes arising out of this Agreement shall be amicably settled by the authorised representatives of the Parties, failing any such disputes shall be resolved by Arbitration in accordance with the Arbitration and Conciliation Act, 1996, as amended by one or more arbitrators appointed in accordance with the said Act. This Clause shall survive the termination of this Agreement..[Language of Arbitration shall be English]. The venue of the Arbitration proceedings shall be in _____, India. The Parties jointly and severally undertake that the implementation and completion of the Project shall not be affected during the dispute(s) or the settlement of dispute(s) period.The Award rendered by the Arbitral Tribunal shall be final and binding upon the Parties.

(b) In the event of a dispute between the Parties over the subject of this Agreement , the prevailing party shall be entitled to reasonable advocates/solicitors' fees and costs incurred in the resolution of such dispute.

16. Amendments –

This Agreement can be amended or suppressed by further Agreement made in writing at the request of any of the Parties after unanimous approval by the Parties and by obtaining prior consent and written approval from GSCDCL.

17. Notices

Any notices, requests, demands or any communications from any party to the other party under this Agreement shall be by Regd./Speed mail or facsimile transmission sent to the addresses as indicated in this Agreement. Any party may change its address but shall promptly inform GSCDCL and the other Parties/JV Members of any such change.

18. Language –

The official language of this Agreement and all future Agreements shall be English.

19. Assignment –

None of the Parties to this Agreement shall have the right to assign its benefits or liabilities under this Agreement to any other company, firm or person without obtaining prior consent and written approval of GSCDCL.

20. Entire Agreement –

This Agreement constitutes the entire Agreement between the Parties and supersedes all prior writings, Agreements or understandings; written or oral relating to the subject matter thereof.

IN WITNESS WHEREOF the Parties hereto have caused this Agreement to be executed by their duly authorized representatives the day and year first above written.

SIGNED AND DELIVERED BY _____

By: _____

Title: _____

Date: _____

SIGNED AND DELIVERED BY _____

By: _____

Title: _____

Date: _____

SIGNED AND DELIVERED BY _____

By: _____

Title: _____

Date: _____

Witness:

1. _____
2. _____

ANNEXURE-H

(See clause 12 of Section 2 ITB& clause 4 of GCC)

ORGANIZATIONAL DETAILS
(To be enclosed with technical proposal)

S.N.	Particulars	Details
1.	Registration No. issued by centralized registration system of Govt. of MP or proof of application for registration	(If applicable, scanned copy of proof of application for registration to be uploaded)
2.	Valid registration of Bidder in appropriate class through centralized registration of Govt. of MP Registration no……. date…….	(Scanned copy of Registration to be uploaded)
3.	Name of Organization/ Individual	
4.	Entity of Organization Individual/Proprietary Firm/Partnership Firm (Registered under Partnership Act)/ Limited Company (Registered under the Companies Act–1956)/ Corporation	
5.	Address of Communication	
6.	Telephone Number with STD Code	
7.	Fax Number with STD Code	
8.	Mobile Number	
9.	E-mail Address for all communications	
10.	GST No	
11.	Pan No	
12.	EPF Registration	
	Details of Authorized Representative	
13.	Name	
14.	Designation	
15.	Postal Address	
16.	Telephone Number with STD Code	
17.	Fax Number with STD Code	
18.	Mobile Number	
19.	E-mail Address	

Note: In case of partnership firm and limited company certified copy of partnership deed/ Articles of Association and Memorandum of Association along with registration certificate of the company shall have to be enclosed.

Signature of Bidder with Seal

Date:

Annexure – I

(See clause 14 of Section 2 of ITB)

Envelope – B, Technical Proposal

Technical Proposal shall comprise the following documents:

S.N.	Particulars to be submitted	Format
1.	Financial and Physical Experience	(Format: I - 1)
2.	Annual Turnover	(Format: I - 2)
3.	List of technical personnel for the key positions	(Format: I - 3)
4.	List of Key equipment/ machine/s in quality control labs	(Format: I - 4)
5.	List of Key equipment/ Machines for Construction Work	(Format: I - 5)

Note:

1. Technical Proposal should be duly page numbered and indexed.
2. Technical Proposal should be uploaded on website www.mpeproc.gov.in, otherwise will not be considered.

Annexure-I (Format: I- 1)

(See clause 14 of Section 2 of ITB)

FINANCIAL & PHYSICAL EXPERIENCE DETAILS

(Bidders has to furnish details along with certificates as required for the qualification purposes).

Annexure – I (Format: I - 2)

(See clause 14 of Section 2 of ITB)

ANNUAL TURN OVER

Requirements:

Average annual construction turnover for the construction works to be provided in the following format for the last 3 financial years.

Financial Information			
Financial Year	2014-15	2015-16	2016-17
Annual Turnover (in INR Crore)			

AVERAGE ANNUAL TURNOVER

Note:

i. Annual turnover of **construction works s**hould be certified by chartered accountant. ii. Mandatory Supporting Documents:
   a. Audited balance sheet including all related notes and income statements for the above financial years to be enclosed.

iii. Should have positive net- worth.

Annexure – I (Format: I - 3)

(See clause 14 of Section 2 of ITB)

LIST OF TECHNICAL PERSONNEL FOR THE KEY POSITIONS

The Contractor will have to appoint the following key personnel during the execution and entire contract period, apart from other key personnel and support staff as necessary.

S. No.	Details	Required nos.
1	Project Manager with Master's degree in Civil Engineering having minimum relevant post qualification experience of 15 years	One
2	Site Engineer with Degree/Diploma in Civil Engineering having minimum 5(for Degree holders) / 7 (for Diploma holders) years experience	Two
3	Quality Control / Quality Assurance Engineer with Degree in Civil Engineering having minimum 5 years of relevant experience	One
4	Traffic Manager / Safety Officer having 5 years' experience in Road Safety and Management	One

Penalty for Non-deployment of above staff are as follows:

S. No.	Details	Penalty to be computed on Per Day basis
1	Project Manager with Master's degree in Civil Engineering having minimum relevant post qualification experience of 15 years	Rs. 75,000/- p.m.
2	Site Engineer with Degree/Diploma in Civil Engineering having minimum 5(for Degree holders) / 7 (for Diploma holders) years of experience	Rs. 40,000/- p.m.
3	Quality Control / Quality Assurance Engineer with Degree in Civil Engineering having minimum 5 years of relevant experience	Rs. 30,000/- p.m.
4	Traffic Manager / Safety Officer having 5 years' experience in Road Safety and Management	Rs. 25,000/- p.m.

Annexure – I (Format: I - 4)

(See clause 14 of Section 2 of ITB)

List of Key Equipment / Machines for Quality Control Labs

Indicative Laboratory Equipment List			Available with the bidder		
S. No.	Name of Equipment/ Machinery	Quantity	S. No.	Name of Equipment/ Machinery	Quantity
1	Machinery and Equipment Required for Conducting Tests as per MOST / MORTH Specifications (5th Revision) for Roads & Bridges Works / MP UADD Specifications (Part 3 – Road & Bridge)				
2					
3					
4					
5					
6					
…					
…					
…					

- The Contractor shall arrange to provide fully furnished and adequately equipped field laboratory with adequate qualified technical staff. Preferably located adjacent to the Project Office and provided amenities like water supply, electric supply etc.
- The laboratory equipment shall confirm I.S. specifications and MOST / MORTH specifications. The Contractor shall carry out the calibration of the instruments as directed by the Engineer – in- charge on expiry date of calibration. On completion of work in all respect, the equipment will be the sole property of the Contractor.
- It shall be considered as incidental to the work, and no extra payment will be made what so ever will not be made for the same.

Annexure – I (Format: I - 5)

(See clause 14 of Section 2 of ITB)

LIST OF EQUIPMENTS / MACHINES FOR CONSTRUCTION WORK

Bidders to furnish details of minimum requirement in the format given below for the Work:

S. No.	Name of Equipment/ Machinery	Min Quantity Required	Details of Equipment/ Machinery Available with the bidder	Quantity Available
1	Fixed-form Paver with electronic sensor	1		
2	Vibratory Roller	1		
3	Static roller having minimum 8-10 Ton capacity (2)	1		
4	Motor Grader	1		
5	Loader with Back Hoe	2		
6	Tipper Truck	4		

After Inspection, Engineer In charge may accept the request as it is or instruct for some changes if required in the machinery which shall be carried out by the Contractor at this own cost. Only after its approval by the Engineer In Charge, the Contractor shall carry out work from the approved machinery.

FINANCIAL BID

Annexure – J

(See clause 14 of Section 2 of ITB)

TENDER FOR ITEM RATE CONTRACT:

NAME OF WORK: (NAME OF THE WORK AS APPEARING IN THE BID FOR THE WORK)

We do hereby bid for the execution of the above work within the time specified on item rate at a total price (in figures) …….. (in words)…….. excluding GST based on the rates of each item quoted in Annexure J-1 bill of quantities. The item wise rates given therein in all respects are in accordance with the specifications, designs, drawings and instructions in writing in all respects in accordance with such conditions so far as applicable.

We have visited the site of work and are fully aware of all the difficulties and conditions likely to affect carrying out the work. We have fully acquainted ourselves about the conditions in regard to accessibility of site and quarries/ kilns, nature and the extent of ground, working conditions including stacking of materials, installation of tools and plant conditions effecting accommodation and movement of labour etc. required for the satisfactory execution of contract.

Should this bid be accepted, we hereby agree to abide by and fulfill all the terms and provisions of the said conditions of contract annexed hereto so far as applicable, or in default thereof to forfeit and pay to the EXECUTIVE DIRECTOR, GWALIOR SMART CITY DEVELOPMENT CORPORATION LIMITED, GWALIOR; Madhya Pradesh or his/her successors in office the sums of money mentioned in the said conditions.

Note:

i. Only one rate above or below or at par against quantity of each item given in the Bill of Quantities shall be quoted.

ii. Rate shall be quoted in figures as well as in words. If any difference in figures and words is found, lower of the two shall be taken as valid and correct rate. If the Bidder is not ready to accept such valid and correct rate and declines to furnish performance security and/or fails to sign the contract its earnest money deposit shall be forfeited.

iii. In case the rate "above" or "below" is not given by a Bidder for any item of the Bill of Quantity, its bid shall be treated as non-responsive. Items for which no rate or price is entered by the Bidder will not be paid for by GSCDCL when executed and shall be deemed covered by the other rates and prices in the BoQ.

iv. All duties, taxes, (excluding GST) and other levies payable by the Bidder shall be included in the rate quoted by the Bidder.

Signature of Bidder

Name of Bidder

Annexure – J -1

Bill of Quantities for Smart Roads, Gwalior						
S.N.	Particular	Quantity	Unit	Rate (INR)		Amount (INR)
				Figures	Words	

Annexure-K
(See clause 15 of Section 2 of ITB)

MATERIALS TO BE ISSUED BY THE DEPARTMENT

Not Applicable

Annexure – L
(See clause 21 of Section 2 of ITB)

No. _____ Dated: _____

LETTER OF ACCEPTANCE (LOA)

M/s. _____

(Name and address of the Contractor)

Subject: _____
(Name of the work as appearing in the bid for the work)

Dear Sir (s),

Your bid for the work mentioned above has been accepted on behalf of the [Name of Authority], at your bided offer as per scope of work given therein. You are requested to submit within 15 (Fifteen) days from the date of issue of this letter:

a. The performance security/performance guarantee of Rs. _____ (in figures) Rupees_____ (in words only). The performance security shall be in the shape of term deposit receipt/ bank guarantee of any nationalized / schedule commercial bank.

b. Sign the contract agreement.

Please note that the time allowed for carrying out the work as entered in the bid is _____ months including/excluding rainy season, shall be reckoned from the date of signing the contract agreement.

Signing the contract agreement shall be reckoned as intimation to commencement of work and no separate letter for commencement of work is required. Therefore, after signing of the agreement, you are directed to contact Engineer-in-charge for taking the possession of site and necessary instructions to start the work.

Yours faithfully,

EXECUTIVE ENGINEER

Annexure – M
(See clause 22 of Section 2 of ITB)

PERFORMANCE SECURITY

To
_____[Name of Employer]
_____
_____ [Address of Employer]
_____

WHEREAS_____ [name and Address of Contractor] (Hereinafter called "the Contractor") has undertaken, in pursuance of Letter of Acceptance No._____ Dated _____to execute_____ [Name of Contract and brief description of works] (herein after called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the contract;

AND WHREREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of _____[amount of Guarantee]*_____ (in words), such sum being payable in the types and proportions of currencies in which the contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of_____[amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand. We also state that you are no way required to justify the demand raised to us.

We further agree that no change or addition to or other modification of the terms of the Contract of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 3 (three) months from the date of expiry of the Defect Liability

Period. _____

Signature, Name and Seal of the Guarantor
Name of Bank_____
Address_____
Phone No., Fax No., E-mail Address, of Signing

Authority_____

Date_____

* An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

SECTION 3
Conditions of Contract

Part – I: General Conditions of Contract [GCC]

Table of Clauses of GCC

A. GENERAL

1. DEFINITIONS

1.1 “Bill of Quantities” means the priced and completed Bill of Quantities forming part of the Bid.

1.2 “Chief Executive Officer” means the executive officer as defined under the relevant section of the article of association;

1.3“Completion“means completion of the work, as certified by the Engineer-in-Charge, in accordance with provisions of agreement.

1.4 “Contract” means the Contract between the Employer and the Contractor to execute, complete and/or maintain the work. Agreement is synonym of Contract and carries the same meaning wherever used.

1.5 “Contract Data Sheet” means the documents and other information which comprise of the Contract.

1.6 “Contractor “means a person or legal entity whose bid to carry out the work has been accepted by the Employer.

1.7 “Contractor's bid” means the completed bid document submitted by the Contractor to the Employer.

1.8 “Contract amount” means the amount of contract worked out on the basis of accepted bid.

1.9 “Completion of work” means completion of the entire contracted work. Exhaustion of quantity of any particular item mentioned in the bid document shall not imply completion of work or any component thereof.

1.10 “Day” means the calendar day.

1.11 “Defect” means any part of the work not completed in accordance with the specifications included in the contract.

1.12 “Drawings” means drawings including calculations and other information provided or approved by the Engineer-in-Charge.

1.13 “Department” means Gwalior Smart City Development Corporation Limited, Gwalior as the case may be.

1.14 “Employer” means the party as defined in the Contract Data, who employs the Contractor to carry out the work. The employer may delegate any or all functions to a person or body nominated by him for specified functions. The word Employer/Government/Department wherever used denote the Employer.

