Ujjain Smart City Limited

Request for Proposal

"Investigation, survey, detailed design and execution of retrofitting & reconstruction of roads consisting of up-gradation, augmentation, retrofitting of existing water supply, underground storm water drains & retrofitting of existing open storm water surface drains, construction of footpath, utility ducts, underground electrification with allied infrastructure, road markings, traffic signage in ABD Area under Ujjain Smart City Project".

.

NIT No: 27/USCL/ 17-18 Dated 30 Nov. 2017

Ujjain Smart City Limited
Mela Karyalaya, Kothi Road, Ujjain, (MP), India
E-mail: ujjainsmartcity@gmail.com

UJJAIN SMART CITY LIMITED

APPENDIX 2.10

TENDER DOCUMENT

FOR ITEM RATE ONLY IN WORKS DEPARTMENT AND OTHER DEPARTMENTS

NIT Number and Date : 27USCL/2017-18; Date 30/11/2017

Agreement Number and Date : _____

Name of Work	:	RFP for Investigation, survey, detailed design and retrofitting & reconstruction of Roads consisting of up-gradation, augmentation, underground storm water drainage, retrofitting of existing water supply, footpath, utility service ducts, underground electrification with allied infrastructure, road markings and traffic signage in ABD Area under Ujjain Smart City Project"
Name of the Contractor	:	
Probable Amount of Contract	:	
(Rupees. in Figures)	:	Rs.241.44Crore
(Rupees in Words)	:	Rupees Two Hundred and Forty-One Crores and Forty-Four Lakhs
Contract Amount	:	
(Rupees. in Figures)	:	
(Rupees. in Words)	:	
Stipulated Period of Completion	:	30 Months -Thirty Months including Rainy Season

Tender Document

Table of Contents

Section-1

NIT No. 27/USCL/17-18 Date: 30 / Nov 2017

NOTICE INVITING TENDER

Ujjain Smart City Limited invites online percentage cum Item rate tender from experienced and reputed contractors for the following works. Tender forms may be purchased online by the eligible contractors.

No.	Name of Work:	Estimated Cost of Work	Cost of Tender Form	Earnest Money Deposit	Completion Period
1	Investigation, survey, detailed design and retrofitting & reconstruction of Roads consisting of up-gradation, augmentation, underground storm water drainage & retrofitting of open storm water drains, footpath, utility ducts, underground electrification with allied infrastructure, retrofitting of water supply line, road markings and traffic signage in ABD Area under Ujjain Smart City Project"	₹.241.44 Cr.	₹ 50,000/-	₹.50.00 Lakhs	30 Months

Key Dates

1. Pre-Bid Meeting	:	29th Dec 2017 at 1500 Hrs.
2. Last date for Purchase of Tender	:	15th Jan 2018 till 1700 Hrs.
3. Last Date for Submission of Tender (Online)	:	15th Jan 2018 till 1730 Hrs.
4. Last Date for Submission of Hard Copy of Technical Bid and EMD	:	18th Jan 2018 till 1500 Hrs.
5. Technical Bid Opening (Online)	:	19th Jan 2018 at 1600 Hrs.
Tender Document and other details shall be available on: - Website- www.mpeproc.gov.in		
Amendment to NIT, if any would be published on website only.		

Executive Director
Ujjain Smart City Limited, Ujjain

UJJAIN SMART CITY LIMITED

Notice Inviting e-Tenders

NIT No. 27 /USCL/17-18 Date: 30/11/ 2017

Ujjain Smart City Limited invites online Item rate tenders from experienced and reputed contractors for the following works. Tender forms may be purchased online by the eligible contractors.

No.	Name of Work:	Estimated Cost of Work	Cost of Tender Form	Earnest Money Deposit	Completion Period
1	Investigation, survey, detailed design and retrofitting & reconstruction of Roads consisting of up-gradation, augmentation, underground storm water drainage, footpath, utility ducts, underground electrification with allied infrastructure, retrofitting of water supply line, road markings and traffic signage ABD Area under Ujjain Smart City Project"	₹ 241.44 Cr.	₹ 50,000/-	₹ 50.00 Lakh	30 Months

Key Dates

1. Pre-Bid Meeting	:	29th Dec 2017 at 1500 Hrs.
2. Last date for Purchase of Tender	:	15th Jan 2018 till 1700 Hrs.
3. Last Date for Submission of Tender (Online)	:	15th Jan 2018 till 1730 Hrs.
4. Last Date for Submission of Hard Copy of Technical Bid and EMD	:	18th Jan 2018 till 1500 Hrs.
5. Technical Bid Opening (Online)	:	19th Jan 2018 at 1600 Hrs.
Tender Document and other details shall be available on: - Website- www.mpeproc.gov.in		
Amendment to NIT, if any would be published on website only.		

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;
ii) Deposit the Earnest Money;
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
Ujjain Smart City Ltd., Ujjain

SECTION 2

INSTRUCTIONS TO BIDDERS

(ITB)

A. GENERAL

1. SCOPE OF BID

Area based development is taken up in Ujjain smart city under smart city Mission of GoI initiated in yr. 2015. Under Ujjain smart city project infrastructure is proposed to be developed with underground storm water drains, underground pipe ducting for electrical power supply and optical fibre cable laying, new gas pipe line. It is also proposed to retrofit existing water supply lines, open surface drains and augment, retrofit and reconstruct roads finally after laying the said underground utility services. The roads are to be constructed as per the street design attached in this document following the street design guidelines prescribed by IRC, UTIPEC, MoUD, GoI.

Dedicated corridors will be provided with traffic services like cycle track and pedestrian track etc. as per the available ROW and approval of engineer in charge. The scope of project includes re-construction of the selected existing roads as per the latest guidelines, rules, and regulations. The roads construction should include construction of junction, pedestrian track, cycle lane as per the design. The construction of roads must have to be considered for complete modification/up-gradation with utility ducts for underground electrification work and OFC cables. The existing pedestrian track has to be upgraded and construction of non-motorized cycle lanes of world class standard meeting all the national as well as local guidelines/standards.

About 25 km. of roads in Smart City area are proposed to be developed with all infrastructure facilities like utility ducts for power supply & fibre optic cable laying, CNG gas supply lines, water supply, storm water drainage etc. The details of different roads to be developed under this project are given in table on page no 6

Width wise road lengths proposed to be developed with the aforementioned infrastructure are tabulated as follows:

S. No.	**Road Nos**	**Length**	**Width**
1	R13, R18, R26	18 M	2645 M
2	R8, R11, R19, R25	15 M	3187 M
3	R2, R3, R4, R6, R9, R22, R23, R27, R49	12 M	4454 M
4	R5, R12, R48, R51	10 M.	2160 M
5	R1, R7, R20, R24, R28, R29, R30, R31, R32, R33, R34, R35, R50	8 M.	6568 M
6	R10, R14, R15, R16, R17, R21, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47	6-8M	5982 M

The details of various project components are as per the drawings attached herewith this document and is mentioned in Section 5 of this Tender Document.

Details and drawings given in document are for information purpose only and successful bidder shall undertake confirmatory surveys for accuracy and completeness of data. It is

mandatory and is in scope of successful Bidder to undertake all Site Surveys, Geotechnical investigations/Engineering Surveys, hydrological investigations, underground Utility Survey of the roads for shifting and creating new infrastructure for water supply, electrification, fibre optic cable, gas supply line, storm water sewers etc., It shall be the responsibility of the contractor to obtaining all required approvals from the relevant authorities, Carry out Design and Drawings for all the components of the work as per Employers requirement and submit the same to client for review and approval and carry out construction work as per the approved drawings accordingly. Prepare Good for Construction Drawings, submit maintenance manual to client for approval before start of the project for post construction period.
The successful bidder shall have to prepare and submit both 'Good for Construction Drawings' before execution and 'As Built Drawings' after execution depicting the exact construction carried out on site, in soft and hard copy format.

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 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 joint venture (if permitted as per Bid Data sheet). In case J.V. is permitted, the requirement of 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 USCL.

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 DOCUMENT

The Bid Document comprises of the following documents:

1. NIT.
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 as stipulated in the Bid Data Sheet are fulfilled. 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.

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 or Hindi. 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 rates in format referred in Bid Data sheet, in overall percentage above or below the estimated cost, and not item wise. If the bid is in absolute amount, overall percentage would be arrived at in relation to the probable amount of contract given in NIT. The overall percentage rate would apply for all items of work.

ii. Percentage shall be quoted in figures as well as in words. If any difference in figures and words found, lower of the two shall be taken as valid and correct.

iii. The bidder shall have to quote rates inclusive of all duties, taxes, royalties and other levies ect. and excluding GST.

iv. The material along with the units and rates, which shall be issued, if any, by the department to the contractor, is mentioned in the Bid Data Sheet.

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 EMD shall be in the form of Demand Draft/Fixed Deposit Receipt of a scheduled commercial bank, issued in favour of the name given in the Bid Data Sheet. The Fixed Deposit Receipt shall be valid for six months or more after the last date of receipt of bids. However, other forms of EMD may be allowed by the employer by mentioning it in the Bid Data sheet.

17.3 Bid not accompanied by EMD shall be liable for rejection as non-responsive.

17.4 EMD of bidders whose bids are not accepted will be returned within 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 the Earnest money deposit.

D. SUBMISSION OF BID

18. The bidder is required to submit online bid duly signed digitally, and Envelope "A" in physical form also at the place prescribed in the Bid Data Sheet.

E. OPENING AND EVALUATION OF BID

19. PROCEDURE

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

19.2 Wherever **Envelope '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 **Envelope 'B'**. **Envelope 'C'** (Financial Bid) of bidders who are not qualified in Technical Bid (Envelope 'B') shall not be opened.

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

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

19.5 The Employer 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 Employer 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 of the amount, form and duration, etc. as specified in the Bid Data Sheet.

22.2 Additional Performance Security, if applicable, is mentioned in the Bid Data Sheet and shall be in the form and for the duration etc. similar to Performance Security.

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, his EMD shall stand forfeited without prejudice to the right of the employer for taking action against the bidder.

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.

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.

General

BID DATA SHEET

S.N.	Particulars	Data
1	Office inviting Tender	Ujjain Smart City Ltd., Ujjain
2	NIT No.	27 /USCL/17-18
3	Date of NIT	30 Nov 2017
4	Bid document download Available from date & time	30 Nov 2017 from 1800 Hrs.
5	Website link	http://www.mpeproc.gov.in

Section 1– NIT

Clause Reference	Particulars	Data
1	Portal fees	Rs._____(shall be reflected on the portal)
2	Cost of bid document	₹ 50,000/-
	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, Ujjain Smart City Ltd.
3	Affidavit format	Annexure B
4	Pre-qualifications required	Yes
	If Yes, details	As per Annexure C
5	Special Eligibility	Yes
	If Yes, details	As per Annexure D
6	Key Dates	Annexure A

Section 2–ITB

Clause Reference	Particulars	Data
1	Name of work	Investigation, survey, detailed design and retrofitting & reconstruction of Roads consisting of up-gradation, augmentation, underground storm water drainage & retrofitting of open storm water surface drains, footpath, utility ducts, underground electrification with allied infrastructure, road markings and traffic signage in ABD Area under Ujjain Smart City Project". Description of Roads are as follows: Roads are segregated as per Width of way/ road widths as 18M, 15M, 12M, 10M, 8M and Below 8M up to 6 M. These roads are spread in ABD area and are numbered from R1 to R51. A brief description of all roads, as per their nos. is given in sub-clause no. 2.2.11 of Article 2 of Scope of Project given in GCC under " SALIENT FEATURES OF ROADS FOR IMPROVEMENT AND OTHER DEVELOPMENT"
2	Specifications	Annexure E
3	Procedure for participation in e- tendering	Annexure F

Clause Reference	Particulars	Data
4	Whether Joint-venture is allowed	yes
	If yes, requirement for JV	As per Annexure G
5	Pre-bid meeting to held	Yes
	If Yes, Date, Time & Place	Date: 29 Dec 2017 Time: 11:00 Hrs Place: Ujjain Smart City Ltd., Mela Karyalaya, Kothi Road, Ujjain (MP), India, Pin - 456010
6	Envelope-A should reach in physical form to	Executive Director Ujjain Smart City Ltd., Mela Karyalaya, Kothi Road, Ujjain (MP), India, Pin - 456 010.
7	Envelope-B Technical Proposal	Annexure – I (Formats I-1 to I-5)
	Envelope-C Financial Bid	Annexure – J
8	Material to be issued by the department	Nil
9	Period of Validity of Bid	120 Days
	Earnest Money Deposit	Rs.50 Lakhs (Rupees Fifty-Two Lakh Fifty Thousand Only)
10	Forms of Earnest Money Deposit	i. FDR / e-FDR payable at Ujjain ii. Demand Draft of Nationalized / Scheduled Commercial Bank payable at UJJAIN iii. Interest Bearing Securities of Post Office iv. Bank Guarantee (Format S2)
	EMD valid for a period of	180 days
	FDR (Fixed Deposit Receipt) must be drawn in favour of	Executive Director, USCL, Ujjain
11	Letter of Acceptance (LoA)	Annexure L
12	Amount of Performance Security	5% of contract amount
13	Additional Performance Security, if any (as per clauses 22.2, 23.1)	Yes, applicable.
14	Performance security in the format	Annexure M
15	Performance security in favour of	Executive Director, USCL, Ujjain
16	Performance security valid up to	Till issue of Physical Completion Certificate as per clause 35.1

ANNEXURE – A

KEY DATES & EVENTS

S. No.	Department Stage	Bidder's Stage	Start		Expiry		Envelopes
			Date	Time	Date	Time	
1.		Purchase of Tender – Online	30th Nov 2017	1030 Hours	15th Jan 2017	1700 Hours	
2.	Pre-Bid Meeting		29th Dec 2017	1500 Hours			
3.		Bid Submission – Online			15th Jan 2018	1730 Hours	
4.	Mandatory Submission Opening		19th Jan 2018	1600 Hours			Envelope A
5.	Technical Proposal Opening		19th Jan 2018	1600 Hours			Envelope B
6.	Financial Bid Opening		TBA				Envelope C

Earnest money deposit and affidavit shall be submitted by the bidder so as to reach the office as per prescribed in Bid Data Sheet, before specified start time and date of opening of technical proposal as per key dates in Bid Data Sheet.

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 / Demand Draft / 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
(Technical Bid evaluation)

A) The bidder should have an Average Annual Financial Turnover for Construction Works not less than 50% of the probable amount of contract during last 3 financial years.

B) The bidder should have executed either of the following within last 5 years.

a. One Civil Infrastructure Work of similar nature costing not less than 25% of the probable amount of the contract; or

b. Two Civil Infrastructure Works of similar nature each costing not less than 15% of the probable amount of the contract; or

c. Three Civil Infrastructure Works of similar nature and costing not less than 10% of the probable amount of the contract.

AND

d. One work of providing, laying and construction of underground storm water/ sewerage/ water supply costing not less than 12.5% of the probable amount of the contract; or

e. Two works of providing, laying and construction of underground storm water/ sewerage/ water supply costing not less than 7% of the probable amount of the contract; or

f. Three works of providing, laying and construction of underground storm water/ sewerage/ water supply costing not less than 5% of the probable amount of the contract.

AND

g. One Electrical Work costing not less than 12.5% of the probable amount of the contract; or

h. Two Electrical Works costing not less than 7% of the probable amount of the contract; or

i. Three Electrical Works costing not less than 5% of the probable amount of the contract.

AND

C) The Bidder should have experience of providing, installation and commissioning of HT and/ or LT underground cabling works.

AND

Note:

1. 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 the rank of Executive Engineer) of client. USCL may call for original certificates for verification.
2. In case of joint venture, combined financial turnover and experience of both the partners should fulfil the above financial and technical criteria.
3. Cost of similar works done in last 5 years shall be brought up with the use of WPI to determine its current cost for comparison with the Probable Amount of Contract (PAC). WPI shall be referred for all commodities as prescribed by ministry of Commerce and Industry GOI.

ANNEXURE – D

(See Clause 6 of Section 1 NIT)
SPECIAL ELIGIBILITY CRITERIA
(Technical Bid Evaluation)

The bidder should have successfully completed/ substantially executed during the preceding Five years:

- A minimum of one urban transport (Roads, Bridges, MRTS, BRTS or LRTS) project in last 5 years.

AND

- A minimum of one underground utility service ducting project during the last 5 years.

AND

- A minimum of one electrification work with laying underground cabling with allied electrical infrastructure project necessary for power supply and distribution network executed in Urban local bodies or any township of any Public or Pvt Sector industrial setup or alike.

AND

- A minimum one work of underground Storm Water drainage/ sewerage/ water supply should have been done in last 5 years.

ANNEXURE – E

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

SPECIFICATIONS

I. CIVIL WORKS

The works in General shall be carried out as per latest MP-UADD Specifications, (updated with corrections slips issued up to 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 that are not given in the technical specifications appended or not incorporated in the nomenclature of the individual item, all Civil work shall be done as per following specifications or as per approval of Engineer-in-charge:

1. MP UADD Specification
2. MP PWD Department Specifications,
3. IRC Specifications
4. UTIPEC Road Design Specifications
5. CPWD Specifications
6. MoRTH Specifications as per 5th revision w.e.f. April 2013.
7. IRC-15-2002 Design of Concrete Roads
8. IRC-58-1988 Design of Rigid Pavements for Highways

i. 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.

ii. Material should be of the best approved quality obtainable and they shall comply with 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.

iii. 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.

iv. 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.