1.15 “Engineer” means the person named in contract data sheet.

1.16 “Engineer in charge” means the person named in the contract data.

1.17 “Equipment” means the Contractor's machinery and vehicles brought temporarily to the Site for execution of work.

1.18 “Executive Director” means the executive director of the Board as appointed under the provision of the article of association;

1.19 “Government” means Government of Madhya Pradesh.

1.20 “In Writing” means communicated in written form and delivered against receipt.

1.21 “Material” means all supplies including consumables used by the Contractor for incorporation in the work.

1.22 “Stipulated date of completion” means the date on which the Contractor is required to complete the work. The stipulated date is specified in the Contract Data.

1.23 “Specification” means the specification of the work included in the Contract and any modification or addition made or approved by the Engineer-in-Charge.

1.24 “Start Date “means the date 14 days after the signing of agreement for the work. However, the employer may extend this time limit by another 14 days, as and when required.

1.25 “Sub-Contractor” means a person or corporate body who has a Contract (duly authorized by the employer) with the Contractor to carry out a part of the construction work under the Contract.

1.26 “Temporary Work” means work designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the work.

1.27 “Tender/Bid, Tenderer/Bidder” are the synonyms and carry the same meaning where ever used.

1.28 “Variation “means any change in the work which is instructed or approved as variation under this contract. The maximum variation shall be permitted upto 20% of contract value.

1.29 “Work” the expression "work" or "works" where used in these conditions shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the work by virtue of contract, contracted to be executed, whether temporary or permanent and whether original, altered, substituted or additional.

1.30 “Work Plan” means the implementation plan, including phasing of works, physical completion milestones and other such details that the Employer shall seek from time to time with respect to tracking progress of the works.

2. INTERPRETATIONS AND DOCUMENTS

2.1 Interpretations: In the contract, except where the context requires otherwise:

a. words indicating one gender include all genders;

b. words indicating the singular also include the plural and vice versa.

c. provisions including the word “agree”, “agreed” or “agreement” require the agreement to be recorded in writing;

d. written” or “in writing” means hand-written, type-written, printed or electronically made, and resulting in a permanent record;

2.2 Documents Forming Part of Contract:

1. NIT with all amendments.
2. Instructions to Bidders
3. Conditions of Contract:
    i. Part I General Conditions of Contract and Contract Data; with all Annexures
    ii. Part II Special Conditions of Contract.
4. Specifications
5. Drawings
6. Bill of Quantities
7. Technical and Financial Bid
8. Agreement
9. Any other document (s), as specified.

3. LANGUAGE AND LAW

The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. COMMUNICATIONS

All certificates, notice or instruction to be given to the Contractor by Employer/Engineer shall be sent on the address or contact details given by the Contractor in [Annexure H of ITB]. The address and contract details for communication with the Employer/Engineer shall be as per the details given in Contract Data Sheet. Communication between parties that are referred to in the conditions shall be in writing. The notice sent by facsimile (fax) or other electronic means (email) shall also be effective on confirmation of the transmission. The notice sent by registered post or speed post shall be effective on delivery or at the expiry of the normal delivery period as undertaken by the postal service. In case of any change in address for communication, the same shall be immediately notified to Engineer-in-Charge

5. SUBCONTRACTING

Subcontracting shall be permitted for contracts value more than amount specified in the Contract Data with following conditions.

a. The Contractor may subcontract up to 25 percent of the contract price, only with and after the approval of the Employer in writing, but will not assign the Contract. Subcontracting shall not alter the Contractor's obligations.

b. The following shall not form part of the sub-contracting:

i. hiring of labour through a labour Contractor,

ii.hiring of plant & machinery

ii. the purchase of Materials to be incorporated in the works

c. The Sub-Contractor will have to be registered in the appropriate category in the centralized registration system for Contractors of the GoMP.

6. PERSONNEL

6.1 The Contractor shall employ for the construction work and routine maintenance the technical personnel as provided in the Annexure I-3 of Bid Data sheet, if applicable. If the Contractor fails to deploy required number of technical staff, recovery as specified in the Contract Data will be made from the Contractor.

6.2 If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within three days and has no further connection with the Works in the Contract.

7. FORCE MAJEURE

7.1 The term "Force Majeure" means an exceptional event or circumstance:

a) Which is beyond a party’s control,

b) Which such party could not reasonably have provided against before entering into the contract,

c) Which, having arisen, such party could not reasonably have avoided or overcome, and

d) Which is not substantially attributed to the other Party

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

(i) War, hostilities (whether war be declared or not), invasion, act of foreign enemies),

(ii) Rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
(iii) Riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
(iv) Munitions of war, explosive materials, ionizing radiation or contamination by radio activity, except ass may be attributed to the Contractor's use of such munitions, explosives, radiation or radio activity, and
(v) Natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity,

7.2 In the event of either party being rendered unable by force majeure to perform any duty or discharge any responsibility arising out of the contract, the relative obligation of the party affected by such force majeure shall upon notification to the other party be suspended for the period during which force majeure event lasts. The cost and loss sustained by either party shall be borne by respective parties.

7.3 For the period of extension granted to the Contractor due to Force Majeure the price adjustment clause shall apply but the penalty clause shall not apply. It is clarified that this sub clause shall not give eligibility for price adjustment to contracts which are otherwise not subject to the benefit of Price adjustment clause.

7.4 The time for performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such cause lasts. Should the delay caused by force majeure exceed twelve months, the parties to the contract shall be at liberty to foreclose the contract after holding mutual discussions.

7.5 A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible to the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give notice of the restoration of normal conditions as soon as possible.

7.6 The Parties shall take all reasonable measures to minimise the consequences of any event of Force Majeure.

8. CONTRACTOR'S RISKS

8.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.

8.2 All risks and consequences arising from the inaccuracies or falseness of the documents and/or information submitted by the Contractor shall be the responsibility of the Contractor alone, notwithstanding the fact that designs/drawings or other documents have been approved by the department.

9. LIABILITY FOR ACCIDENTS TO PERSON

The Contractor shall be deemed to have indemnified and saved harmless the Government and/or the employer, against all action, suits, claims, demands, costs etc. arising in connection with injuries suffered by any persons employed by the Contractor or his subcontractor for the works whether under the General law or under workman's compensation Act, or any other statute in force at the time of dealing with the question of the liability of employees for the injuries suffered by employees and to have taken steps properly to ensure against any claim there under.

10. CONTRACTOR TO CONSTRUCT THE WORKS

10.1 The Contractor shall construct, install and maintain the Works in accordance with the Specifications and Drawings as specified in the Contract Data

10.2 In the case of any class of work for which there is no such specification as is mentioned in contract Data, such work shall be carried out in accordance with the instructions and requirement of the Engineer-in-charge. In the event of any disparity between the written

specifications and BIS provisions, the provisions in BIS shall prevail.

10.3 The Contractor shall supply and take upon himself the entire responsibility of the sufficiency of the scaffolding, timbering, Machinery, tools implements and generally of all means used for the fulfilment of this contract whether such means may or may not approved of or recommended by the Engineer.

11. DISCOVERIES

Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

12. DISPUTE RESOLUTION SYSTEM

12.1 No dispute can be raised except before the Competent Authority as defined in Contract data in writing giving full description and grounds of Dispute. It is clarified that merely recording protest while accepting measurement and/or payment shall not be taken as raising a dispute.

12.2 No issue of dispute can be raised after 45 days of its occurrence. Any dispute raised after expiry of 45 days of its first occurrence shall not be entertained and the Employer shall not be liable for claims arising out of such disputes.

12.3 The Competent Authority shall decide the matter within 45 days.

12.4 Appeal against the order of the Competent Authority can be preferred within 30 days to the Appellate Authority as defined in the Contract data. The Appellate Authority shall decide the dispute within 45 days.

12.5 Appeal against the order of the Appellate Authority can be preferred before the Madhya Pradesh Arbitration Tribunal constituted under Madhya Pradesh Madhyastham Adhikaran Adhiniyam, 1983.

12.6 The Contractor shall have to continue execution of the works with due diligence notwithstanding pendency of a dispute before any authority or forum.

B. TIME CONTROL

13. PROGRAMME

13.1 Within the time stated in the Contract Data, the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works for the construction of works.

13.2 The program shall be supported with all the details regarding key personnel, equipment and machinery proposed to be deployed on the works for its execution. The Contractor shall submit the list of equipment and machinery being brought to site, the list of key personnel being deployed, the list of machinery/equipment being placed in field laboratory and the location of field laboratory along with the Programme

13.3 An update of the Programme shall be a Programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Works, including any changes to the sequence of the activities.

13.4 The Contractor shall submit to the Engineer for approval an updated Programme at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted.

13.5 The Engineer's approval of the Programme shall not alter the Contractor's obligations

14. EXTENSION OF TIME

14.1 If the Contractor desires an extension of time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other grounds, he shall apply, in writing, to the Engineer-in-charge, on account of which he desires such extension. Engineer-in-charge shall forward the aforesaid application to the competent authority as prescribed.

14.2 The competent authority shall grant such extension at each such occasion within a period of 30 days of receipt of application from Contractor and shall not wait for finality of work. Such extensions shall be granted in accordance with provisions under clause -7 and/or clause- 15 of this agreement.

14.3 In case of the work already in progress, the Contractor shall proceed with the execution of the works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid with all due diligence.

15. COMPENSATION FOR DELAY

15.1 The time allowed for carrying out the work, as entered in the agreement, shall be strictly observed by the Contractor.

15.2 The time allowed for execution of the contract shall commence from the date of signing of the agreement. It is clarified that the need for issue of work order is dispensed with.

15.3 In the event milestones are laid down in the Contract Data for execution of the works, the Contractor shall have to ensure strict adherence to the same.

15.4 Failure of the Contractor to adhere to the timelines and/or milestones shall attract such liquidated damages as is laid down in the Contract Data

15.5 In the event of delay in execution of the works as per the timelines mentioned in the contract data the Engineer-in- charge shall retain from the bills of the Contractor Amount equal to the liquidated damages to be levied until the Contractor makes such delays good. However, the Engineer-in-charge may accept bankable security in lieu of retaining such amount.

15.6 If the Contractor is given extension of time after liquidated damages have been paid, the engineer in charge shall correct any over payment of liquidated damages by the Contractor in the next payment certificate.

15.7 In the event the Contractor fails to make good the delay until completion of the stipulated contract period (including extension of time) the sum so retained shall be adjusted against liquidated damages levied.

C. QUALITY CONTROL

17. TESTS

17.1 The Contractor shall be responsible for:

a. Carrying out the tests prescribed in specifications, and

b. For the correctness of the test results, whether preformed in his laboratory or elsewhere.

17.2 The Contractor shall have to establish field laboratory within the time specified and having such equipment as are specified in the Contract Data.

17.3 Failure of the Contractor to establish laboratory shall attract such penalty as is specified in the Contract Data.

17.4 Ten percent of the mandatory tests prescribed under the specifications shall be got carried out through Laboratories accredited by National Accreditation Board of Laboratories (NABL) by the Engineer-In –Charge and the cost of the such testing shall be deducted from the payments due to Contractor.

18. CORRECTION OF DEFECTS NOTICED DURING THE DEFECT LIABILITY PERIOD

18.1 The defect liability period of work in the contract shall be the as per the Contract Data Sheet.

18.2 The Contractor shall promptly rectify all defects pointed out by the Engineer well before the end of the Defect Liability Period. The Defect Liability Period shall automatically stand extended until the defect is rectified.

18.3 If the Contractor has not corrected a Defect pertaining to the Defect Liability Period to the satisfaction of the Engineer, within the time specified by the Engineer, the Engineer will assess the cost of having the Defect corrected, and the cost of correction of the Defect shall be recovered from the Performance Security or any amount due or that may become due to the Contractor and other available securities.

D. COST CONTROL

19. VARIATIONS - CHANGE IN ORIGINAL SPECIFICATIONS, DESIGNS, DRAWINGS ETC.

19.1 The Engineer in charge shall have power to make any alterations, omissions or additions to or substitutions for the original specifications, drawings, designs and instructions, that may appear to him to be necessary during the progress of the work and the Contractor shall carry out the work in accordance with any instructions which may be given to him in writing signed by the Employer, and such alterations, omission, additions or substitutions shall not invalidate the contract and any altered, additional or substituted work, which the Contractor may be directed to do in the manner above specified, as part of the work, shall be carried out by the Contractor on the same conditions in all respects on which he agree to do the main work.

19.2 The time for the completion of the work shall be extended in the proportion that the altered, additional or substituted work bears to the original contract work and the certificate of the Engineer in charge shall be conclusive as to such proportion.

20. EXTRA ITEMS

20.1 All such items which are not in the priced Bills of Quantities (BOQ) shall be treated as extra items.

21. PAYMENTS FOR VARIATIONS AND/ OR EXTRA QUANTITIES

21.1 The rates for the additional (Extra Quantities), altered or substituted work/ extra items under this clause shall be worked out in accordance with the following provisions in their respective order: -

a. The Contractor is bound to carry out the additional (Extra quantity), work at the same rates as are specified in the contract for the work. The maximum variation shall be permitted upto 20% of contract value.
b. If the item is not in the priced BOQ and is included in the Schedule of Rate (SOR) of the department, the rate shall be arrived at by applying the quoted tender percentage on the SOR rate.
c. If the rates of the altered or substituted work are not provided in applicable SOR-such rates will be derived from the rates for a similar class (type) of work as is provided in the contract (priced BOQ) for the work.
d. If the rates are for the altered, substituted work cannot be determined in the manner specified in the sub clause (c) above-then the rates for such composite work item shall be worked out on the basis of the concerned schedule of rates quoted by the Contractor.
e. If the rates of a particular part or parts of the item is not in the schedule of rates and the rates for the altered, or substituted work item cannot be determined in the manner specified in sub clause (b) to (d) above, the rate for such part or parts will be determined by the Competent Authority as defined in the Contract data on the basis of the rate analysis derived out of prevailing market rates when the work was done.
f. But under no circumstances, the Contractor shall suspend the work on the plea of non-acceptability of rates on items falling under sub clause (a) to (e). In case the Contractor does not accept the rate approved by Engineer in charge for a particular item, the Contractor shall continue to carry out the item at the rates determined by the Competent Authority. The decision on the final rates payable shall be arrived at through the dispute settlement procedure.

2. NO COMPENSATION FOR ALTERATIONS IN OR RESTRICTION OF WORK TO BE CARRIED OUT.

22.1 If at any time after the commencement of the work, the Government, for any reason whatsoever, not require the whole or any part of the work as specified in the bid to be carried out, the Engineer in charge shall give notice in writing of the fact to the Contractor and withdraw that whole or any part of the work.

22.2 The Contractor shall have no claim to any payments or compensation whatsoever, on account of any profit or advantage which he might have derived from the execution of work in full or on account of any loss incurred for idle men and machinery due to any alteration or restriction of work for whatsoever reason.

22.3 The Engineer in charge may supplement the work by engaging another agency to execute such portion of the work, without prejudice to his rights.

23. NO INTEREST PAYABLE

No interest shall be payable to the Contractor on any payment due or awarded by any authority.

24. RECOVERY FROM CONTRACTORS

Whenever any claim against the Contractor for the payment arises under the contract, the Department shall be entitled to recover such sum by:

a) Appropriating, in part or whole of the Performance Security and additional Performance Security, if any; and/or Security deposit and/or any sums payable under the contract to the Contractor.

b) If the amount recovered in accordance with (a) above is not sufficient, the balance sum may be recovered from any payment due to the Contractor under any other Contracto/agreement of the department, including the securities which become due for release.

c) The department shall, further have an additional right to effect recoveries as arrears of land revenue under the M.P. Land revenue Code.

25. TAX

25.1 The rates quoted by the Contractor shall be deemed to be inclusive of the commercial tax and other levies, duties, cess, toll, taxes of Central and State Governments, local bodies and authorities.

25.2 The liability, if any, on account of quarry fees, royalties and any other taxes and duties in respect of materials actually consumed on public work, shall be borne by the Contractor.

25.3 Any Changes in the taxes due to change in legislation or for any other reason shall not be payable to the Contractor.

26. CHECK MEASUREMENTS

26.1 The department reserves to itself the right to prescribe a scale of check measurement of work in general or specific scale for specific works or by other special orders.

26.2 Checking of measurement by superior officer shall supersede measurements by subordinate officer(s), and the former will become the basis of the payment.

26.3 Any over/excess payments detected, as a result of such check measurement or otherwise at any stage up to the date of completion of the defect liability period specified in this contract, shall be recoverable from the Contractor, as per clause 24 above.

27. TERMINATION BY ENGINEER IN CHARGE

27.1 If the Contractor fails to carry out any obligation under the Contract, the Engineer in charge may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

27.2 The Engineer in charge shall be entitled to terminate the contract if the Contractor

a. Abandons the works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the contract;
b. the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
c. without reasonable excuse fails to comply with the notice to correct a particular defect within a reasonable period of time;
d. the Contractor does not maintain a valid instrument of financial Security, as prescribed;
e. the Contractor has delayed the completion of the Works by such duration for which the maximum amount of liquidated damages is recoverable;
f. If the Contractor fails to deploy machinery and equipment or personnel or set up a field laboratory as specified in the Contract Data.
g. if the Contractor, in judgment of the engineer in charge has engaged in corrupt or fraudulent practices in competing for or in executing the contract;
h. Any other fundamental breaches as specified in the Contract Data.

27.3 In any of these events or circumstances, the engineer in charge may, upon giving 14(Fourteen) days' notice to the Contractor, terminate the contract and expel the Contractor from the site. However, in the case of sub paragraph (b) or (g) of clause 27.2, the Engineer in charge may terminate the contract immediately.

27.4 Notwithstanding the above, the Engineer in charge may terminate the contract for convenience by giving notice to the Contractor.

28. PAYMENT UPON TERMINATION

28.1 If the contract is terminated under clause 27.3, the Engineer-in-Charge shall issue a certificate for value of the work accepted on final measurements, less advance payments received up to the date of issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data.

28.2 Payment on termination under clause 27.4 above, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the works, and the Contractor's costs of protecting and securing the works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

28.3 If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be recovered as per clause 24 above.

29. PERFORMANCE SECURITY

The Contractor shall have to submit performance security and additional performance security, if any, as specified in Bid data sheet at the time of signing of the contract. The Contractor shall have to ensure that such performance security and Additional performance, if any; security remains valid for the period as specified in the Contract data.

30. SECURITY DEPOSIT

30.1 Security deposit shall be deducted from each running bill at the rate as specified in the contract data. The total amount of security deposit so deducted shall not exceed the percentage of contract price specified in the Contract data.

30.2 The Security may be replaced by equivalent amount of bank guarantee or fixed deposit receipt assigned to the Employer, with validity up to 3 (three) months beyond the completion of defect Liability Period/ Extended Defect Liability Period.

30.3 The Security deposit shall be refunded on completion of defect liability period.

31. PRICE ADJUSTMENT

31.1 Applicability

1. Price adjustment shall be applicable only if provided for in the Contract Data.
2. The price adjustment clause shall apply only for the works executed from the date of signing of the agreement until the end of the initial intended completion date or extensions granted for reasons attributed to the Employer by the Engineer.
3. The Contractor shall not be entitled to any benefit arising from the price adjustment clause for extension in the contract period for reasons attributed to the Contractor.
4. In the Force Majeure event the price escalation clause shall apply.

31.2 Procedure

1. Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with following principles and procedures and as per formula given in the contract data.
2. The price adjustable shall be determined during each quarter from the formula given in the contract data.
3. Following expression and meaning are assigned to the work done during each quarter:

R =Total value of work during the quarter. It would include the amount of secured advance granted, if any, during the quarter, less the amount of secured advance recovered, if any during the quarter, less value of material issued by the department, if any, during the quarter.

4. Weightages of various components of the work shall be as per the Contract Data.

31.3 To the extent that full compensation any rise or fall in costs to the Contractor is not covered by the provisions of this or clauses in the contact, the unit rates and prices included in the contract shall be deemed amounts to cover the contingency of such other rise or fall in costs.

31.4 The index relevant to any quarter, for which such compensation is paid, shall be the arithmetical average of the indices relevant of the calendar month.

31.5 For the purpose of clarity it is pointed out that the adjustment may be either positive or negative, i.e. if the price adjustment is in favour the same shall be recovered from the sums payable to the Contractor.

32. MOBILIZATION ADVANCE

32.1 Payment of advances shall be applicable if provided in Contract Data.

32.2 If applicable, the Engineer bearing advance payment to the Contractor of the against provision by the Contractor of an unconditional Bank in nationalized/Scheduled banks, in the name as stated in the in the advance payment. The Guarantee shall remain effective been repaid, but the amount of the guarantee shall be progressively repaid by the Contractor.

32.3 The rate of interest shall be as per Contract data.

32.4 The advance shall be recovered as stated in the Contract data by deducting proportionate amounts from payment otherwise due to the Contractor. No account shall be taken of the advance payment or its recovery in assessing valuations of work done, variations, price adjustments, compensation events, or liquidated damages.

33. SECURED AND CONSTRUCTION MACHINERY ADVANCE

33.1 Payment of secured advance shall be applicable if provided in Contract data.

33.2 If applicable, the Engineer in Charge shall make interest bearing advance payment to the Contractor of the amounts stated in the Contract Data, against provision by the Contractor of an unconditional Bank Guarantee in a form and by nationalized/ scheduled banks, in the name as stated in the Contract Data, in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor.

33.3 The rate of interest chargeable shall be as per Contract Data.

33.4 The construction machinery advance, if applicable, shall be limited to 80% of the cost of construction machinery and admissible only for new construction machinery.

33.5 The advance payment shall be recovered as stated in the Contract Data by deducting proportionate amounts from payment otherwise due to the Contractor. No account shall be taken of the advance payment or its recovery in assessing valuations of work done, variations, price adjustments, compensation events, or liquidated damages.

34. PAYMENT CERTIFICATES

The payment to the Contractor will be as follows for construction work:

a. The Contractor shall submit to the engineer monthly statement of the value of the work executed less the cumulative amount certified previously, supported with detailed measurement of the items of work executed.
b. The engineer shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
c. The value of work executed shall be determined, based on the measurements approved by the Engineer/Engineer in charge.
d. The value of work executed shall comprise the value of the quantities of the items in the Bill of quantities completed.
e. The value of work executed shall also include the valuation of variations and compensation events.
f. All payments shall be adjusted for deductions for advance payment, security deposit, other recoveries in terms of contract and taxes at source as applicable under the law.
g. The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
h. Payment of intermediate certificate shall be regarded as payments by way of advance against the final payment and not as payments for work actually done and completed.
i. Intermediate payment shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or be considered as an admission of the due performance of the Contractor any part thereof, in any respect or the occurring of any claim.
j. The payment of final bill shall be governed by the provisions of clause 36 of GCC.

E. FINISHING THE CONTRACT

35. COMPLETION CERTIFICATE

35.1 A completion certificate in the prescribed format in Contract data shall be issued by the Engineer in charge after physical completion of the work and successful handover to respective agencies owning different heads with their respective clearance certificates.

35.2 After final payment to the Contractor, a final completion certificate in the prescribed format in the contract data shall be issued by the Engineer in charge.

36. FINAL ACCOUNT

36.1 The Contractor shall supply the Engineer with a detailed account of the total amount that the Contractor considers payable for works under the Contract within 21 days of issue of certificate of physical completion of works. The Engineer shall issue a Defects Liability Certificate and certify any payment that is due to the Contractor within 45 days of receiving the Contractor's account if it is correct and complete. If the account is not correct or complete, the Engineer shall issue within 45 days a schedule that states the scope of the corrections or additions that are necessary. If the Account is still unsatisfactory after it has been resubmitted, the matter shall be referred to the competent authority as defined in the Contract data, who shall decide on the amount payable to the Contractor after hearing the Contractor and the Engineer in Charge.

36.2 In case the account is not received within 21 days of issue of Certificate of Completion as provided in clause 35.1 above, the Engineer shall proceed to finalize the account and issue a payment certificate within 28 days.

F. OTHER CONDITIONS OF CONTRACT

37. CURRENCIES

All payments will be made in Indian Rupees.

38. LABOUR

38.1 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

38.2 The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

39. COMPLIANCE WITH LABOUR REGULATIONS

39.1 During continuance of the Contract, the Contractor and his sub-Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given in the Contract data. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/byelaws/Acts/Rules/ regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

I. The Contractor or its sub-Contractors shall be solely responsible for complying with all statutory provisions relating to manpower engaged by, for, or through them. In the event of any liability on GSCDCL by virtue of its being principal employer due to failure of the Contractor or its sub-Contractors to comply with all applicable labour legislations, the Contractor and its sub-Contractors Bidder shall indemnify and/or reimburse the amount payable by GSCDCL, if any on this account.

II. If any accident, any injury or physical harm to any person is caused during operations within the contract period, the Contractor and its sub-Contractors, as the case may be the Contractor sub56 Contractors shall be solely responsible and shall bear all the cost and consequences' associated with such eventualities. The Contractor and its sub-Contractors also agrees and undertakes to indemnify and keep indemnified GSCDCL, its directors/ employees/ agents and its consultants.

39.2 Construction Safety

The Contractor should be well conversant with technical as well as administrative and legal aspects of safety and judicial pronouncement. The Contractor shall all times take all reasonable precautions and safety measures to maintain safety of personnel and property. The Contractor shall, at its own expenses and throughout the period of the contract ensure

appropriate and suitable arrangements for health, safety and hygiene requirements for the surroundings. The State and Central Government prevailing all Statues in this regard must be complied in letter and spirit throughout the period of contract.

40. AUDIT AND TECHNICAL EXAMINATION

Government shall have the right to cause an audit and technical examination of the works and the final bill of the contract including all supporting vouchers, abstract etc. To be made after payment of the final bill and if as a result of such audit and technical examination any sum is found to have been overpaid in respect of any work done by the Contractor under the contract or nay work claimed by him to have been done under the contract and found not to, have been executed, the Contractor shall be liable to refund the amount of overpayment and it shall be lawful for government to recover the same from him in the manner prescribed in clause 24 above and if it is found that the Contractor was paid less than what was due to him, under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by government to the Contractor.

41. DEATH OR PERMANENT INVALIDITY OF CONTRACTOR

During continuance of the contract, the Contractor and his sub- Contractor s shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications, and bye laws of the state or central government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the state or the major labour laws that are applicable to construction industry are given in the contract data. The Contractor shall keep the employer indemnified in case any action is taken against the employer by the competent authority on account of contravention of any of the provisions of any Act or rules made their under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules regulations including amendments, if any, on the part of the Contractor, the engineer/employer shall have the right to deduct from any money due to the Contractor including his amount of performance of security. The employer/engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the employer. The employees of the Contractor and the Sub- Contractor in no case shall be treated as the employees of the employer at any point of time.

42. JURISDICTION

This contract has been entered into the State of Madhya Pradesh and its validity, construction, interpretation and legal effect shall be subjected to the exclusive jurisdiction of the courts in Gwalior or of the courts at the place where this contract/agreement is entered into. No other jurisdiction shall be applicable.