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

vi. 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.

vii. 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.

viii. The provisions of general / special conditions of contract, those specified elsewhere in the Bid-Document, as well as execution drawings and notes, or other specifications appended in Tender Document or issued in writing by the Employer shall form part of the technical specifications of this work.

ix. General specifications on type, material, construction and quality of HDPE pipe ducts meant for laying of various utility services of power supply, telecom (OFC) and gas supply, following specifications shall be referred:

SPECIFICATION FOR STORM WATER DRAINAGE

All specifications for storm water drainage shall be followed by:

1. CPHEEO manual sewerage and drainage, MoUD, GoI published in Nov. 2013
2. MP PWD specifications on sewerage and drainage
3. MP UADD specifications on sewerage and drainage

SPECIFICATION FOR WATER SUPPLY RETROFITTING

All specifications for water supply shall be followed by:

1. CPHEEO manual on water supply MoUD, GoI published in Year 1999
2. MP PWD specifications on water supply
3. MP UADD specifications on water supply
4. BIS Standards on water supply

SPECIFICATION FOR FIBRE OPTIC CABLE AND COMMUNICATION CABLE INSTALLATIONS

1.0 General:

HDPE Ducts for laying Optical Fibre Cables shall be bundled in 2 bundles each of 7 pipe ducts of 38mm inner and 50 mm outer dia. Multiple Bundled PLB (Permanent solidly Lubricated Silicore) HDPE ducts provide pathways & the ability to install fibre optic cables and communication cables for the fibre optic network, all within the same multi-channel construction. The multiple channels enable to install OF cables for present needs and a provision for futuristic use as when demand grows. Thus, Bundled Multi Channel pathway gives maximum cost-effective builds and good return on investment for existing and future networks.

This specification envisages manufacturing, testing at works, transport to site, insurance, storage, erection and commissioning of Bundled HDPE (High-Density polyethylene) multi-channel primarily intended for buried for laying of underground fibre Optic Cable up to 16mm outer diameter.

1.1 Bundled Multi Channel Requirement

Construction:

Bundled HDPE multi-channel consists of multiple pathways in different colours for identification

and in specific sizes all bound together with an over sheath for ease of placement. All of the multi-channels shall have internal spiral ribs with a solid permanent solidly lubricated material i.e. Silicore to reduce friction during cable placement installations.

The inner layer of solid permanent lubricant shall not come out during storage, usage and throughout the life of the duct. The colour of HDPE duct shall be as per requirement and shall be uniform throughout the length of the duct.

The PLB multi-channel shall have inner spiral Ribbed and shall have the dimensions of outer diameter as per project requirement.

1.2 Standards:

1.2.1 PLB HDPE DUCTS:

The PLB (Permanent Lubricant) HDPE duct shall conform to the following standard and the technical specifications described below:

S. No	Properties	Test Method	Requirements
1	Workmanship	ASTM F 2160	The Co-extruded layers of duct/conduit shall be homogeneous throughout & essentially uniform in colour, opacity, density & other properties. The outside surfaces shall be free from visible cracks, holes, blisters, voids, foreign inclusions, or other deleterious material. The inner surface shall be Spiral ribbed.
2	Density of Raw Material	ISO 1183	0.940 - 0.958 g/cc
3	Melt Flow Rate	ISO 1133	The melt flow rate of the duct should be 0.2 to 1.1 grams/10 Minutes @5kg.
4	Tensile Strength at Yield	ASTM F 2160 / ASTMD 638 Type IV	Min 20 N/mm²
5	Elongation	ASTM F 2160 /ASTMD 638 Type IV	Min 500%
6	Environmental Stress Crack Resistance	ASTM D 1693	No cracking when tested with 10% Igepal Solution at 50 ± 1º C for 96 Hours. (Type Test shall be for minimum 500 Hours.)
7	Oxidation Induction test	ISO 11357-6	Oxidation Induction time should not be less than 30 minutes.
8	Reversion	ISO 2505	Reversion of duct shall not be more than 3%
9	Hydraulic Characteristics (Acceptance Test)	IS 4984	No swelling leakage or bursting should appear after 48 Hours at a Induced stress of 4.9Mpa @ 80ºC (Type for 165 hrs. at a Induced stress of 4.6Mpa @ 80ºC)
10	Crush Resistance test	Standard	The Sample should not crack or split when 1000N load applied on 200mm length of the sample. Deflection shall remain < 15%.
11	Impact Strength	ASTM D 2444	There should be no crack / split when 9.1 Kg. load (Tup B) dropped from 1.5 Meters. Height after conditioning at 0ºC for 1 hour.

12	Inner Surface of the Duct		The Inner Surface shall be spirally ribbed and shall be of a configuration for faster installation of Cable.

1.2.2 BUNDLED MULTI CHANNEL SHEATHING:

S. No.	Properties	Test Method	Requirements
1	Density of Raw Material	ISO 1183	0.940 - 0.958 g/cc
2	Melt Flow Rate	ISO 1133	The melt flow rate of the duct should be 0.2 to 1.1 Grams/10 Minutes @5kg.
3	Workmanship	Standard	A bundle of five PLB HDPE ducts where external Sheath shall free from visual defects like blisters, shrink holes, flaking, scratches, groove lines & surface roughness.
4	Colour of PLB HDPE ducts in Bundle		The Colour of the Ducts shall be Green, Blue, Yellow, Red, Violet,
5	Outer Sheath Thickness	Standard	1.2 mm ± 0.2 mm
6	Outer Sheathing: Anti Termite	Standard	Outer sheath of Bundled PLB Multi Channel shall be complied with Anti termite property as per Standard testing procedure/protocol of IICT, Hyderabad. Certificate of Anti Termite shall be submitted for from IICT, Hyderabad or any reputed government testing laboratory. (Type Test)
7	Minimum Bending Diameter in field installation	Standard	3000 mm
8	ISO Requirements	Standard	ISO 9001, 14001 & 18001
9	Special Requirement	Standard	No regrind material shall be used
10	Cable Blowing	Standard	For the Telecom duct, the height of the rib and geometry of the rib shall be informed. The superior cable blowing performance shall be authenticated by a report document.

1.3 MATERIAL:

The raw material used for the Bundled PLB Multi Channel shall meet the following requirements

i. The anti-oxidant establishers, colour master batch and other additive used shall be physiologically harmless and shall be used only to minimum extent necessary to meet the specification.

ii. Usage of any additives used separately or together should not impair the long-term physical and chemical properties of the HDPE duct.

iii. Suitable UV stabilizers may be used for manufacture of the HDPE duct to protect against UV degradation when stored in open for a minimum period of 8 months.

iv. Suitable anti-termite master batch shall be used in outer sheath of Bundled PLB Multi Channel to protect damages of the duct from anti-termite when using for underground application.

v. The pipe ducts shall be rodent proof.

vi. In case of PLB Multi Channel duct with inner spiral ribs construction, the friction reducing, polymeric material to be used as the inner layer lubrication material shall be integral with HDPE layer.

vii. HDPE Virgin material shall be used. No other reworked or recycled material shall be used

1.4 TESTS ON MATERIAL OF HDPE DUCT:

The base HDPE resin material shall be subjected to following tests and shall satisfy

i. Melt flow Index: ISO 1133

ii. Density: ISO 1183

1.5 DIMENSION OF DUCT:

Bundled PLB Multi-Channel duct should consist five 40 mm PLB HDPE ducts with inner spiral ribs in colour sequence of Green, Blue, Yellow, Red, Violet, colors clockwise when viewed from outer end of the coil.

1.5.1 Dimensions of PLB HDPE Duct:

Sl. No	**Description**	**40 PLB HDPE duct**
1	Outer Diameter of duct (mm)	40 + 0.4 mm
2	Wall Thickness (mm) (**Excluding rib height**)	2.9 mm + 0.3 mm
3	Ovality before bundling	Max 1.4

The Bundled PLB HDPE duct should be supplied in length of 100 meters of coil.

1.5.2 HDPE Ducts should be sourced from the manufacturer with ISO 9001, 14001 and 18001 accredited manufacturing facilities.

1.5.5 ACCESSORIES:

The following accessories are required for jointing the PLB Multi Channel and shall be supplied along with the duct. The manufactures shall provide procedure for method of installation and type of the material used for the accessories.

a) **Plastic coupler**: Plastic Coupler (Push-fit type type): It is used to couple two ducts. The design of this shall be simple, easy to install and shall ensure that the two ducts are butted smoothly without any step formation in the inner surface. The jointing shall meet the air pressure test of 15 kg/cm² for a minimum period of 2 hours without any leakage.

Note: Both sides of the coupler shall be marked with the manufacturers name by engraving and

that the ends of the opening (for entry of duct) shall be covered with paper sticker, to prevent the entry of foreign matter while not in use.

b) **End Plug:** This is for scaling the ends of the empty ducts, prior to installation of the OF cable and shall be fitted immediately after laying of the duct, to prevent the entry of any dirt, water, moisture, insects/rodents etc.

1.6 WORKMANSHIP:

The outer sheath of Bundled PLB Multi Channel shall be free of blisters, shrink holes, break and other defects. The external surface of PLB Multi Channel shall be smooth and free from visual defects like blisters, shrink holes, flaking, scratches, groove lines & surface roughness and inner ribbed layer. The colour of outer sheath surface should be uniform throughout.

1.7 MARKING:

Each coil length of Bundled PLB Multi Channel shall be clearly marked with ink jet in contrast to outer surface colour on length of the duct at every meter of duct with the following minimum information:

a) Employer's name,

b) Manufacturer's name/Trade-mark,

c) Description of duct,

d) Coil Number/Batch number,

e) Sequential meter making at every one meter

1.8 TESTS ON PLB MULTI CHANNEL:

(Each of the test shall be carried out individually on the HDPE Duct)

1.8.1 Visual Inspection: The external surfaces of the Bundled PLB Multi Channel shall be smooth and inner surface of the PLB Multi Channel shall be spirally ribbed, clean and free from grooving and other defects.

1.8.2 Dimensions: The wall thickness and diameter of the PLB Multi Channel, shall be measured by a dial Vernier or ball ended micrometre and shall conform to the clause 1.4.1.

1.8.3 Reversion Test: This test shall be carried out as per ISO 2505. The dimension of inner layer or outer layer shall not change by more than 3% in the longitudinal direction when a sample duct placed (sample length 200mm approx..) horizontally in an air- oven at 110+/- 2^{O} C for 60 minutes and cooled to the room temperature.

1.8.4 Tensile Strength at yield and Elongation at break Test: The tensile strength and elongation of the HDPE duct shall be carried out as per ASTM D 638 Type IV. The tensile strength for finished material shall be minimum 20 N/mm^2 and elongation at break shall be 500%.

1.8.5 Environmental Stress Crack Test: The test shall be conducted as per ASTM D 1693 with the specimen prepared from HDPE duct sample. The specimen shall be immersed in 10% IGPAL (CO 630) Solution at 50± 1^{O} C for 96 hrs. There shall be no crack or split.

1.8.6 Impact Strength Test: The test shall be carried out as per ASTM D 2444. A sample HDPE duct 150mm in length shall be conditioned at 0°C for one hour and placed on a heavy rigid flat block. A striker as per Tup B and loaded to a total weight of 9.1kg shall be allowed to fall freely in a suitable vertical guide through a height of 1.5m. The HDPE duct shall not crack or split.

1.8.7 Crush Resistance: The test shall be in a sample of 200± 2 mm length of HDPE duct which shall be subjected to 1000N crush load with compression speed 12.5 mm per minute. The deflection shell be < 15% on PLB HDPE duct.

1.8.8 Ovality test: The ovality is the difference between maximum outside diameter and the minimum outside diameter of the PLB HDPE duct at same cross section of the duct at 300mm away from the cut end.

1.8.9 Hydraulic Characteristics: The duct shall be tested for internal pressure creep rupture test as per the test method outlined in IS: 4984. For this purpose, a sample length of 10 times the outside diameter of the duct shall be taken. At the end of the test, the sample shall not show signs of localized swelling or leakage and shall not burst during the test duration. The test showing failure within a distance equivalent to the length of end cap from the end shall be disregarded and the test repeated. This test temperatures and the duration of the test shall be as follows:

Test	Test Temp. °C	Test Duration (Hrs.) (Min. holding time)	Induced Stress (Mpa.)
Type Test	80	165	4.6
Acceptance Test	80	48	4.9

1.8.10 Oxidation Induction Test: The induction time oxygen when tested shall not be less than 30 minutes.

Testing should be carried out on computerized machine and graphs should be submitted along with the test results.

1.9 TEST ON BUNDLED PLB HDPE DUCTS

1.9.1 **Visual Inspection**: The external surfaces of the Bundled PLB HDPE ducts/ PLB HDPE duct shall be smooth and clean and free from grooving and other defects.

1.9.2 **Dimensions:** The outer sheath thickness of the Bundled PLB HDPE duct, shall be measured by a dial Vernier or ball ended micrometre and shall conform to the clause 1.2.2.

1.9.3 **Tracing mechanism:** PE insulated copper wire shall be used during bundling of PLB HDPE ducts. The tracing mechanism shall be demonstrated including the depth measurement

1.9.4 **Outer Sheathing:** Outer sheath of Bundled PLB HDPE duct should complied to Anti termite property as per Standard testing procedure of IICT, Hyderabad. Certificate of Anti Termite shall be submitted for from IICT, Hyderabad or any reputed government testing laboratory

1.9.5 **Cable Blowing**: For the Telecom duct, the height of the rib and geometry of the rib shall be informed. The superior cable blowing performance shall be authenticated by a report document.

2.0 PACKING AND CONDITION OF DELIVERY:

a. The duct should be supplied in coils of 100 meters.

i. All materials furnished, and all work performed shall be inspected and tested. Deliverables shall not be shipped until all required inspections and tests have been completed, and all deficiencies have been corrected to comply with this Specification and approved for shipment by the Employer.

ii. Except where otherwise specified, the Contractor shall furnish all manpower and materials for tests, including testing facilities, power and instrumentation, and replacement of damaged parts. The costs shall be borne by the Contractor and shall be deemed to be included in the contract price.

iii. The entire cost of testing for factory & site acceptance, routine tests, production tests and other test during manufacture & site activities specified herein including the expenses of Inspector/Employer's representative shall be treated as included in the quoted unit price of materials.

iv. Acceptance or waiver of tests will not relieve the Contractor from the responsibility to furnish material in accordance with the specifications.

v. All tests shall be witnessed by the Employer and/or its authorized representative (hereinafter referred to as the Employer) unless the Employer authorizes testing to proceed without witness. The Employer representative shall sign the test form indicating approval of successful tests.

vi. Should any inspections or tests indicate that specific item does not meet Specification requirements, the appropriate items shall be replaced, upgraded, or added by the Contractor as necessary to correct the noted deficiencies at no cost to the Employer. After correction of a deficiency, all necessary retests shall be performed to verify the effectiveness of the corrective action.

vii. The Employer reserves the right to require the Contractor to perform, at the Employer's expense, any other reasonable test(s) at the Contractor's premises, on site, or elsewhere in addition to the specified type. Acceptance, Routine or Manufacturing tests to assure the Employer of specification compliance.

viii. The Employer also reserves the right to require any retesting of previously approved tests at the Employer's expenses. However, if the retest(s) reveal non-compliance to the specification, the Contractor shall bear the expenses for the retesting and remedial action at no cost to the employer.

2.1 FACTORY ACCEPTANCE TEST:

Factory acceptance tests shall be conducted on randomly selected final assemblies of all equipment to be supplied. Visual inspection shall be carried out on 100% basis for all the equipment/items offered. Factory acceptance testing shall be carried out on HDPE and accessories.

Material shall not be dispatched to the Employer until required factory tests are completed satisfactory all variances are resolved, full test documentation has been delivered to the Employer, and the Employer has issued Material Inspection & Clearance Certificate (MICC). Successful completion of the factory tests and the Employer approval to dispatch shall in no way constitute final acceptance of the system or any portion thereof. These tests shall be carried out in the presence of the Employer's authorized representatives.

2.2 Factory acceptance tests shall not proceed without the prior delivery to and approval of all test documentation by the Employer.

The factory acceptance test shall demonstrate the technical characteristics of the equipment in relation to this specifications and approved drawings and documents. The factory acceptance test for items shall be proposed by the Contractor in accordance with technical specifications and Contractor's (including Sub- Contractor's/supplier's) standard FAT testing program. For Test equipment, FAT tests shall include supply of proper calibration certificates, demonstration of satisfactory performance, evidence of correct equipment configuration and manufacturer's final inspection certificate/report.

2.3 Sampling for FAT:

From each batch Bundled PLB Multi Channel presented by the Contractor for Factory acceptance testing, the Employer shall select random sample (s). For HDPE ducts, following sampling plans shall be followed.

A. Sampling plan for Visual inspection and dimensional test

Scale of sampling for Visual inspection and dimensional test shall be as per below table:

No of Ducts in the Lot	Sample No A	Sample Size	Cumulative Sample Size	Acceptance No	Rejection No
(1)	(2)	(3)	(4)	(5)	(6)
Upto 150	First	13	13	0	2
	Second	13	26	1	2
151 to 280	First	20	20	0	3
	Second	20	40	3	4
281 to 500	First	32	32	1	4
	Second	32	64	4	5
501 to 1200	First	50	50	2	5
	Second	50	100	6	7

the number of detectives found in the first sample is greater than or equal to the corresponding rejection numbers given in column 6 of above Table.