[End of GCC]

CONTRACT DATA SHEET

Clause Reference	Particulars	Data
1.14	Employer	Gwalior Smart City Development Corporation Limited (GSCDCL)
1.15	Engineer	Engineer as notified by employer
1.16	Engineer In Charge	Executive Engineer of GSCDCL
1.22	Stipulated period of completion	12 Months including rainy season
3	Language	English
	Law of Contract	Indian Contract Act 1872
4	Address & contact details of the Contractor	As per "Annexure – "H"
	Address & contact details of the Employer/Engineer-phone, Fax, e-mail.	-
5	Subcontracting permitted for contract value	Permitted till 25 percent of the contract price
6	Technical Personnel to be provided by the Contractor	As per 'Annexure-I' (Format I-3)
	Penalty, if required Technical personal not employed	As per Annexure – I (Format: I - 3)
10	Specifications	As per "Annexure – E"
	Drawings	As per "Annexure – N"
12	Competent authority for deciding dispute under Dispute resolution system	Chief Executive Officer, GSCDCL, Gwalior
	Appellate Authority for deciding dispute under Dispute resolution system	Executive Director, GSCDCL, Gwalior
13	Period of submission of updated construction program	15 days after signing of contract agreement and every month thereafter.
14	Competent authority for granting time permission	Executive Director, GSCDCL, Gwalior
15	Milestones laid down for the contract	Annexure O
	If yes, details of milestone	As per "Annexure O"
	Compensation (to Employer) for Delay	As per "Annexure P"
17	List of equipment for lab	As per Annexure I
	Time to establish	30 days from date of signing of the Agreement
	Penalty for not establishing lab	Rs. 50,000/- per month (or part thereof) of delay
18	Defects Liability Period for Civil Work	36 months after physical completion of the work
21	Competent authority for determining the rate	Executive Director, GSCDCL, Gwalior
27	Any other condition for breach of contract	-
28	Penalty	Penalty shall include (a) Security deposit as per clause 30 of General conditions of contract and the

Clause Reference	Particulars	Data
		the percentage to apply to the value of work not completed representing the Employer's additional cost for completing the works shall be 20 percent. (b) Liquidated damages imposed as per clause 15 or performance security (Guarantee) including additional performance security (Guarantee), if any, as per clause 29 of General conditions of contract, whichever is higher.
29	Performance guarantee (Security) shall be valid up to	Till issue of physical completion certificate as per Clause 35.1.
30	Security deposit to be deducted from each running bill	At the rate of 5%
	Maximum limit of deduction of Security Deposit	5% of final contract amount
31.1 (1)	Price adjustment shall be applicable	Yes
31.2 (4)	Weightages of Component in the work	As per Annexure R
32	32.1 Mobilization Advance applicable	Yes
	32.2 If yes, unconditional Bank Guarantee	As per format in Annexure S1
	32.3 If Yes Rate of Interest	10%
	32.4 If Yes, Type and Amount that can be paid	upto 10% of the Contract Amount
	32.5 If Yes, Recovery of Payment	@10% of the Advance from each running bill (third running bill onwards)
33	33.1 Secured Advance Payable	No
	33.2 If Yes, Amount of Secured Advance	No
	33.3 If Yes, Conditions for Secured Advance	No
	33.4 If Yes, Recovery of Secured Advance	No
35	Completion Certificate – after physical completion of work	As per Annexure – U
	Final Completion Certificate – after final payment on completion of the work.	As per Annexure – V
39	Salient features of some of the major labour laws that are applicable	As per Annexure – W

Annexure – N

(See clause 10 of Section 3 of GCC)

DRAWING

Drg no.	**Drg title**
P.011219-Z-20365-001	ACHLESHWAR ROAD-PLAN AND L-SECTION
P.011219-Z-20365-002	ACHLESHWAR ROAD-SECTIONS
P.011219-Z-20365-003	ACHLESHWAR ROAD-SECTIONS
P.011219-Z-20365-004	ACHLESHWAR ROAD-SECTIONS
P.011219-Z-20365-005	KATORA TAAL ROAD-PLAN AND L-SECTION
P.011219-Z-20365-006	KATORA TAAL ROAD-SECTIONS
P.011219-Z-20365-007	MAHAL ROAD-PLAN AND L-SECTION
P.011219-Z-20365-008	MAHAL ROAD-SECTIONS
P.011219-Z-20365-009	TYPICAL DETAIL OF-WATER SUPPLY VALVE CHAMBER & GAS T CONNECTION, MAN HOLE CHAMBER
P.011219-Z-20365-010	STORM WATER DRAIN-SECTION & REINFORCEMENT DETAILS
P.011219-Z-20365-011	TYPICAL MAN HOLE AND HAND RAIL DETAIL
P.011219-Z-20365-012	TYPICAL MAN HOLE AND HAND RAIL DETAIL

Annexure-0

(See clause 13 of Section 3 of GCC)

DETAILS OF MILESTONE

The time allowed for the carrying out the work as detailed below:

7 (seven) months including rainy season for construction and thereafter 5 (five) years of operation and maintenance period shall be strictly observed by the Contractor and shall be deemed to be essence of the contract and shall be reckoned immediately from the date of signing of Agreement to commence the work issued to the Contractor.

The work shall, throughout the stipulated period of contract, be proceeded with all due diligence keeping in view that time is the essence of the contract. The Contractor shall be bound in all cases, to complete

- 1/8th of the whole work before 1/4th of the whole time allowed under the contract has elapsed,
- 3/8th of the work before 1/2 of such time has elapsed
- 3/4th of the work before 3/4 of such time has elapsed.

Annexure – P
(See clause 10 of Section 3 of GCC)

COMPENSATION FOR DELAY

If the contractor fails to achieve the milestones, and the delay in execution of work is attributable to the contractor/the Employer shall retain an amount from the sums payable and due to the contractor as per following scale -

h. Slippage up to 25% in financial target during the milestone under consideration - 2.5% of the work remained unexecuted in the related time span.

ii. Slippage exceeding 25% but Up to 50% in financial target during the milestone under consideration 5% of the work remained unexecuted in the related time span
..

iii. Slippage exceeding 50% but Up to 75% in financial target during the milestone under consideration -7.5% of the work remained unexecuted in the related time span ..

iv. Slippage exceeding 75% in financial target during the milestone under consideration - 10% of the work remained unexecuted in the related time span.

Note: For arriving at the dates of completion of time span related to different milestones, delays which are not attributable to the Contractor shall be considered. The slippage on any milestone is if made good in subsequent milestones or at the time of stipulated period of completion, the amount retained as above shall be refunded. In case the work is not completed within the stipulated period of completion along with all such extensions which are granted to the Contractor for either Employer's default or Force Majeure, the compensation shall be levied on the contractor at the rate of 0.05% per day of delay limited to a maximum of 10% of contract price. The decision of Executive Director, GSCDCL shall be final and binding upon both the parties.

Annexure-Q
List of Equipment for Quality Control Laboratory

As per Annexure I (Form 1-4)

Annexure – R
(See clause 10 of Section 3 of GCC)

Price Adjustment

Weightages of components in all the works under the project are determined by the Authority, as below:

S. No.	Component	Weightage (K)
1	Materials	50% (K1)
2	POL	15% (K2)
3	Labour	35% (K3)

Adjustment for Materials Component

The source for the wholesale price index for all commodities shall be the publication of the Economic Advisor to the Govt. of India published in the Reserve Bank of India, Bulletin.

$V_m = 0.85 \times P_O \times K_1 \times [(M_2-M_1)/M_1]$

Where,

V_m = Amount of price adjustment in Rs. for the Materials Component

P_O = Value of work executed as per the bills, running or final during quarter, less the cost of materials supplied to the Contractor, at fixed rate and recovered from the particular bill. In the case of materials brought to site, for which any advance is granted in the quarter the value of materials shall be added and for which advance has been recovered during the quarter shall be deducted. Furthermore, the value of such materials as assessed by the Engineer-in-charge (and not the reduced amount for which secured advance has been paid) shall be considered for this purpose.

K_1 = The factor representing all materials to be arranged for all works ancillary/temporary works and overheads etc.

M_1 = Base cost index

M_2 = Current Cost index

Adjustment for P.O.L Component

The source for working out the price adjustment on P.O.L. the representative items for reference shall be the costs of High Speed Oil only at the nearest HSD Supply Depot.

$V_P = 0.85 \times P_O \times K_2 \times [(D_2-D_1)/D_1]$

Where,

V_P = The amount of price adjustment in Rs.

P_O = As mentioned herein before

K_2 = A factor representing the component of transportation cost connected with completion of work under the contract.

D_2 = Current price per liter of HSD

D_1 = Base price per liter of HSD

Adjustment for Labour Component

The source for such indices being publication of Labour Bulletin Bureau, Govt of India published in the Reserve Bank of India Bulletin, on component representing Labour cost i/c all types of benefits and amenities etc.

$V_L = 0.85 \times P_O \times K_3 \times [(L_2-L_1)/L_1]$

Where,

P_O = As mentioned herein before

V_L = Amount of price adjustment in Rs. for the Labour Component

K_3 = A factor representing component of Labor cost i/c benefits, amenities etc. to be incurred by the Contractor for their work i/c all allied/ancillary/temporary works and overheads etc.

L_2 = Current cost index for industrial workers.

L_1 = Base Consumer cost index for industrial workers.

The following principles shall be followed while working out the adjustments:

- To the extent that full compensation for any rise or fall in the costs to the Contractor is not covered by the provision of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.
- If the Contractor shall fail to complete the works within the stipulated period of completion under the contract, the adjustment of prices thereafter, until the date of completion of the works shall be made using either the indices or prices relating to the stipulated time for completion or the current indices or prices whichever is more favorable to the Engineer-in-Charge. Provided that if any extension of time is granted for reasons beyond the control of the Contractor, the above provisions shall apply only to the adjustment made after the expiry of such extension of time.
- The price adjustment shall be evaluated for each of the interim payment certificate submitted by the Contractor.
- The following items are not to be included in the price adjustment calculations:
  - Recovery of Liquidated damages.
  - Recovery of Retention money, with holding and release.

ANNEXURE – S1
(See clause 32 of Section 3 of GCC)

BANK GUARANTEE FORMAT FOR MOBILIZATION AND CONSTRUCTION MACHINERY ADVANCE

WHEREAS _____ (name of Bidder) (hereinafter called "the Bidder") has submitted his Bid dated _____ (date) for the work of _____ [name of Contract hereinafter called "the Bid"]

KNOW ALL PEOPLE by these presents that we _____(name of Bank) of _____[name of country] having our registered office at _____ (hereinafter called "the Bank") are bound unto _____(name of the Authority) in the sum of _____* for which payment well and truly to be made to the said name of the (Authority Name) the Bank itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____day of _____

THE CONDITIONS of this obligation are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid.

OR

(2) If the Bidder having been notified to the acceptance of his bid by the name of the Executive Engineer during the period of Bid validity

   (a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or
   (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders.

we undertake to pay to the (name of the Executive Engineer) up to the above amount upon receipt of his first written demand, without the (Authority) having to substantiate his demand, provided that in his demand of (name of the Authority) will note that the amount claimed by him is due to him owing to the occurrence of one or any of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date 180 ** days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the (name of the Authority), notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE _____
WITNESS _____ SEAL _____

_____
(Signature, name and address)

* The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Bid Data Sheet at reference 17.

** EMD should be valid for a period of 180 days or more.

ANNEXURE – S2

Deleted

Annexure-T
(See clause 33 of Section 3 of GCC)

BANK GUARANTEE FORM FOR SECURED ADVANCE

Not Applicable

Annexure - U
(See clause 35 of section 3 -GCC)

PHYSICAL COMPLETION CERTIFICATE

Name of Work:
_____
_____
_____

Agreement No. _____Date_____

Amount of Contract Rs _____

Name of Agency: _____

Used MB No.: _____

Last measurement recorded

a. Page No. & MB No.: _____

b. Date: _____

Certified that the above-mentioned work was physically completed on..... (Date) and taken over on..... (Date) and that I have satisfied myself to best of my ability that the work has been done properly.

Date of issue

Engineer
_____
_____

Annexure-V
(See clause 35 of section 3 -GCC)

FINAL COMPLETION CERTIFICATE

Name of Work:
_____
_____
_____

Agreement No._____ Date: _____

Name of Agency: _____

Used MB No._____

Last Measurement recorded
a. Page No. & MB No._____
b. Date_____

Certified that the above-mentioned work was physically completed on_____(date) and taken over on_____(date).

Agreement amount Rs. _____

Final amount paid to Contractor Rs. _____

Incumbency of officers for the work

I have satisfied myself to best of my ability that the work has been done properly.

Date of Issue: _____

Engineer in Charge
Gwalior Smart City Development Corporation Limited, Gwalior

Annexure – W
(See clause 39 of Section 3 -GCC)

Salient Features of Some Major Labour Laws Applicable

(a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days'(say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.

(c) Employees P.F. and Miscellaneous Provision Act 1952: The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:

i. Pension or family pension on retirement or death as the case may be. '
ii. Deposit linked insurance on the death in harness of the worker.
iii. Payment of P.F. accumulation on retirement/death etc.

(d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is, required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.

(f) Minimum Wages Act 1948: - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.

(g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.

(i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus 'within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.

(j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and gets these certified by the designated Authority.

(l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(m) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations o employment ofchildren in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.

(n) Inter -State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter- State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.

(o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as. may be modified by the Government., The Employer of the establishment- is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the-work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

(p) Factories Act 1948: - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. it is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.

Section 3: Conditions of Contract – Part II

Special Conditions of Contract [SCC]

1. General

The data and information given in the Contract Document are based on the investigations, planning and designs carried out so far. The data considered for the project planning have been included in the bid documents. The Contractor shall, therefore, satisfy himself about the adequacy and accuracy of the said data/information and interpretation thereof and collect fresh data/additional data/information and carry out/conduct further investigations and studies and get the approval of same from the employer. The Employer shall not be responsible for the accuracy/adequacy of the data/information and interpretation thereof by the Contractor.

2. Sufficiency of Bid

2.1 The Contractor shall be deemed to have visited and carefully examined the Project Site and it's surrounding to have satisfied himself to the nature and conditions of the means of transport and communications, whether by land or air, as available at present and as to possible interruptions thereto including the access and regress conditions for the Site. The Contractor is also deemed to have made enquiries, examined and satisfied himself as to the sites source for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials and accommodation for depots, colonies, workshops and other infrastructure facilities as may be necessary for executing and completing the Works, as also the sub-soil water and variations thereof, storms, prevailing winds, climatic conditions and all other similar matters affecting the works including law & order.

2.2 Any neglect or omission or failure on the part of the Contractor in obtaining necessary and reliable information upon the foregoing or any other matter affecting the Contract shall not relieve him from any risks or liabilities or the entire responsibility for the completion of the Works in accordance with the Contract.

3. Incentive for Early Completion

In the event that the Contractor completes the work ahead of scheduled completion time, a bonus @ 1% (one percent) of the contract price per month computed on per day basis, shall be payable to the Contractor, subject to a maximum limit of 5% (five per cent) of the contract price. The amount of bonus, if payable, shall be paid along with final bill after completion of work.

4. Dismantling of Jawahar Marg Bridge

Dismantling of the bridge shall be under the Contractor's scope and no cost shall be payable for it. Dismantled material will be the property of the Contractor and as such no cost shall be recovered from the Contractor which shall be appropriately considered by the Contractor in his bid.