If, however, the number of detectives found in the first sample lies between the corresponding acceptance and rejection numbers given in col 5 and 6 of above Table, the second sample of the size given in col 3 of above Table shall be taken and examined for these requirements. The lot shall be considered to have satisfied these, requirements, if the number of detectives found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 5 of above Table; otherwise not.

B. Sampling Plan for performance test

The lot having satisfied dimensional and visual requirements shall be tested for other requirements with the sample size selected as per below Table from the lot. The lot shall be considered to have met the requirements of these tests, if none of samples tested fails.

No. of coils in the lot	Sample size
Up to 150	3
151 to 1200	5
1201 and 3500	8
3501 and above	12

Since FAT testing provides a measure of assurance that the Quality Control objectives are being met during all phases of production, the Employer reserves the right to require the Contractor to investigate and report on the cause of FAT failures and to suspend further testing/approvals until such a report is made and remedial actions taken, as applicable.

2.4 SITE ACCEPTANCE TESTS

- Random checks somewhere in the middle of the PLB Multi Channel, by cutting the single duct, will be made at site to ensure that ducts supplied are of correct dimension and thickness and there is no compromise on thickness in intermediate length, for saving in materials cost.
- 100% Duct being supplied would be measured length to cross check the length of the duct.
- Third party inspection on above, in addition to inspection at factory, would be carried out by independent agencies. on randomly picked up samples from field for testing of relevant parameters, thereby ensuring right quality of ducts. Failure of samples to pass any of the prescribed tests/parameters would result in immediate invoking of PBG/Blacklisting of the Vendor.

Notwithstanding anything stated in these specifications, USCL reserves the right to assess the bidder's capability to fulfill the scope of the bid, should the circumstances warrant such assessment.

2.5 DESIGN – WORKMANSHIP AND INTERPRETATION OF CLAUSES:

2.51 The design and quality of goods supplied, and the workmanship shall be in accordance with the best engineering practice to ensure satisfactory performance of the system throughout the service life.

2.52 The goods and accessories offered shall be complete in all respects. Any material and / or component thought not specifically stated in this specification but is necessary for trouble free and successful operation shall be deemed to be included. All such components, accessories, etc., shall be supplied at no extra cost.

2.53 The goods supplied shall be such that components, accessories of the same type shall be interchangeable. Likewise, similar or corresponding parts, components / accessories shall also be interchangeable.

2.54 Wherever and whenever a material or article is specified or described by the name of a particular brand, manufacturer, vendor, the specific item mentioned shall be understood as establishing type, function, quality and not as limiting competition. However, bidders may offer other similar components / accessories provided they meet with the required standards, design, duties and performance.

2.55 Goods and accessories so offered shall conform to type test and shall also be subjected to acceptance and routine tests in accordance with the requirements stipulated in this specification. The CESU reserves the right for repeating any or all of the type tests to be conducted on the goods supplied.

2.6 HDPE POWER DUCT SPECIFICATION

2.61. GENERAL:

This specification envisages manufacturing, testing at works, transport to site, insurance, storage, erection and commissioning of High-Density polyethylene primarily intended for buried for laying of underground Power cables. The expected service life of HDPE pipe and accessories shall not be less than 50 years.

2.62. DETAIL REQUIREMENTS OF HDPE PIPE.

THREE-LAYER CONSTRUCTION:

The HDPE pipe shall have three concentric layers viz. outer layer, middle layer and inner layer with ribs. The outer layer shall be made of HDPE material in red colour, middle layer shall be made of HDPE in translucent (natural) and the inner ribbed layer of solid permanent lubricant (PLB) i.e. Silicore. These concentric layers shall be continuous, co-extruded and integral part with HDPE outer/middle layer and shall distinctively visible in cross-section under normal lighting conditions and outer layer generally conform to IS-9938.

The inner layer of solid permanent lubricant shall not come out during storage, usage and throughout the life of the pipe. The colour of HDPE pipe shall be as per client requirement and shall be uniform throughout the length of the pipe.

The HDPE pipe shall Inner Ribbed of standard make and shall have the outer diameter as fallows.

S. No	**Type of Cable**	**Outer Diameter of Pipe in mm**
1	33 kV and 11kV	250
2	LV cable	225
3	Service Cable	75

2.7 STANDARDS:

S. No	Properties	Test Method	Requirements
1	Density of Raw Material	ISO 1183	≥ 930 Kg/m³
2	Melt Flow Rate	ISO 1133	The melt flow rate of the duct should be 0.2 to 1.1 Grams/10 Minutes @5kg.
3	Construction	Manufacturer' Standard	The outer layer shall be made of HDPE material in red colour, middle layer shall be made of HDPE in translucent (natural) and the inner ribbed layer of solid permanent lubricant (PLB) i.e. Silicore. These concentric layers shall be continuous, co-extruded and integral part with HDPE outer/middle layer and shall distinctively visible.
4	Tensile Strength at Yield	ISO 6259 - 1 & 3	Min 18 N/mm²
5	Environmental Stress Crack Resistance	ASTM D 1693	There should be no crack or split when tested with 10% IGEPAL - CO – 630 solutions at 50 ± 1º C for 96 hours.
6	Ovality	IS 4984-1995	Maximum 2% of outer diameter.
7	Reversion	IS 4984-1995	3.00% Max
8	Elongation	ISO 6259 - 1 & 3	Min 350%
9	Colour Pigment Dispersion (Outer Layer)	ISO 4427 / ISO 18553	≤ Rating A3
10	Ash Content of Outer Layer of the Duct	ASTM D5630	≤ 0.3%
11	Impact Strength	IS 12235 (Part 9)	There should be no crack / split when 10 Kg load dropped from 1.50 Meter height after conditioning at 0º C for 1 hour.
12	Toe- in	ASTM F 2160	Outside diameter at cut end of the conduit shall not be more than 1.5% smaller than outside diameter that measured at 300mm away from the cut end of the conduit.
13	Friction reduction	ASTM F 2160	Lubrication materials shall be Compatible with the conduit & any cable jacketing.
14	ISO Certifications	Standard	ISO 9001,14001 & 18001
15	Special Requirement	Standard	No regrind shall be used

The PLB (Permanent Lubricant) HDPE pipe shall conform to the following standard and the technical specifications described below.

2.71. Material:

The raw material used for the HDPE pipe shall meet the following requirements:

i. The anti-oxidant establishers, color master batch and other additive used shall be physiologically harmless and shall be used only to minimum extent necessary to meet the specification.

ii. Usage of any additives used separately or together should not impair the long-term physical and chemical properties of the HDPE pipe.

iii. Suitable Ultra-Violet stabilizers may be used for manufacture of the HDPE pipe to protect against UV degradation when stored in open for a minimum period of 8 months.

iv. In case of HDPE pipe of three concentric layer construction, the friction reducing, polymeric material to be used as the inner layer lubrication material shall be integral with HDPE layer.

2.72. Tests on Material of HDPE pipe:

The base HDPE resin material shall be subjected to following tests and shall satisfy

i. Melt flow Index: ISO 1133

ii. Density: ISO 1183

2.73. Dimension of pipe:

The Duct to be used in the in this project may vary from 250 mm dia to 75 mm dia. Ducts sizes to be used preferably for installation and laying power cables shall be 250 mm, 225 mm and 75 mm for HT, LT and service cables respectively, but these sizes may vary as per the requirement generated at the site during laying or may be changed by engineer in charge.

2.731. Dimensions of HDPE Duct:

Sl. No	**Description**	**250 DIA**	**225 DIA**	**75 DIA**
1	Outer Diameter of Pipe (mm)	250 mm	225 mm	75 mm
2	Wall Thickness (mm) (**Excluding rib height**)	18.8 - 21.1 mm	16.52- 18.72 mm	4 mm
3	Ovality	5.0 mm	4.5 mm	2.2 mm

Pipe Length shall be 6 or 12 meters, length of supply preferred to be 12 mtrs

2.732. HDPE Ducts should be sourced from the manufacturer having ISO 9001, 14001 & 18001 certification.

2.8. Accessories:

The following accessories are required for jointing the pipe and shall be supplied along with the pipe. The manufactures shall provide complete design details, procedure for method of installation and type of the material used for the accessories.

2.8.1. **Plastic coupler**: The coupler shall be used to join two HDPE pipes. It should either snap fit or Split type.

2.8.2. Workmanship:

The pipe shall be free of blisters, shrink holes, break and other defects. The HDPE pipe ends shall be cut as square as possible to longitudinal aspects. The external and internal HDPE pipe surfaces shall be smooth and inner ribbed layer.

2.8.3. Marking:

Each straight length of pipe shall be clearly marked hot embossed on white base or ink jet in black on straight length of the pipe at every meter of pipe with the following information:

a) Employer's name,

b) Manufacturer's name/Trade-mark,

c) Designation of pipe,

d) Lot number/Batch number,

2.9. Tests on finished HDPE pipe:

2.9.1. **Visual Inspection**: The external surfaces of the pipes shall be smooth and inner surface of the pipe shall be ribbed, clean and free from grooving and other defects. The pipe shall be cleanly cut and shall be square with axis of the pipes. Slight shallow longitudinal grooves or irregularities in the wall thickness shall be permissible, if the wall thickness remains within the permissible limits.

2.9.2. **Dimensions**: The wall thickness and diameter of the pipe, shall be measured by a dial Vernier or ball ended micrometer. The diameter shall be measured with circometer and shall conform to the figures given in the clause 1.4.1.

2.9.3. **Reversion Test**: This test shall be carried out as per IS: 4984. The dimension of inner layer or outer layer shall not change by more than 3% in the longitudinal direction when a sample pipe placed (sample length 200mm approx..) horizontally in an air- oven at 110+/-2^{o} C for 60 minutes and cooled to the room temperature.

2.9.4. **Tensile Strength at yield and Elongation at break Test**: The tensile strength and elongation of the HDPE pipe shall be carried out as per ISO: 6259 1& 3. The tensile strength for finished material shall be minimum 18 N/mm^2 and elongation at break shall be 350%.

2.9.5. **Environmental Stress Crack Test:** The test shall be conducted as per ASTM D 1693 with the specimen prepared from HDPE pipe after making compression moulding sheet. The specimen shall be immersed in 10% IGPAL (CO 630) Solution at 50± 1° C for 96 hrs. There shall be no crack or split.

2.9.6. **Impact Strength Test**: The test shall be carried out as per IS:12235 (Part 9). A sample HDPE pipe 150mm in length shall be conditioned at 0°C for one hour and placed on a heavy rigid block whose faces are at angle of 120°. A striker with a total weight of 10kg shall be allowed to fall freely in a suitable vertical guide through a height of 1.5m. The HDPE pipe shall not crack or split.

2.9.7. **Crush Resistance**: The test shall be in a sample of 200± 2 mm length of HDPEpipe which shall be subjected to crush load as specified below with compression speed

12.5 mm per minute. The deflection with crush load on period shall not exceed 5%.

i) **250 mm:** 1900 N Minimum

ii) **225 mm:** 1700 N Minimum

iii) **75 mm:** 600 N Minimum

2.9.8. **Ovality test**: The ovality is the difference between maximum outside diameter and the minimum outside diameter of the HDPE pipe at same cross section of the duct at 300mm away from the cut end. The same shall be measured as per IS-4984 as described above.

Raw Material: HDPE Virgin material shall be used. No other reworked or recycled material shall be used

2.10. Packing and condition of delivery:

The pipe may be supplied in loose sticks.

All materials furnished and all work performed shall be inspected and tested. Deliverables shall not be shipped until all required inspections and tests have been completed, and all deficiencies have been corrected to comply with this Specification and approved for shipment by the Employer.

Except where otherwise specified, the Contractor shall furnish all manpower and materials for tests, including testing facilities, power and instrumentation, and replacement of damaged parts. The costs shall be borne by the Contractor and shall be deemed to be included in the contract price.

The entire cost of testing for factory & site acceptance, routine tests, production tests and other test during manufacture & site activities specified herein including the expenses of Inspector/Employer's representative shall be treated as included in the quoted unit price of materials.

Acceptance or waiver of tests will not relieve the Contractor from the responsibility to furnish material in accordance with the specifications.

All tests shall be witnessed by the Employer and/or its authorized representative (hereinafter referred to as the Employer) unless the Employer authorizes testing to proceed without witness. The Employer representative shall sign the test form indicating approval of successful tests.

Should any inspections or tests indicate that specific item does not meet Specification requirements, the appropriate items shall be replaced, upgraded, or added by the Contractor as necessary to correct the noted deficiencies at no cost to the Employer. After correction of a deficiency, all necessary retests shall be performed to verify the effectiveness of the corrective action.

The Employer reserves the right to require the Contractor to perform, at the Employer's expense, any other reasonable test(s) at the Contractor's premises, on site, or elsewhere in addition to the specified type. Acceptance, Routine or Manufacturing tests to assure the Employer of specification compliance.

The Employer also reserves the right to require any retesting of previously approved tests at the Employer's expenses. However, if the retest(s) reveal non-compliance to the specification, the Contractor shall bear the expenses for the retesting and remedial action at no cost to the employer.

2.10.1. Factory Acceptance Test:

Factory acceptance tests shall be conducted on randomly selected final assemblies of all equipment to be supplied. Visual inspection shall be carried out on 100% basis for all the equipment/items offered. Factory acceptance testing shall be carried out on HDPE and accessories.

Material shall not be dispatched to the Employer until required factory tests are completed satisfactory all variances are resolved, full test documentation has been delivered to the Employer, and the Employer has issued Material Inspection & Clearance Certificate (MICC). Successful completion of the factory tests and the Employer approval to dispatch shall in no way constitute final acceptance of the system or any portion thereof. These tests shall be carried out in the presence of the Employer's authorized representatives.

Factory acceptance tests shall not proceed without the prior delivery to and approval of all test documentation by the Employer.

The factory acceptance test shall demonstrate the technical characteristics of the equipment in relation to these specifications and approved drawings and documents. The factory acceptance test for items shall be proposed by the Contractor in accordance with technical specifications and Contractor's (including Sub- Contractor's/supplier's) standard FAT testing program. For Test equipment, FAT tests shall include supply of proper calibration certificates, demonstration of satisfactory performance, evidence of correct equipment configuration and manufacturer's final inspection certificate/report.

2.10.2. Sampling for FAT:

From each batch HDPE pipe presented by the Contractor for Factory acceptance testing, the Employer shall select random sample (s). For HDPE pipes, following sampling plans

shall be followed.

B. Sampling plan for Visual inspection and dimensional test

Scale of sampling for Visual inspection and dimensional test shall be as per below table:

No of Pipes in the Lot	Sample No A	Sample Size	Cumulative Sample Size	Acceptance No	Rejection No
(1)	(2)	(3)	(4)	(5)	(6)
Upto 150	First	13	13	0	2
	Second	13	26	1	2
151 to 280	First	20	20	0	3
	Second	20	40	3	4
281 to 500	First	32	32	1	4
	Second	32	64	4	5
501 to 1200	First	50	50	2	5
	Second	50	100	6	7
1201 to 3500	First	80	80	3	7
	Second	80	160	8	9
3501 to above	First	125	125	5	9
	Second	125	250	12	13

The number of pipes given for the first sample in col 3 of above Table shall be examined for dimensional and visual requirements given in clause 1.8.1 & 1.8.2. A pipe failing to satisfy any of these requirements shall be considered as defective. The lot shall be deemed to have satisfied these requirements, if the number of detectives found in the first sample are less than or equal to the corresponding acceptance number given in col 5 of above Table. The lot shall be deemed not to have met these requirements if the number of detectives found in the first sample is greater than or equal to the corresponding rejection numbers given in column 6 of above Table.

If, however, the number of detectives found in the first sample lies between the corresponding acceptance and rejection numbers given in col 5 and 6 of above Table, the second sample of the size given in col 3 of above Table shall be taken and examined for these requirements. The lot shall be considered to have satisfied these, requirements, if the number of detectives found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 5 of above Table; otherwise not.

B. Sampling Plan for performance test

The lot having satisfied dimensional and visual requirements shall be tested for other requirements with the sample size selected as per below Table from the lot. The lot shall be considered to have met the requirements of these tests, if none of samples tested fails.

No. of pips in the lot	Sample size
Up to 150	3
151 to 1200	5
1201 and 3500	8
3501 and above	12

Since FAT testing provides a measure of assurance that the Quality Control objectives are being met during all phases of production, the Employer reserves the right to require the Contractor to investigate and report on the cause of FAT failures and to suspend further testing/approvals until such a report is made and remedial actions taken, as applicable.

2.10.3. SITE ACCEPTANCE TESTS

2.10.3.1. Randoms checks somewhere in the middle of the pipe, by cutting the duct, will be made at site to ensure that ducts supplied are of correct dimension and thickness and there is no compromise on thickness in intermediate length, for saving in materials cost.

2.10.3.2. 100% Duct pipe being supplied would be measured length to cross check the length of the duct pipe.

2.10.3.3. To keep a check on the use of filler material, ash contents would be determined on randomly selected samples as per ASTM D 1603 method and the value of ash content, thus determined, shall not exceed 0.3% (outer coloured layer).