5. Safety, Security and Protection of the Environment

i. The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.

ii. The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated.

iii. The Contractor shall take all the necessary precautions and abide by relevant rules and regulations of safety which are presently in force and which may come into force during the currency of the contract.

iv. The Contractor shall also take such other additional precautions and resort to such other additional safety measures as may be directed from time to time by the Engineer-in-charge. Violation of any rules, regulations and guidelines contained herein will entail immediate termination of the contract.

v. In the event of any spoil, debris, waste or any deleterious substance from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material and restore the affected area to its original state to the satisfaction of the Employer.

vi. The Contractor shall prevent any interference with the supply to or abstraction from, and prevent any pollution of, water resources (including underground percolating water) as a result of the execution of the Works.

vii. The Contractor shall at all times ensure that all existing water courses / bodies within, and adjacent to the Site are kept safe and free from any debris and materials arising from the Works.

viii. The Contractor shall devise and arrange methods of working to minimize dust, gaseous or other air-borne emissions and carry out the Works in such a manner as to minimize adverse impacts on air quality.

ix. The Contractor shall utilize effective water sprays during delivery manufacture, processing and handling of materials when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of friable materials shall be covered with clean tarpaulins, with application of sprayed water during dry and windy weather. Stockpiles of material or debris shall be dampened prior to their movement, except where this is contrary to the Specification.

x. In the event that the Contractor is permitted to use gravel or earth roads for haulage, he shall provide suitable measures for dust palliation, if these are, in the opinion of the IMC officials necessary. Such measures may include spraying the road surface with water at regular intervals.

xi. The Contractor shall take all necessary measures so that the operation of all mechanical equipment and construction processes on and off the Site shall not cause any unnecessary or excessive noise, taking into account applicable environmental requirements. The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good condition so as to minimize the noise emission during construction works.

xii. The Contractor shall control the disposal of all forms of waste generated by the construction operations and in all associated activities. No uncontrolled deposition or dumping shall be permitted. Wastes to be controlled shall include, but shall not be limited to, all forms of fuel and engine oils, all types of bitumen, cement, surplus aggregates, gravels, bituminous mixtures, etc. The Contractor shall make specific provision for the proper disposal of these and any other waste products, conforming to local regulations and acceptable to the Project Manager.

xiii. The Contractor shall plan and provide for remedial measures to be implemented in the event of occurrence of emergencies such as spillages of oil or bitumen or chemicals.

xiv. The Contractor shall provide the Employer with a statement of the measures he intends to implement in the event of such an emergency which shall include a statement of how he intends to provide personnel adequately trained to implement such measures.

xv. Should any pollution arise from the Contractor's activities he shall clean up the affected area immediately at his own cost and to the satisfaction of the Project Manager, and shall pay full compensation to any affected party.

Note: - In addition to above Contractor shall have to follow the instruction of IS codes for security and Safety (As per Handbook on construction And Safety Practices: SP 70: 2001)

6. Protection of Trees and Vegetation

The Contractor shall ensure that no trees or shrubs or waterside vegetation are felled or harmed except for those required to be cleared for execution of the Works. The Contractor shall protect trees and vegetation from damage to the satisfaction of the Employer. No tree shall be removed without the prior approval of the Employer and any competent authorities. Should the Contractor become aware during the period of the Contract that any tree or trees designated for clearance have cultural or religious significance he shall immediately inform the Employer and await his instructions before proceeding with clearance. In the event that trees or other vegetation not designated for clearance are damaged or destroyed, they shall be repaired or replaced to the satisfaction of the Employer, who shall also impose a penalty of twice the commercial value of any timber affected, as assessed by the Employer.

7. Water Supply

The Contractor shall make his own arrangements at his own expense for water supply for construction, sectional testing if any and other purposes.

8. Relations with Local Communities and Authorities

In setting and operating his plant and facilities and in executing the Works the Contractor shall at all-time bear in mind and to the extent practicable minimize the impact of his activities on existing communities. Where communities are likely to be affected by major activities such as road widening or laying of utility lines or the establishment of a camp, large borrow pit or haul road, he shall liaise closely with the concerned communities and their representatives and if so directed, shall attend meetings arranged by the Employer to resolve issues and minimise impacts on local communities.

9. Fire Prevention

The Contractor shall take all precautions necessary to ensure that no vegetation or property/ies along the line of the road outside the area of the permanent works is affected by fires arising from the execution of the Works. The Contractor shall obtain and follow any instructions of the competent authorities with respect to fire hazard when working in the vicinity of gas installations. Should a fire occur adjacent to the project road for any reason, the Contractor shall immediately suppress it. In the event of any other fire emergency in the vicinity of the Works the Contractor shall render assistance to the civil authorities to the best of his ability. Any scrub or plantation damaged by fire considered by the Employer to have been initiated by the Contractor's staff or labour shall be replanted and otherwise restored to the satisfaction of the Employer at the Contractor's expense.

10. Interference with Traffic and Adjoining Properties

In case any operation connected with the works necessitates diversion, obstruction or closure of any road, waterway or any other right of way, the approval of respective competent authorities shall be obtained well in advance by the Contractor. In case the Contractor’s operations obstruct access to adjacent properties, the Contractor shall be responsible to provide reasonable temporary access to the affected parties. In case the Contractor fails to provide adequate temporary facilities, this shall be deemed to be an Uncorrected Defect and the Employer shall have the right to engage a third party to correct the Defect and the cost of such correction will be deducted from the Contract Price.

11. Arrangement for Traffic During Construction

10.1 General

The Contractor shall at all times, carry out work on the City/Urban road in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing urban road, the Contractor shall, in accordance with the directives of the Engineer as well as the Traffic Police, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement or along a alternative diversion route. Before taking up any construction, the Contractor shall prepare a Traffic Management Plan for each road and submit it to the Engineer for prior approval. This plan should include inter alia:

A qualified safety officer with support staff to serve as a site safety team
Provision of traffic safety devises as per IRC:SP 55 with the following specifications:

- Signages of retro-reflective sheet of high intensity grade
- Delineators in the form of cones/drums made of plastic/rubber having retro-reflective red and white bands, at a spacing of 5 m along with a reflective tape to be tied in between the gaps of cones/drums. A bulb preferably using solar energy is to be placed on the top of the cone/drum for delineation in the dark hours and night.
- Barricades using iron sheet with adequate iron railing/frame painted with retro-reflective paint in the alternate yellow and black & white stripes. Warning lights at 5 m spacing shall be mounted on the barricades and kept lit in dark hours and night.
- Road markings with hot applied thermoplastic paint with glass beads.
- Safety measures for the workers engaged including personal protection equipment
- First aid and emergency response arrangements

10.2 Passage of Traffic along a Part of the Existing Carriageway under improvement

- For widening/strengthening existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress. The treatment to the shoulder shall consist of providing at least 300 mm moorum layer properly rolled and compacted in a width of at least 1.5 m and the surface shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer.
- After obtaining permission of the Engineer, the treated shoulder shall be dismantled, the debris disposed of and the area cleared as per the direction of the Engineer.

10.3 Traffic Safety and Control

The Contractor shall keep the roadway under construction open to traffic and pedestrian movement with proper drainage arrangement and smooth surface condition. Suitable ingress and egress shall be provided as necessary for all intersecting roads and for all abutting properties. Its purpose shall be to protect people from associated hazards and to prevent trespassing into the construction zone.

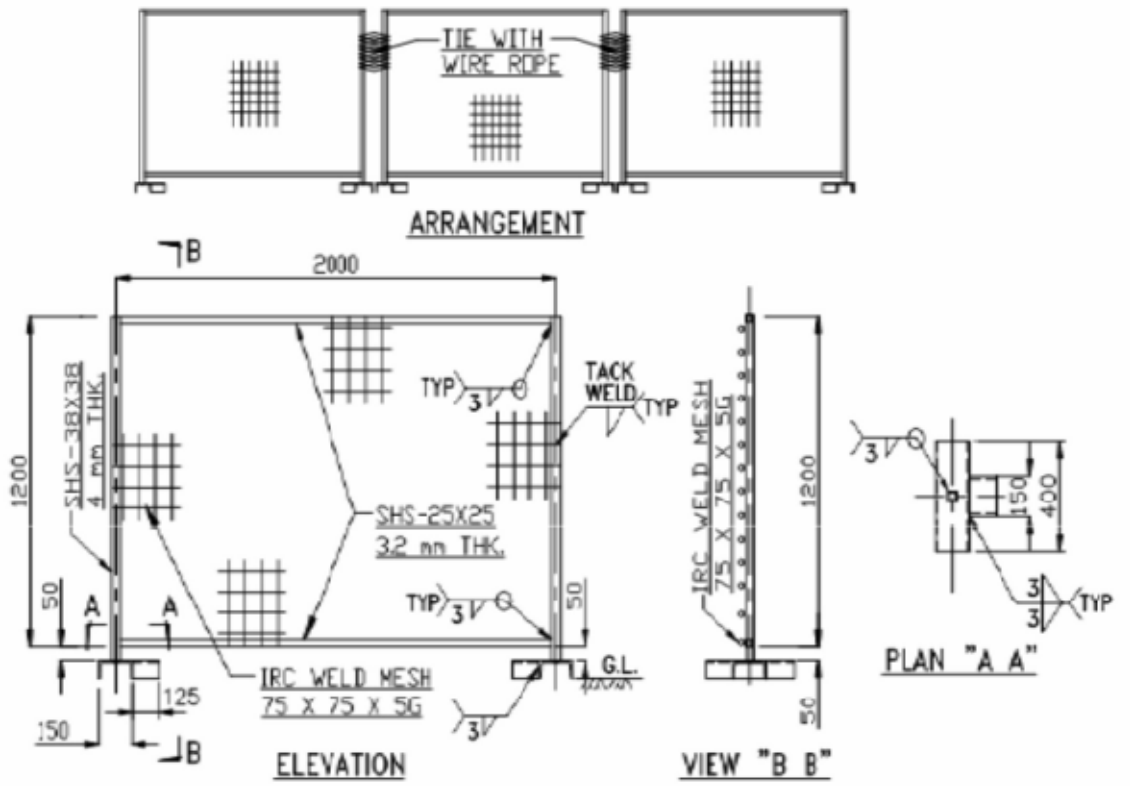
The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights, drums, traffic cones, delineators and flagmen as per the traffic management plan submitted by the Contractor and approved by the Engineer. An agreed phased programme for the diversion of traffic on the urban road shall be drawn up in prior consultation with the Engineer and the Traffic Police.

The Contractor shall keep all signs in proper position, clean and legible at all times.

The barricades erected on either side of the carriageway/portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of approved design and of reflective type, as directed by the Engineer. Two persons with red / green flag and whistle to be deputed at both ends of the barricades to regulate traffic. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light source.

No material to project / spill beyond barricades.
This work item shall include all labour, equipment and services involved in the erection, maintenance, moving, adjusting, cleaning, relocating and storing of signs, barricades, drums, traffic cones and delineators furnished by the Contractor as well as all labour and equipment involved in the maintenance of traffic lanes and detours, for maintenance of traffic.



10.4 Maintenance of Diversions and Traffic Control Devices

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required and as directed by the Engineer. Such temporary ways shall be kept free of dust by frequent applications of water.

Examples of some barricading equipment are as below:

12. Transport of Contractor's Equipment or Temporary Works

Where the Contractor intends to use a particular route for the haulage of large quantities of materials he shall consult well in advance with any affected communities and submit in advance for the Employer's approval a plan including but not limited to the proposed route, the existing condition of the pavement and bridges, the estimated number and type of vehicle movements per day, a programme for monitoring the condition of the pavement and structures, and measures for limiting vehicle speeds and dust nuisance in built-up areas. The Employer reserves the right to disallow certain haul routes should these in his opinion cause or be likely to cause unreasonable nuisance or hazards to the public. The Employer's approval will not remove the Contractor's obligations under this Sub-Clause to prevent and repair damage to roads or his liability for compensation for any accidents caused by his vehicles.

13. Work in Monsoon and Dewatering

The execution of the work may entail working in the monsoon also. The contractor must maintain labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No special/ extra rate will be considered for such work in monsoon. The Contractor's rate shall be considered inclusive of cost of dewatering required if any and no extra rate shall be payable on this account.

14. Site Clearance

Before handing over the work to the Authority, the Contractor shall remove all temporary structure like the site offices, cement godown, stores, labour hutments etc., scaffolding rubbish, left over materials tools and plants, equipments etc., clean and grade the site to the entire satisfaction of the Engineer-In-Charge. If this is not done the same will be got done by GSCDCL at his risk and cost.

15. Site Documents

The following site documents shall mainly be maintained by the Contractor at site:

- Copy of contract documents and drawings.
- Computerized bill format.
- Site Order Book.
- Material testing registers / Quality Inspection Reports.
- Measurement books on computerized format.
- Progress bar chart.
- Sample approval register.
- Hindrance Register.
- Work Diary.
- Deviation/variation order registers.
- Cement consumption register.
- Reinforcement registers.
- Concrete cube test register.
- Slump test register.
- Silt content and sand bulkage register.

16. Safety Guidelines

i. Proper and correct lifting methods shall be adopted.
ii. All lifting tools, tackles and wires ropes etc. shall be of tested quality for safe working loads. Wire ropes shall be of sound construction without any splaying.
iii. It is mandatory for all jobs done at a height of 2.5 M and more to use fall arrestor type safety belts & safety nets.

iv. While carrying out work in confined areas, proper ventilations and lighting arrangement should be made by the Contractor. Adequate precautions shall be taken while the work is in progress to ensure that naked light, fire, welding or any other hot work is not in progress in the vicinity of the area where painting is being carried out.

v. If the work is to be carried out at height, safety of the personnel is of utmost importance. Therefore, all necessary precautions must be taken by the Contractor and he has to obtain work permit from authorized official of GSCDCL for working at height before start the work.

vi. In addition to the above, Contractor has to adhere to the following safety checklist:

A. CIVIL WORKS

- During excavation, the excavated earth must be dumped at a safe distance from the edge of excavation. In no case, this shall be less than 1.5 meters from the top edge of the excavation.
- Safe cross walkways are to be provided at distances not more than 30 meters along a continuous trenching for pipelines etc.
- Hard hats (safety helmets), rubber boots, safety shoes, and hand gloves, etc are required to be provided for supervising as well as other working personnel by the Contractor.
- Keep a watch on buried cables and underground systems. Ladders, gangways are to be provided at convenient places for carrying out required works. Ladders shall be firmly secured to ground and rungs of the ladders shall be properly secured and safe.
- Install Barricading as per IS code with the marking “Gwalior Smart City Works”.

B. ELECTRICAL WORKS

- All temporary electrical connections should be got done to conform to statutory regulations and a certificate obtained from the authorities. The connection and the wiring to be maintained by competent and licensed supervisors and wiremen. As far as possible, the cables are to be safely buried to ensure free access to equipment and machineries movements.
- Hard hats (safety helmets) made out of insulating material to be used by personnel working in 'live' areas like substations, etc.
- Safety boots, necessary hand-gloves as required, shall be used.
- ‘Earthling’ of machineries and equipment shall be ensured. No open/ bare connections allowed. The arrangements should be checked periodically for damages to insulation and loose connections, etc and rectified so that the wiring becomes non-hazardous.
- The areas of working during nights shall be properly illuminated with floodlights and hand- lamps as per the demand of the job.
- Danger signals and safety tags in the live areas shall be demonstrated properly. All connections to be switched off after the working hours.
- Isolation switches and main switches shall be accessible easily. Necessary precautions should be taken while excavating earthing pits.

C. MECHANICAL WORKS

- Hard hats (safety helmets), safety belts, eye goggles, face shields, safety boots, hand-gloves, respirators, etc as required/ directed shall be used.
- Proper, correct and safe lifting methods shall be adopted
- All lifting tools tackle and wires ropes etc shall be of tested quality for safe working loads. Wire ropes shall be of sound construction without any splaying.
- Checks to be exercised for broken wires and core proportion in the main body of the wire ropes to be rejected. Manufacturer’s guidelines/ standards instructions are to be followed for using wire ropes and slings with broken wires. Experience and common sense is of immense help.
- Usage of hoisting belts/ safety belts is must for personnel working at higher elevations.

- Only safe gangways / walkways shall be used for movement of personnel. Short cuts shall be avoided.
- Check connections to headman anchors before hoisting.
- All live wires to be crossed during hoisting shall be made dead near the vicinity of the area during hoisting/ rigging.
- Avoid keeping the loads supported by hoisting equipments for an unreasonable length of time.
- Ropes, cables, and slings must be protected with pads or wooden blocks at sharp edges.

D. GENERAL

- Safety starts from the individual on the job. Experience and common sense shall be generously used. In case of any doubt regarding safety, Engineer–in-Charge can be consulted.
- Proper communication and alertness on the job is to be ensured.
- Manholes and openings for ducts etc shall be kept properly covered.
- Correct tools and tackles should be used for every work. Make shift tools and tackles will result in accidents.
- Fire-fighting equipment shall be placed at designated locations and kept unobstructed.
- Do not use loose clothing, neckties, and etc. while on the job.
- Safety precautions recommended by the manufacturers/ vendors shall be strictly adhered to.
- All machinery, tools and tackles shall be maintained properly, and clearly.

17. Encumbrances in Construction Area, including Trees and Utilities -

1. The Contractor shall be responsible to coordinate with service provider / concerned authorities for cutting of trees, shifting of utilities and removal of encroachments etc. and making the site unencumbered from the project construction area required for completion of work. This will include initial and frequent follow-up meetings / actions / discussions with each involved service provider / concerned authorities. The Contractor will not be entitled for any additional compensation for delay in cutting of trees, shifting of utilities and removal of encroachments by the service provider / concerned authorities. Payment for cutting of trees and shifting of utilities as required by the concerned department shall be made by the Employer. The entire cut material will be property of the Contractor and no cost of such material shall be recovered from the Contractor which shall be appropriately considered by the Contractor in his bid.
2. Drawings scheduling the affected encumbrances such as trees and services like water pipes, sewers, oil pipelines, cables, gas ducts, electricity lines, accessories, telephone poles and OFC cables etc. included in the contract document shall be verified by the Contractor for accuracy of scope.
3. The Employer will make payments to the respective service provider / authorities for cutting of trees and shifting of utilities, wherever required. The Contractor will obtain necessary approval from such Authorities after payments by the Employer and also in cases where payments are not required to be made for such shifting. The Employer will also write to all concerned departments/ service provider organization for expediting and facilitating cutting of trees, shifting of utilities and removal of encroachment etc.
4. Any services affected by the Works must be temporarily supported by the Contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of the Works. It shall be deemed to be part of the Contract and no extra payment shall be made for the same.
5. The Contractor may be required to carry out certain works for and on behalf of the various bodies and he shall also provide, with the prior approval of the Engineer, such assistance to the various bodies as may be authorized by the Engineer.

18. Supply of Colored Record Photographs

The Contractor shall, at his own cost, arrange to take colour photographs at various stages / facets of the work including interesting and novel features of the work as directed by the IMC officials and supply two copies of colour record photographs mounted in the albums including negatives with specification and these shall be kept by Employer.

19. Public Awareness / Information Display

The Contractor shall, at his own cost, arrange to provide, erect and maintain necessary display boards/ banners etc as directed by IMC officials at selection points of project site giving such information as considered necessary for public awareness/ information.

20. Completion Drawings

The Contractor is required to submit the completion drawings (As built Drawings) for the work done by him. However the completion drawings for works done and covered underground, it is essential to prepare the completion drawing as soon as the work is done and before backfilling.

The drawings have to be prepared in digital format in AUTO-CAD, it is therefore made mandatory that the completion drawings of the cross section of road with all utilities, Road Plan, Inspection Chambers, Rainwater Catch pit, L-section of road etc, shall be submitted along with the running account bills for all the works carried out during the period.

The completion drawing should provide adequate data to enable finding the exact location of the system in ground at a later date by any other new person. It should also provide the data related to material, class and size of the line, its depth in ground, Invert Levels and levels in the manholes. The details will be provided from Chainage-wise in details and the plan layout of the roads along with Cross section and L-section on the reference map should be updated and submitted along with the bill. Two hard copies of the drawings will also be submitted along with the soft copy.

21. Execution of work according to Time Schedule

The Bidder shall include in his bid, a detailed construction programme of executing the project, describing broadly the technology and construction methodology major components of the project including traffic diversion plan, deployment of machinery, submission of drawings and design. The programme shall be supplemented with Master Control Network. The employer reserves the right to request for change in Master Control Network after discussions with the successful bidder. Mutually agreed Master Control Network shall form part of the Contract.

The Contractor has to start construction works in the fronts available at particular road site. This shall be planned in close consultation with the Engineer-In-Charge and in coordination with the concerned authorities / departments / local groups.

The Works shall be executed and performed in accordance with the Master Control Network (Work Programme) which shall clearly indicate the interlinking / interdependencies of all the works of the Contract.

The Programme shall be reviewed jointly by the Employer/ Engineer and the Contractor, at least once in a month where-in the hold ups/delays, if any, in the progress of Works, with reference to the agreed Schedule shall be given Special Attention. Necessary modifications (updating / Revisions) of the Programme, within the overall Time for Completion, shall be carried out by mutual agreement between the Employer/ Engineer and the Contractor.

22. Working Procedure

The Contractor shall be required to adopt a Working Procedure based on the following:

- Protection of properties along the project roads and their activities / operations such that these suffer minimum (if any) adverse effects as a result of construction activities.
- Observe all local requirements related to work and traffic restrictions (for example, transportation of material during particular times of a day or week, use of manual labour / smaller vehicles for carriage of material to / from narrow lanes) as may be specified by GSCDCL from time to time.
- Avoid disruption of any public utility network and promptly restore the same in case of any unavoidable disruption at his own cost and time without causing any discomfort to people as well as businesses.
- Provide for all temporary arrangements essential to allow normal operations / living conditions for people as well as businesses.

23. Coordination of Works

Due to the peculiar nature and location of the project, and in view of the objective of proper laying of all utility services, the specialist will need to work simultaneously and ensure proper mutual coordination to avoid any hardships to the community. GSCDCL reserves the right to schedule the order of performance of Work in such a manner as will minimize interference within different works involved. As shown in the table below, three works will be needed to be taken up simultaneously.

<table>
<tr><th>Description of Work</th><th>Implementation Strategy</th></tr>
<tr><td>1. Roads widening / improvement and laying of Footpath, Central Divider, RCC Cable Duct, RCC Pipes for OFC, Telecom Lines and Gas Pipeline, Storm Water Drainage Pipe and Chambers, including appurtenances signages, road markings and adjunct structures.</td><td>Removal of old road in stretches / phases and shifting of electric poles, laying of new CC Road with central divider and storm water drainage pipes and chambers, provide for crossing of utility pipes for future demand at regular intervals, laying pipes for OFC and Gas, construction of RCC Duct, construction of foot-path after laying of utility services.</td></tr>
<tr><td>a. Water supply network (transmission / distribution) including all appurtenances and structures – upto house connections</td><td rowspan="2">Laying of utility services network including structures and appurtenances in designated widths with additional excavation if any after excavation by Contractor 1 for road, proper finishing of chamber / manhole top levels after footpath construction by Contractor 1. New user-end connections, abandonment of old connections / pipes.</td></tr>
<tr><td>b. Sewerage pipes and manholes – upto house connections</td></tr>
<tr><td>c. Power cables (HV / LV), Substations, Distribution Boxes / Feeder Pillars etc. upto house connections and Street-lighting.</td><td>Laying of HV/LV cables in RCC Ducts upto Distribution Boxes / Feeder Pillars, Installation of compact substations, street lighting poles installation. New user-end connections.</td></tr>
</table>

24. Material Storage

All materials shall be stored as per IS:4082.

Section 4
Bill of Quantities

HTML SCHEDULE-B : TEMPLATE

Department:	Gwalior Smart City Development Corporation Limited
Tender Number:	MPGMC/TENDER NO -.....
NIT No:	1st Call
Bidder :	

Detail			
Category	**Description**	**UOM**	**Quantity required**
	Road Works		
	Dismantling		
	Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 100m and earth filling in the depression/pit and as per relevant clauses of section-200 for		
	Girth from 300mm to 600 mm	*Each*	16.000
	Girth from 600mm to 900 mm	*Each*	36.000
	Girth from 900mm to 1800 mm	*Each*	6.000
	Clearing & Grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth upto 300 mm, removal of stumps of trees cut earlier and disposal of unservicable materials and stacking of servicable material to be used or auctioned up to lead of 1000 m including removal and disposal of top organic soil not exceeding 150 mm in thickness complete as per relevant clauses of section-200. by Mechanical means. In area of light jungle.	*Hectare*	0.505
	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\Re-Use the serviceable material with all lifts and lead 1000 meter.		
	Cement Concrete Grade M-15 & M-20, Stone Works	*Cum*	2114.000
	Dismantling kerb stone by manual means and disposal of dismantled material with all lifts and up to a lead upto 1000 meter and as per relevant clauses of section-200.	*Meter*	2220.000
	Removal of telephone / Electric poles including excavation and dismantling of foundation concrete and lines under the supervision of concerned department, disposal with all lifts and up to a lead of 1000 meter and stacking the serviceable and unserviceable material separately.	*each*	180.000
	Scarifying the existing granular road surface to a depth of 50 mm and disposal of scarified material within all lifts and leads upto 1000 meters.	*Sqm*	71460.000
	Excavation		
	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto1000 metres and as per relevant clauses of section-	*Cum*	5716.800
	Earthwork		0.000
	Filling available excavated earth in trenches, plinth sides of foundation of layers not exceeding 20cm, in depth including consolidation of each layer by ramming watering, lead upto 50m and lift upto 1.5m in all kinds of soils.	*Cum*	1905.600

	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) shaping & dressing (Cl 305.3.7), finishing etc. complete but excluding scarifying existing granular/bituminous road surface vide clause 305.6	*Cum*	7168.200
	GSB		
	Construction of granular sub-base by providing coarse graded crushed stone aggregates of granite/trap/basalt material, spreading in uniform layers with motor grader on prepared surface, by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per specifications by Mix in Place Method (For Grading II Material)	*Cum*	435.000
	WMM		
	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*	542.400
	Primer Coat		
	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*	24490.000
	Tack Coat		
	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.		
	@0.25 kg per sqm (normal bituminous surfaces)	*sqm*	24490.000
	@0.30 kg per sqm (dry & hungry bituminous surfaces/granular surfaces treated with primer	*sqm*	24490.000
	Dense Bituminous Macadam		
	Providing and laying dense bituminous macadam (in layers of 50mm thickness each or as per the instruction of engineer in charge) 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)		
	(for Grading II (50-75mm thickness)	*Cum*	1952.900
	Bituminous Concrete		
	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).		
	for Grading II (30-45 mm thickness) with 60/70 bitumen	*Cum*	979.600
	Construction of cement concrete kerb with top and bottom width 115 and 165 mm respectively, 325 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.	*Meter*	5840.000
	Footpath & Cycle track		

	Footpath		
	Providing & laying brick bat coba sub-base with aggregate 63mm to 40mm size & approved binding material including screening, sorting, spreading, packing & consolidation with half tonne roller to template, complete work.	*Cum*	723.600
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	542.700
	Flag Stone		
	40 mm thick rubbed local Flag stone flooring over 20 mm (average) thick base of cement mortar 1:5 (1 cement :5 coarse sand) with joints 3mm thick, side buttered with cement mortar 1:2 (1 cement : 2 stone dust) admixed with pigment to match the shade of stone and pointing with same mortar (minimum size of kota stone 0.25 sqm)		
	Red sand stone	*sqm*	7962.000
	White sand stone	*sqm*	
	Providing & laying tactile tile (for vision impaired person as per standards) of size 300x300x9.8mm having water absorption less than 0.5% & conforming to IS-15622, of approved make in all colours & shades in outdoor floors such as footpath, courtyard, multimodal location etc, laid on 20mm thick base of cement mortar 1:4 in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc complete as per direction of engineer-in-charge.	*sqm*	888.000
	Cycle Track		
	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 .		
	PCC Grade M30	*Cum*	228.000
	WMM CYCLE TRACK		
	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*	228.000
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	228.000
	Median		
	Proving & laying brick bat coba sub-base with aggregate 63mm to 40mm size & approved binding material including screening, sorting, spreading, packing & consolidation with half tonne roller to template, complete work.	*Cum*	133.000
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	100.000
	Storm Water Drain		
	RCC WORK		
	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) including form work shuttering curing etc. complete as per drawing and technical specifications and as per relevant clauses of sections 1500,1700 &2100 with		
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	211.328
	RCC Grade M25 with 20 mm maximum size of aggregate		
	Base slab	*Cum*	355.920
	Wall	*Cum*	978.780
	Top Slab	*Cum*	237.280
	Raised Drain Wall	*Cum*	8.898

	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete.		
	Thermo-Mechanically Treated bars	*kg*	158087.800
	Form work for Duct		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains etc. For mass concrete.		
	PCC	*sqm*	444.900
	Base slab	*sqm*	889.800
	Wall	*sqm*	13050.400
	Top Slab	*sqm*	2076.200
	Raised Drain Wall	*sqm*	118.640
	Providing and fixing of Pre-Cast R.C.C. Grating with frame 450 x 100 mm Vertical Grating	*Each*	158.000
	Under Ground Ducting for Power & OFC		
	Earthwork		
	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	6387.927
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	3193.963
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	6387.927
	Earthwork Chamber		
	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	235.690
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	117.845
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	235.690
	3.0 m to 4.5 m depth	*Cum*	117.845
	Chamber For Power Cables		
	M25 Ready Mixed **cement Concrete Access Electrical Chamber** with Inner Dimension 1.5m(L) X 2.0m (W), Depth 1.8m, side walls of 0.15m thick, top cover 0.15m thick, PCC bed of M15 concrete Complete including all lead and lifts and as per the directions of engineer in charge .		
	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) including form work shuttering curing etc. complete as per drawing and technical specifications and as per relevant clauses of sections 1500,1700 & 2100 with		
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	17.677
	RCC Grade M25 with 20 mm maximum size of aggregate		
	Base slab	*Cum*	30.636
	Wall	*Cum*	751.640
	Top Slab	*Cum*	20.424
	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete.		
	Thermo-Mechanically Treated bars	*kg*	80270.000
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		