2.10.3.4. UV Stabilise Content: UV Stabiliser content of finished duct shall not be less than 0.15%

2.10.3.5. Third party inspection on above, in addition to inspection at factory, would be carried out by independent agencies on randomly picked up samples from field for testing of relevant parameters, thereby ensuring right quality of ducts. Failure of samples to pass any of the prescribed tests/parameters would result in immediate invoking of PBG/Blacklisting of the Vendor.

II. TECHNICAL SECIFICATIONS OF ELECTRICAL WORKS

2.11. TECHNICAL SPECIFICATIONS FOR COMPACT TYPE PACKAGE SUB-STATION

2.11.1. **APPLICABLE CODE & STANDARDS**: All equipment and material shall be designed manufactured and tested in accordance with the latest applicable IEC and equivalent IS standards.

2.11.2. The 12KV Package Substation Design must be as per IEC 61330/62271-202 and equivalent IS codes.

2.11.3. The Package Sub-station offered shall in general comply with the latest issues including amendments of the following standards.

Particulars	**Standards**
High Voltage Low Voltage Pre-Fabricated Substation	IEC: 62271-202
High Voltage Switches	IEC 60265
Metal Enclosed High Voltage Switchgear	IEC 60298/ IEC62271-200
High Voltage Switchgear	IEC 60694
Low Voltage Switchgear and Control gear	IEC 60439
Power Transformers	IEC 60076

2.12. Applicable Service Conditions:

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below

Ambient Temperature:	50 Deg C
Relative Humidity	upto 95%
Altitude of Installation	upto 1000m

The Enclosure of High Voltage switchgear-control gear, Low Voltage switchgear-control gear & Transformer of the package substation shall be designed to be used under **normal outdoor service condition** as mentioned. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside.

2.13. GENERAL DESIGN CRITERIA FOR PACKAGE SUB-STATION

2.13.1. The required Package Sub-station should consist of the following electrical equipment:

- SF6 insulated VCB Ring Main Unit – Motorized & Non-extensible type
- Transformer
- LV Switchgear
- FRTU
- HT Metering

2.13.2. The design of the compact substation should enclose the above-mentioned equipment in one single continuous enclosure. No equipment shall be placed outside the CSS enclosure.

The main equipment i.e HT RMU, Transformer & LV Switchgear shall be as of the same make as of the compact substation.

2.13.3. The prefabricated-package substation shall be designed for

a) Compactness,
b) Fast installation,
c) Maintenance free operation,
d) Safety for worker/operator & public.

2.13.4. The Switchgear and components of Package Sub-station shall be capable of withstanding all type of Stresses whether mechanical or electrical or developed due to short circuits (listed in ratings and requirements clause) without any damage or deterioration of the materials.

2.13.5. For continues 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.

2.14. SPECIFIC REQUIREMENT

2.14.1. The main components of a prefabricated- package substation are Transformer, High-voltage switchgear-control gear, Low-voltage switchgear-control gear and corresponding interconnections (cable, flexible, bus bars) & auxiliary equipment. The components shall be enclosed, by either common enclosure or by an assembly of enclosure. All the components shall comply with their relevant IEC and equivalent Indian standards.

2.14.2. **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	**315/500/630KVA Cast Resin Dry type**
Rated Ingress protection class of Enclosure	IP:	IP-23 for Transformer Compartment and IP: 54 for LT & HT Switchgear Compartment.
Rated temp Class of Transformer Compartment		K10
HV Insulation Level		
Rated withstand voltage at power frequency of 50 Hz	kV rms	28
Rated Impulse withstand Voltage	kV peak	75
HV Network & Busbar		
Rated current	Amp	630A
Rated short time withstand current	kA rms / 3 sec	21
Making capacity for switch-disconnector & earthing switches	kA peak	50kA
Breaking capacity of Isolators (rated full load)	A	630A
LV Network		As per schedule of items.

2.15. SPECIFICATIONS FOR ENCLOSURE OF COMPACT TYPE PACKAGE SUB-STATION

2.15.1. The outdoor enclosure shall be made of galvanized Sheet Steel suitable for local weather conditions

2.15.2. The enclosure shall be of partially modular design of GI sheets fastened by riveting.

2.15.3. Excessive use of bolts for fastening on the front side of doors shall not be allowed. If bolting is employed for fastening it should be fastened from the inside of enclosure. This is to avoid corrosion.

2.15.4. The thickness of enclosure shall be minimum 1.5 mm for non-load bearing members & minimum 2mm for load bearing members.

2.15.5. The enclosure shall be powder coated / Wet Polyurethane paint.

2.15.6. The protection degree of the Enclosure shall be **IP54 for LT & HT switchgear compartment & IP23 for Transformer compartment.** Proper / adequate ventilation aperture shall be provided for natural ventilation by way of Louvers etc.

2.15.7. The metal base shall ensure rigidity for easy transport & installation.

2.15.8. Substation will be used in outdoor application hence to prevent enclosure from rusting/corrosion, welding should be avoided. All equipment to be fitted inside Enclosure only.

2.15.9. Considering the outdoor application of the substation the doors shall be provided with proper interlocking arrangement for safety of operator and to avoid corrosion door should have stainless steel hinges. Door should be provided with stoppers.

2.15.10. Interconnection between HT switchgear and transformer shall be using 1Cx3x95 sq.mm al. unarmored XLPE cable and between transformer and LT switchgear shall be using Aluminum busbar.

2.15.11. **Internal Fault**: Failure within the package 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 highest practicable degree of protection to persons shall be provided. The Design shall be tested as per IEC61330/62271-202.

2.15.12. Type test report of arcing due to internal fault should submitted with offer. The Package substation shall be tested for internal arc test –AB for 20KA for 1 sec (A-operator, B-pedestrian)

2.15.13. Covers & doors are part of the enclosure. When they are closed, they shall provide the degree of protection specified for the enclosure. Ventilation openings shall be so arranged or shielded that same degree of protection as specified for enclosure is obtained. Additional wire mesh may be used with proper Danger board for safety of the operator. 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 90^0 & be equipped with a device able to maintain them in an open position. **The doors shall be lockable type with cylindrical shooting bolt and the locking arrangement shall be covered by magnetic flap. 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 Compact Package 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,

2.15.14. There shall be an arrangement for internal lighting activated by associated switch for HV, Transformer & LV compartments separately.

2.15.15. **Labels**: Labels for warning, manufacturer's operating instructions etc. shall be durable & clearly legible.

2.15.16. Cleaning & Painting:

2.15.17. The paints shall be carefully selected to withstand tropical heat and rain. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling. **The enclosure shall be painted with polyurethane paint/ Powder coated**

2.16. TECHNICAL SPECIFICATION OF 11KV SF6 METAL ENCLOSED, INDOOR RING MAIN UNIT (RMU with VCB quenching)

This RMU should be complete with all components necessary for its effective and trouble-free operation along with associated equipment etc. such components should be deemed to be within the scope of supplier's supply.

The RMU should be fixed type SF-6 insulated with Vacuum circuit breakers with O/C & E/F relay for the protection of the transformer. It should be maintenance free equipment, having stainless steel robotically welded IP67 enclosure.

2.17. STANDARDS AND REFERENCE DOCUMENTS

2.17.1. Codes and Standards

The **RING MAIN UNIT (RMU)** should be designed, manufactured and tested to the latest version of:

IEC 60694 Common specifications for high-voltage switchgear and control gear standards.
IEC 62271-200 : A.C metal-enclosed switchgear and control gear for rated voltages above 1KV and up to and including 72KV and the IEC Codes herein referred.
IEC 60129/ IEC 62271-102: Alternating current disconnections (isolators) and earthing switches
IEC 60529 : Classification of degrees of protection provided by enclosures
IEC 60265 High-voltage switches-Part 1: Switches for rated voltages above 1kV and less than 52 kV
IEC 60056 : Circuit breakers
IEC 60420 High-voltage alternating current switch-fuse combinations
IEC 60185 Current transformers
IEC 60186 Voltage transformers
IEC 60255 Electrical relays
Any other codes recognized in the country of origin of equipment might be considered provided that they fully comply with **IEC &equivalent Indian standard**s.

The design of the switchgear should be based on safety to personnel and equipment during operation and maintenance, reliability of service, ease of maintenance, mechanical protection of equipment, interchangeability of equipment and ready addition of future loads.

2.17.2. RMU of the Package Sub-station should have following features:

11KV SF6 INDOOR Ring Main Unit (RMU), comprising of 2 Nos. 630A Load break Switches, 1No. 630 A Vacuum Circuit Breaker with (3 O/C & 1E/F) Relays. And 1 No. metering module.