	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	32.560
	Base slab	*sqm*	60.680
	Wall	*sqm*	1503.280
	Top Slab	*sqm*	244.693
	Chamber For OFC Cables		
	M25 Ready Mixed **cement Concrete Access Chamber of OFC Cable** with Inner Dimension 0.55m(W) X 1.0m(L), Depth 1.14m, side walls of 0.1m thick, top cover 0.075m thick, PCC bed of M15 concrete Complete including all lead and lifts and as per the directions of engineer in charge. - **Data/Derived Rate**		
	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) including form work shuttering curing etc. complete as per drawing and technical specifications and as per relevant clauses of sections 1500,1700 & 2100 with		
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	4.496
	RCC Grade M25 with 20 mm maximum size of aggregate		
	Base slab	*Cum*	4.440
	Wall	*Cum*	196.840
	Top Slab	*Cum*	4.440
	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete.		
	Thermo-Mechanically Treated bars	*kg*	20572.000
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	16.650
	Base slab	*sqm*	28.860
	Wall	*sqm*	393.680
	Top Slab	*sqm*	63.640
	Street Light Foundation		
	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto1000 metres and as per relevant clauses of section-	*Cum*	328.779
	Filling available excavated earth in trenches, plinth sides of foundation of layers not exceeding 20cm, in depth including consolidation of each layer by ramming watering, lead upto 50m and lift upto 1.5m in all kinds of soils.	*Cum*	109.593
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	24.658
	RCC Grade M25 with 20 mm maximum size of aggregate		0.000
	Base slab	*Cum*	17.050
	Pedestal	*Cum*	7.578
	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete.		
	Thermo-Mechanically Treated bars	*kg*	2462.720
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	40.338
	Base slab	*sqm*	56.832
	Pedestal	*sqm*	75.776
	Sand		
	Local Sand	*Cum*	5955.000
	Sewer Line		
	Earthwork		

	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	592.200
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	296.100
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	371.518
	Earthwork Chamber		
	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	85.800
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	42.900
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	68.157
	Dewatering		
	Pumping out water caused by springs, tides or river seepage,broken water mains or drains or well or the like.	*KL*	3000.000
	Closed Timbering		
	Providing and fixing Close timbering in trenches including strutting, shoring and packing cavities where required complete (Measurement to be taken of the face timbered)		
	Up to 1.5 m depth	*sqm*	1026.975
	Above 1.5 m and upto 3.0 m	*sqm*	434.118
	Filling		
	Filling available excavated earth in trenches, plinth sides of foundation of layers not exceeding 20cm, in depth including consolidation of each layer by ramming watering, lead upto 50m and lift upto 1.5m in all kinds of soils.	*Cum*	485.558
	Pipes		
	Providing, Laying, Jointing, Testing non-pressure (NP2) RCC socket & spigot pipes with rubber gasket joint including testing of joints. [Conforming to IS ; 458-1988, ISI marked laying as per IS 783:1985)		
	300 mm	*Meter*	710.000
	Providing and Laying non-pressure (NP4) RCC socket & spigot pipes with rubber gasket joint including testing of joints. **(Conforming to IS:458 - 1988, ISI Marked Laying as per IS: 783-1985)**		
	Internal Dia		
	300 mm	*Meter*	200.000
	Pipe Bedding		
	Shaped bottom or compacted granular bedding with carefully compacted backfill,type B bedding	*Cum*	63.900
	Providing and laying mechanically mixed cement concrete 20 mm maximum size graded crushed stone including cost of centering & Shuttering complete for pipe bedding and surrounding as per drawing and/or as directed by Engineer for AC Class III pipes, carefully tampted back fill type Ab bedding	*Cum*	63.900
	Manhole- Circular Type		

	Construction of circular type manhole 1200mm internal dia at bottom, 560mm dia at top in brick masonry class designation 40 with 1:4 cement mortar 1:4 (1 cement : 4 Coarse sand) 1680m depth, 12mm thick cement plaster 1:3 cement plaster (1 cement : 3 Coarse sand) finished with a floating coat of neat cement. 30cm thick foundation in cement concrete grade M-10 (Nominal Mix) with stone aggregate 40mm nominal size, RCC grade M-20 (Nominal Mix) with stone aggregate M-20 nominal size on top slab and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20mm nominal size neatly finished, curing and fixing of SFRC cover and frame (heavy duty HD-20) 560mm internal dia conforming to IS 12592.	*Nos.*	27.000
	Extra for increasing depth of manhole mentioned above from 1680 mm to 2290 mm with modular brick class designation 40.	*Meter*	48.767
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	213.000
	Providing and making baricading wherever required along the pipe line trenches, surrounding manholes etc using 75mm dia wooden post securely fixed in the ground not more than 3 m apart shall not be less than 1.2 m above the surface of the ground. There shall be two rails, one near the top of the posts and the other about 50 mm above the ground and each shall be of 50 mm to 70 mm in diameter and sufficiently long to run from post to post to which it shall be bound with strong rope inclduing removing the baricading after completion of work including cost of all material, excavation etc complete as per direction of Engineer.(measurement shall be taken separately for both sides of trench, manhole etc)	*RM*	710.000
	Water Line		
	Earthwork		
	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	552.300
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	276.150
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	220.920
	Earthwork Chamber		
	Earth work in Excavation for pipe trench in all kinds of soil and WBM in areas including dressing, watering and ramming and disposal of Excavated earth lead upto 50 meters and lift upto 1.5m, disposal earth to be leveled, neatly dressed.		
	Up to 1.5 m depth	*Cum*	6.435
	For Muddy Area		
	Up to 1.5 m depth	*Cum*	3.218
	Soft rock with or without blasting or bituminous pavement.		
	1.5 to 3 m depth	*Cum*	2.574
	Dewatering		
	Pumping out water caused by springs, tides or river seepage,broken water mains or drains or well or the like.	*KL*	1000.000
	Closed Timbering		
	Providing and fixing Close timbering in trenches including strutting, shoring and packing cavities where required complete (Measurement to be taken of the face timbered)		
	Upto 1.5 m	*sqm*	705.000
	Above 1.5 m and upto 3.0 m	*sqm*	188.000

	Filling		
	Filling available excavated earth in trenches, plinth sides of foundation of layers not exceeding 20cm, in depth including consolidation of each layer by ramming watering, lead upto 50m and lift upto 1.5m in all kinds of soils.	*Cum*	353.866
	Pressure Pipe		
	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-7) conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying conforming to IS 12288 : 1987)		
	600 mm diameter DI K7	*Meter*	470.000
	Fixing including Jointing of Cast iron double flanged sluice valves fitted with cast iron cap testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete (only valve to be supplied by the department free of cost). [conform to IS 2685 : 1971]		
	600 mm dia, PN 1.6	*Each*	1.000
	Providing & fixing cast iron double air valves, flanged without in-built isolating valve as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991		
	200 mm dia, PN 1.6	*Each*	1.000
	Chamber		
	M25 Ready Mixed **cement Concrete Valve Chamber** with Inner Dimension 1.5m(L) X 1.5m (W), Depth 2.1m, side walls of 0.15m thick, top cover 0.15m thick, PCC bed of M15 concrete Complete including all lead and lifts and as per the directions of engineer in charge .		
	Providing and laying Plain/Reinforced cement concrete (mixed in concrete mixture) including form work shuttering curing etc. complete as per drawing and technical specifications and as per relevant clauses of sections 1500,1700 & 2100 with		
	PCC Grade M15 with 40 mm maximum size of aggregate	*Cum*	0.483
	RCC Grade M25 with 20 mm maximum size of aggregate		
	Base slab	*Cum*	0.810
	Wall	*Cum*	25.200
	Top Slab	*Cum*	0.810
	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete.		
	Thermo-Mechanically Treated bars	*Per Kilogram*	2682.000
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	1.080
	Base slab	*sqm*	1.980
	Wall	*sqm*	50.400
	Top Slab	*sqm*	7.380
	Pipe Bedding		
	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate)		
	M-10	*Cum*	63.450
	Form work		
	Centering and shuttering including strutting, propping etc.and removal of form for :		
	Foundations, footings, bases of columns, drains, Chambers etc.		
	PCC	*sqm*	141.000
	Rotary improvements for Achleshwar Chowk		

	Dismantling		
	Cutting of trees, including cutting of trunks, branches and removal of stumps, roots, stacking of serviceable material with all lifts and up to a lead of 100m and earth filling in the depression/pit and as per relevant clauses of section-200 for		
	Girth from 600mm to 900 mm	*Each*	3.000
	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\Re-Use the serviceable material with all lifts and lead 1000 meter.		
	Cement Concrete Grade M-15 & M-20, Stone Works	*Cum*	75.398
	Dismantling kerb stone by manual means and disposal of dismantled material with all lifts and up to a lead upto 1000 meter and as per relevant clauses of section-200.	*Meter*	125.664
	Removal of telephone / Electric poles including excavation and dismantling of foundation concrete and lines under the supervision of concerned department, disposal with all lifts and up to a lead of 1000 meter and stacking the serviceable and unserviceable material separately.	*Each*	20.000
	Dismantling of barbed wire fencing/ wire mesh fencing including posts, foundation concrete, back filling of pit by manual means including disposal of dismantled material with all lifts and up to a lead of 1000 meter, stacking serviceable material and unserviceable material separately.	*RM*	125.664
	Scarifying the existing granular road surface to a depth of 50 mm and disposal of scarified material within all lifts and leads upto 1000 meters.	*sqm*	6785.840
	Excavation		
	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto1000 metres and as per relevant clauses of section-	*Cum*	144.513
	GSB		
	Construction of granular sub-base by providing coarse graded crushed stone aggregates of granite/trap/basalt material, spreading in uniform layers with motor grader on prepared surface, by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per specifications by Mix in Place Method (For Grading II Material)	*Cum*	50.265
	WMM		
	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*	62.832
	Primer Coat		
	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*	2261.947
	Tack Coat		
	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.		
	@0.25 kg per sqm (normal bituminous surfaces)	*sqm*	2261.947
	@0.30 kg per sqm (dry & hungry bituminous surfaces/granular surfaces treated with primer	*sqm*	2261.947

	Dense Bituminous Macadam		
	Providing and laying dense bituminous macadam (in layers of 50mm thickness each or as per the instruction of engineer in charge) 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)		
	(for Grading I (80-100mm thickness)	*Cum*	192.265
	Bituminous Concrete		
	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).		
	for Grading II (30-45 mm thickness) with 60/70 bitumen	*Cum*	90.478
	Providing and laying 60 mm thick factory made cement concrete interlock paver blocks of M-30 grade made by block making machine with strong vibratory compaction and of approved shape, size and colour over and including 50mm thick compacted course sand bed filling the joints with coarse sand etc., all complete as per direction of Engineer-in-charge.	*sqm*	502.655
	Construction of cement concrete kerb with top and bottom width 115 and 165 mm respectively, 325 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.	*Meter*	251.327
	Brick work with well burnt chimney bricks in bulls patent trench kiln manifactured by ghol process,crushing strength not less than 40kg /sqcm and water absorption not more than 15% in foundation and plinth.		
	Cement mortar 1:4 (1 cement : 4 coarse sand)	*Cum*	46.244
	Road Markings		
	Road Marking		
	Solid Lines in White Colour		
	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on 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 2.5mm 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		
	Solid Lines in White Colour	*sqm*	404.000
	Brocken Lines in White Colour	*sqm*	264.667
	Stop Lines in White Colour	*sqm*	9.800
	Applying Zebra Crossing	*sqm*	388.000
	Painting lines, dashes, arrows etc		0.000
	Painting lines, dashes, arrows etc on roads in two coats on new work with ready mixed road marking paint conforming to IS:164 on bituminous surface, including cleaning the surface of all dirt, dust and other foreign matter, demarcation at site and traffic control as per relevant clauses of section-800 & I.R.C.-67 including cost of paint etc. complete.	*sqm*	154.000
	Cycle Track Painting (Colour shall be as per approval of Engineer-in-charge, same paint shall be used for making cycle marking)	*sqm*	2520.000

	Painting two coats after filling the surface with synthetic enamel paint in all shades on new concrete surfaces and as per relevant clauses of section-800 & I.R.C.-67 including cost of paint etc. complete (For Kerb Painting)	*sqm*	2070.000
	Cycle Track Painting (Colour shall be as per approval of Engineer-in-charge, same paint shall be used for making cycle marking)	*sqm*	1520.000
	Signages		
	Providing and fixing of retro- reflectorised cautionary, mandatory and informatory 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 mmx75 mmx6 mm (height from crown level of the road and bottom of the sign board shall not be less than 1.5m) firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cmx45 cmx60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification. (Design and drawing shall be contractor's scope).		
	90 cm equilateral triangle	*Nos*	20.000
	80 cm x 60 cm rectangular	*Nos*	40.000
	Road Delineators (Supplying and installation of delineators(road way indicators , hazard markers, object markers), 80-100cm high above ground level, painted black and white in 15cm wide strips, fitted with 80x100mm rectangular or 75mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming to IRC-79 and the drawings as per relevant clauses of section -800 of specifications.	*Each*	1464.000
	Road Markers/Road Stud with Lense Reflector (Providing and fixing of road stud 100x 100 mm, dia cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30 mm upto a depth of 60 mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973	*Each*	200.000
	Planting permanent hedges including digging of trenches 60 cm wide and 45 cm deep, refilling the excavated earth mixed with farmyard manure, supplied at the rate of 4.65 cum per 100 meters and supplying and planting hedge plants at 30 cm apart	*Meter*	1400.000
	Planting of Trees and their Maintenance for one Year (Planting of trees by the road side (Avenue trees) in 0.60 m dia holes, 1 m deep dug in the ground, mixing the soil with decayed farm yard/sludge mannure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for one year)	*Nos*	10.000
	Under Ground Ducting for Power Cables		
	Supply of 3Cx300Sq.mm. Al. conductor, Round Wire armoured, XLPE insulated, PVC sheathed, 11KV cable . The cable should conform to IS:7098 Part 2, 2011 with upto date amendment.	*Meter*	7000.000
	Installation , Testing & Comissioning of 11 KV 300 Sq.mm x 3c , XLPE Cable in existing RCC / Hume / Metal Pipe of 11 KV 300 Sq.mm x 3c , XLPE Cable in existing RCC / Hume / Metal Pipe	*Meter*	7000.000
	Supply of outdoor termination of 11KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx300Al conductor armoured, XLPE insulated cable	*Set*	150.000
	Cable End Terminals jointing including Kerosene/Gas , tool and other material require for jointing by Heat Shrinkage Kit for 11 KV with testing and lead marking .	*Set*	150.000
	Supply of straight through joint of 11KV cable with heatshrinkable straight through termination kit complete with lugs and other accessories for 3Cx300 Al conductor armoured, XLPE insulated cable	*Set*	20.000
	Cable Straight Through jointing including Kerosene/Gas , tool and other material require for jointing by Heat Shrinkage Kit for 11 KV with testing and lead marking .	*Set*	20.000

	Supply of 3Cx300Sq.mm. Al. conductor, Round Wire Armoured, XLPE insulated, PVC sheathed, 33KV cable . The cable should conform to IS:7098 Part 2, 2011 with upto date amendment.	*Meter*	6000.000
	Installation , Testing & Comissioning of 33 KV 300 Sq.mm x 3c , XLPE Cable in existing RCC / Hume / Metal Pipe	*Meter*	6000.000
	Supply of outdoor termination of 33KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx300Al conductor armoured, XLPE insulated cable	*Set*	30.000
	Cable End Terminals jointing including Kerosene/Gas , tool and other material require for jointing by Heat Shrinkage Kit for 33 KV with testing and lead marking .	*Set*	30.000
	Supply of straight through joint of 33KV cable with heatshrinkable straight through termination kit complete with lugs and other accessories for 3Cx300 Al conductor armoured, XLPE insulated cable	*Set*	15.000
	Cable Straight Through jointing including Kerosene/Gas , tool and other material require for jointing by Heat Shrinkage Kit for 33 KV with testing and lead marking .	*Set*	15.000
	Supply of Al.conductor, round wire armoured, XLPE insulated, PVC sheathed, 1.1KV cable . The cable should conform to IS:7098 Part-2, 2011 with upto date amendment. The cable size is as mentioned below:		
	3.5Cx400 Sq.mm cable	*Meter*	200.000
	3.5Cx300 Sq.mm cable	*Meter*	450.000
	3.5Cx150 Sq.mm cable	*Meter*	3000.000
	3.5Cx70 Sq.mm cable	*Meter*	500.000
	3.5Cx 35 Sq.mm cable	*Meter*	1500.000
	4 Cx 10 Sq.mm cable	*Meter*	1000.000
	2 C x 6 Sq.mm cable	*Meter*	2000.000
	Installation , Testing & Comissioning of 1.1 KV XLPE Cable in existing RCC / Hume / Metal Pipe		
	Upto 120.00 Sq.mm	*Meter*	5000.000
	Above 120.00 Sq.mm but not exceeding 400.00 Sq.mm	*Meter*	3650.000
	Supply, Installation, Testing and Commissioning of termination of Al.conductor, armoured, XLPE insulated, PVC sheathed, 1.1KV cable with double compression chrome plated brass cable gland .		
	3.5Cx400 Sq.mm cable	*Set*	10.000
	3.5Cx300 Sq.mm cable	*Set*	30.000
	3.5Cx150 Sq.mm cable	*Set*	50.000
	3.5Cx70 Sq.mm cable	*Set*	10.000
	Supply, Installation, Testing and Commissioning of termination of Al.conductor, armoured, XLPE insulated, PVC sheathed, 1.1KV cable heavy duty tubular lugs of following size:		
	3.5Cx400 Sq.mm cable	*Set*	10.000
	3.5Cx300 Sq.mm cable	*Set*	30.000
	3.5Cx150 Sq.mm cable	*Set*	50.000
	3.5Cx70 Sq.mm cable	*Set*	10.000
	HDPE Pipe		
	Supply, Installation, Testing and Commissioning HDPE Pipe as per IS 4984:1995 , Conveying to work site including loading and unloading at both destinations and rolling , lowering into trenches , laying true line and joining of pipes , complete giving hydraulic test as per relevant IS .		
	HDPE Pipe - 200 MM Dia	*RM*	26000.000

	Chem rod earthing including electrode, chemical (consisting galvanized mild steel pipe of size 2000 mmx50mm outer diameter or higher size as per site conditions, filled with a highly conductive material and a GI strip minimum 16 mm x 3 mm covering total of pipe forming the electrode) for obtaining earth resistance less than 1 ohm	*Job*	80.000
	Supply, Installation, Testing & Commissioning of GI Srip (Hot Dipped Galvazised) 50 MM x 6 MM	*Per Kilogram*	1000.000
	Supply of LT Feeder Pillars		
	TYPE-A (The feeder pillar shall have anti theft tamper proof feature to automatically send SMS alert if door opening is attempted by unauthorised person)	*Each*	20.000
	Rating of incomer MCCB TPN 250A, 35KA (Adjustable thermal O/L with Ics = 100% Icu).		
	Three Phase Outgoing from MCB 'C' Curve 4P 63A , 10 KA - Qty. 18 No.		
	Single Phase Outgoing from MCB 'C' Curve 2P 40A , 10 KA - Qty. 6 No.		
	TYPE-B (The feeder pillar shall have anti theft tamper proof feature to automatically send SMS alert if door opening is attempted by unauthorised person)	*Each*	7.000
	Rating of incomer MCCB TPN 125A, 35KA (Adjustable thermal O/L with Ics = 100% Icu)		
	Three Phase Outgoing from MCB 'C' Curve 4P 63A , 10 KA - Qty. 12 No.		
	Single Phase Outgoing from MCB 'C' Curve 2P 40A , 10 KA - Qty. 6 No.		
	Earthing of Feeder Pillar		
	Earthing with G.I Earth Pipe 4.5 Meter long and 40 mm dia with masonary enclosure in cement mortor coverplate having locking arrangment on top etc. (but without charcoal or coke and salt) complete as required .	*Each*	27.000
	Add extra for using salt & charcoal / coke for pipe earth electrode as required including excavation & refilling .	*Each*	27.000
	Providing , Laying , and fixing 150 MM Dia Medium Class Heavy Galvanized Pipe in ground complete with GI fittings including trenching (75 cm deep) and re-filling etc. as required .	*Meter*	400.000
	Supply of 11kV, 630KVA, Outdoor Package / Compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following: HT Switchgear : 11KV, 630A, 25KA for 1 Sec SF6 Insulated SCADA compatible RMU consisting of 2 nos. remote operated motorised Load Break Switch and 1 no. remote operated motorised VCB unit with self powered microprocessor based 3 ph numerical relay and metering unit with CTs and PTs. RMU should have built in FPI & FRTU. Transformer : Oil filled 11/0.4KV Dyn11, OCTC Transformer as per IS 1180 with CT and DTR meter. LT : I/C - 1000A 433V, 4Pole, 50Hz, 50KA electrically operated type ACB O/G - 9 nos. 250A, 433V, 3Pole, 50Hz, 36KA MCCB	*Each*	4.000

	Supply, Installation, Testing and Commissioning 11kV, 500KVA, Outdoor Package / Compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following:HT Switchgear : 11KV, 630A, 25KA for 1 Sec SF6 Insulated SCADA compatible RMU consisting of 2 nos. remote operated motorised Load Break Switch and 1 no. remote operated motorised VCB unit with self powered microprocessor based 3 ph numerical relay and metering unit with CTs and PTs. RMU should have built in FPI & FRTU.Transformer : Oil filled 11/0.4KV Dyn11, OCTC Transformer as per IS 1180 with CT and DTR meter. LT : I/C - 1000A 433V, 4Pole, 50Hz, 50KA electrically operated type ACB. O/G - 6 nos. 250A, 433V, 3Pole, 50Hz, 36KA MCCB	*Each*	2.000
	Supply, Installation, Testing and Commissioning 11kV, 315KVA, Outdoor Package / Compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following: HT Switchgear : 11KV, 630A, 25KA for 1 Sec SF6 Insulated SCADA compatible RMU consisting of 2 nos. remote operated motorised Load Break Switch and 1 no. remote operated motorised VCB unit with self powered microprocessor based 3 ph numerical relay and metering unit with CTs and PTs. RMU should have built in FPI & FRTU. Transformer : Oil filled 11/0.4KV Dyn11, OCTC Transformer as per IS 1180 with CT and DTR meter. LT : I/C - 800A 433V, 4Pole, 50Hz, 50KA electrically operated type ACB. O/G - 6 nos. 250A, 433V, 3Pole, 50Hz, 36KA MCCB	*Each*	8.000
	Installation , Testing & Comissioning of above Compact Sub Stations	*Each*	14.000
	Supply, installation, testing and commissioning of RMU, 4 way type (Two Incomers + Two Outgoing) 630A Isolator, 36 KV, 25KA, SF6 insulated Ring Main Unit SCADA enabled with structure required for erection .	*Each*	3.000
	Supply, installation, testing and commissioning of RMU, 5 way type (Three Incomers + Two Outgoing 630A Isolator, 36 KV, 25KA, SF6 insulated Ring Main Unit SCADA enabled with structure required for erection .	*Each*	1.000
	Supply , Installation , Testing , Comissioning of Earthinig Coil of 115 Turns of 50 MM Dia and 2.5 Mtr. Lead of 4.0 MM G.I. Wire for street light poles .	*Each*	67.000
	Supplying and laying of 63 mm outside dia DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II complete with fitting and cutting, jointing etc..direct in ground (75 cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc., complete as required.	*Meter*	1400.000
	Supply of 25.00 Sq.mm x 4C , PVC XLPE Cable LT 1.1 KV , Alu. Arm	*Meter*	600.000
	Installation , Testing & Comissioning of 1.1 KV XLPE Cable in existing RCC / Hume / Metal Pipe		
	Upto 120.00 Sq.mm	*Meter*	600.000
	Supply of 10.00 Sq.mm x 4C , PVC XLPE Cable LT 1.1 KV , Alu. Arm	*Meter*	850.000
	Installation , Testing & Comissioning of 1.1 KV XLPE Cable in existing RCC / Hume / Metal Pipe		
	Upto 120.00 Sq.mm	*Meter*	850.000

	Supply and erection of 9 Mtr. High hot dipped galvanized octogonal poles with bottom of 200 mm A/F top 100 mm A/F made from 3mm thick HT Plate & 290 x 290 x 16mm base plate with 1500 mm long decorative sword type double arm bracket complete erected in an approved manner on provided foundation . Suitable size & type of foundation bolts 4 Nos. bolts type M20 x 750mm 'J' type foundation bolts (EN8 Grade) or as per design requirement. (Foundation & anchor bolt Design & drawing shall be in the scope of Bidder/Vendor/Supplier)	*Each*	6.000
	Supply , Installation , Testing & Comissioning of LED Type IP-66 and Above , 120 W Street Light fitting as per the specification .	*Each*	34.000
	Supply , Installation , Testing & Comissioning of 5O Watt Ornamental Street Light Pole with foundation bolt along with Led Light . Technical Parameters as Per Model No. GGSLP 30220G (PT) . Make :- Glow Green Energy Limited or equivalent.	*Each*	50.000
	Dismantling of existing HT/ LT overhead power system lines complete with all associated items like poles, conductors, insulators, overhead cables, wires, stay , studs, MS structure, transformers, AB sw, DO fuse, LA, LT box, street lights, switching box etc and depositing the same in stores	*Per Kilogram*	
	Design, manufacture, supply, testing and commissioning of **outdoor type external lighting feeder pillar** of suitable size not less than 30 cm and upto 45 cm deep made out of M.S. sheet 2mm thick (14 SWG) duly compartmentalized, double door with locking arrangement (IP-54), duly fixed on MS angle iron frame work of size 50mm x 50mm x 6mm, 90 cm long legs out of which 45 cm duly grouted in cement concrete 1:2:4 (1 cement : 2 sand :4 stone aggrete 20mm) and having following accessories mounted inside the cubical panel i/c connection, inter connection with aluminium thimbles, earthing with two nos. earth struds duly painted with one coat of red oxide & two coats of superior quality enamel paint of approved shade complete etc. as reqd.		
	Supplying, fixing, connecting, testing and commissioning of 3 No. Astronomical Timer along with power contactor 3 set of Double pole of 25 Amp. in the existing cubical panel board / feeder pillar (Timer shall be capable to operate 3 nos double pole Power contactor seprately to operate at different time complete in all respect .		
	External Lighting Feeder Pillar (The feeder pillar shall have anti theft tamper proof feature to automatically send SMS alert if door opening is attempted by unauthorised person)	*Each*	2.000
	INCOMER : 125 AMP FP MCCB (25 KA) Thermal Magnetic Adjustable . Ics = 100 %		
	OUT GOINGS : 3 nos. 63 AMP FP MCB (10 KA)		
	Supply & Installation of 1P LT KWH Meter 5 - 30 Amp ,accuracy class 1.0 , IP 54 Ingress protection class	*Each*	135.000
	Supply & Installation of 3P4W LT KWH Meter 10 - 60 Amp, accuracy class 1.0, IP 54 Ingress protection class	*Each*	80.000
	Supply & Installation of 3P4W LT KWH Meter 20 - 100 Amp, accuracy class 1.0, IP 54 Ingress protection class	*Each*	40.000

Section 5

FORM OF AGREEMENT

This agreement, made on the day of (hereinafter _____between (name and address of Employer) called "the Employer) and hereinafter called "the _____ (name and address of contractor) Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute _____(name and identification number of Contract) (hereinafter called "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a cost of Rs. _____

NOW THIS AGREEMENT WITNESSED as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred' to and they shall be deemed to form and be read and construed as part of this Agreement.

2. 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 aspects with the provisions of the contract.

3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein 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.

4. The following documents shall be deemed to form and be ready and construed as part of this Agreement viz.

i. Letter of Acceptance
ii. Contractor's Bid
iii. Condition of Contract: General and Special
iv. Contract Data
v. Bid Data
vi. Drawings
vii. Bill of Quantities and
viii. Any other documents listed in the Contract Data as forming part of the Contract.

In witnessed whereof the parties there to 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:

Signed, Sealed and Delivered by the said _____ in the presence of:

Binding Signature of Employer ……

Binding Signature of Contractor ……