The RMUs shall be motorized operator for LBS & VCB & can be connected to SCADA / DMS through F-RTU terminal

(A)Load break switch (630A) - 2 Nos with Motorized operation

Load break switch should have the following

- Manually & motorized operated 12 KV, 630A Load Break switch and Earthing Switch with making capacity
- "Live Cable" LED Indicators through Capacitor Voltage Dividers mounted on the bushings.
- Mechanical ON/OFF/EARTH Indication
- Anti-reflex operating handle
- Cable testing possible without disconnection of cables.
- Cable boxes suitable for 1 X 3C x 300 sq mm XLPE Cable with right angle Cable Terminal Protectors.
- Cable boxes should be Arc Proof and interlocked with respective Earthing Switches. For safety of operator it should not be possible to open the cable box unless the earth switch is ON.
- The ON-OFF operation of the load break switch shall be manually/motorized at local & operated through SCADA from remote

(B) Circuit Breaker (630A) – 1 Nos with motorized operation

Circuit Breaker should have the following:
- Manually operated 630 A Vacuum circuit breaker and Earthing Switch with making capacity.
- Mechanical tripped on fault indicator
- Auxiliary contacts 1NO and 1NC
- Anti-reflex operating handle
- "Live Cable" LED Indicators thru Capacitor Voltage Dividers mounted on the bushings.
- 3O/C + 1E/F self powered relay with Low and High set for Over current and Earth Fault. Relay should have facility to display the maximum loaded phase current also. Relay should have facility to trip the breaker from remote commands without shunt trip coil.
- Mechanical ON/OFF/EARTH Indication
- The ON-OFF operation of the VCB shall be manual/motorised at local & operated through SCADA from remote

(C) Metering Module – 1 No
Metering Module should have the following:
- Air insulated metering module 11kV, 630A.
- Potential Transformer with HT fuse on primary side and MCB on secondary side for protection.
- Primary voltage: 11000:V3 V, Secondary voltage: 110:V3 V.
- Burden winding 1: 25 VA, Class winding 1: 1.0.
- Digital MFM (For VCB Feeder)
- Space heater with thermostat.
- All parameters should be available at control room through SCADA

Following is the list of I/O requirements for RMU modules. Please note that all DIDO should be potential free contacts.

a. List of potential free contacts for Isolater (Terminals shall be provided).
   i. Isolator ON – 02 No & 2 NC
   ii. Isolator OFF – 02 No. & 2 NC
   iii. Isolator earth Switch Status (ON/OFF)
   iv. FPI Operated
   v. LOCAL/ REMOTE switch positions

   List of commands
   i. Isolator Close
   ii. Isolator Open
   iii. FPI reset

b. List of Potential free contacts for Circuit Breakers/ Bus Coupler (Terminals shall be provided)

   Digital Indications
   i. Circuit Breaker ON
   ii. Circuit Breaker OFF
   iii. Auto Trip
   iv. LOCAL/ REMOTE switch positions

   List of Commands
   i. Circuit Breaker Close
   ii. Circuit Breaker Open

F-RTU Details

The FRTU Cabinet shall consist of made of 1.5 mm MS Sheet & powder coated enclosure. It shall consist of the following:
- Inputs / Output points
- Status Inputs

- Control inputs
- Analog inputs
- Programmable control Logic
- FRTU data communications.
  The same shall be designed /engineered & tested as the manufacturer's standard practice
  The FRTU shall have a reliable DC/AC power supply on 24 V DC or AC power supply , the same shall be as per customer's site availability
  The FRTU shall be provided with an Ethernet modem as per manufacturer's standard practice
- Should have inbuilt Wi-Fi capability for local operation and maintenance.
- Should have Cyber Security Feature.
- Should have Programmable Logic support to accommodate automation features.
- Should have Embedded Web Server access (for local/remote maintenance)

INDOOR RMU

1. Modular design, panel type with front cable access.
2. RMU must be made of robotically welded Non Ferrite, Non magnetic stainless steel with thickness of minimum 2mm with all live parts inside stainless steel tank
3. The RMU should have provision of Gas refilling at site, in case there is some leakage of the gas.
4. Maximum Modules can be accommodated in a single robotically welded Stainless steel Tank so as to make it more compact and reliable.
5. Cable covers must be interlocked with Earth switch to have complete safety of operating person. The cable bushings shall be bolted type design
6. The HT RMU shall be completely housed inside the enclosure of IP54 rating. The operation of the RMU shall be only possible after opening the CSS enclosure door.

2.18. DIELECTRIC MEDIUM

SF6 GAS shall be used for the dielectric medium, **Arc quenching should take place in vacuum** for 11KV RMU's in accordance with IEC376. It is preferable to fit an absorption material in the tank to absorb the moisture from the SF6 gas and to regenerate the SF6 gas following arc interruption. The SF6 insulating medium shall be constantly monitored via a temperature compensating gas pressure indicator offering a simple go, no-go indication.

2.19. GENERAL TECHNICAL REQUIREMENTS

2.19.1. **Fixed type Vacuum breakers insulated in SF6 gas**. It should be maintenance free, having stainless steel robotically welded enclosure for INDOOR RMU application.
2.19.2. Low gas pressure devices- 1.4 Bar pressure. RMU should have full rating with Bar gas pressure.
2.19.3. Live cable indicators- High operator safety.
2.19.4. Fully Rated integral earthing switch for Switches and Breakers.
2.19.5. Self powered Microprocessor Based 3O/C + 1E/F self-powered relay with Low and High set for Over current and Earth Fault - Does not require any external source of power.
2.19.6. Units fully SCADA Compatible. Retrofitting at site possible at a later date. Line switches (Load break switches) as well as T- OFF circuit Breaker can be operated by remote.
2.19.7. Cable boxes should be front access and interlocked with earth switch. No rear access required.
2.19.8. Cable testing possible without disconnection of cables.
2.19.9. Compact in dimension.
2.19.10. Low pressure, sealed for life equipment,
2.19.11. Cable earthing switch on all switching device-standard, for operator safety.

2.19.12. All live parts should be inside a hermetically sealed Stainless-Steel enclosure for indoor RMU.

2.19.13. Indoor unit should be classified as sealed pressure system with gas leak rate of less than 0.1% per year requiring no gas filling for 30+ years of functional life.

2.20. Technical Parameters to be monitored from SCADA (Remote)

- Ring switch/T Switch off status & operation
- Line status live/dead/earth
- Protection data (setting / events / fault-history)
- Energy consumption other important electrical parameters data
- Equipment healthiness: Gas pressure, Trip Ckt healthy, Number of operations

These inputs shall be hooked up to FRTU Terminal for further SCADA interface

Note: The SCADA system should be supplied complete with SCADA software and SCADA programing software and state of art PC with all required hardware and software.

2.21. TECHNICAL AND GUARANTEED PARTICULARS.

The bidders shall furnish all guaranteed technical particulars as called for this specification.

3.11.1 DESIGN CRITERIA

3.11.1.1*Service conditions*

The offered switchgear and control gear should be suitable for continuous operation under the basic service conditions indicated below. Installation should be in normal indoor conditions in accordance with IEC 60694.

Ambient temperature -1oC to +45oC

Relative humidity up to 95%

Altitude of installation up to 1000m, IEC 60120

3.11.1.2 General structural and mechanical construction

The offered RMU should be of the fully arc proof metal enclosed, free standing, floor mounting, flush fronted type, consisting of modules assembled into one or more units. Each unit is made of a cubicle sealed-for life with SF6 and contains all high voltage components sealed off from the environment. The overall design of the switchgear should be such that front access only is required. It should be possible to erect the switchboard against a substation wall, with HV and LV cables being terminated and accessible from the front.

The units should be constructed from robotically welded NON Ferrite, Non Magnetic grade stainless steel of of minimum 2 mm thickness to ensure very high degree of precision in sealing of SF6 tank. The design of the units should be such that no permanent or harmful distortion occurs either when being lifted by eyebolts or when moved into position by rollers.

The cubicle should be have a pressure relief device. In the rare case of an internal arc, the high pressure caused by the arc will release it, and the hot gases is allowed to be exhausted out at the bottom of the cubicle. A controlled direction of flow of the hot gas should be achieved.

The switchgear should have the minimum degree of protection (in accordance with IEC 60529)

- IP 67 for the tank with high voltage components
- IP 2X for the front covers of the mechanism
- IP 3X for the cable connection covers

The RMU shall be internally arc tested for 20kA for 1 sec for the gas tank & it should be internally arc tested for cable compartment with arc proof doors. Relevant type test reports should be submitted by the manufacturer.

2.22. TECHNICAL DATA

2.22.1. Ring Main Unit, Electrical data

Electrical data and service conditions

No	***Rated voltage***	KV	***12KV***
1	Power frequency withstand voltage	KV	28
2	Impulse withstand voltage	KV	75
3	Rated frequency	Hz	50
4	Rated current busbars	A	630
5	Rated current (cable switch)	A	630
6	Rated current (T-off)	A	630
	Breaking capacities:		
7	active load	A	630
8	closed loop (cable switch)	A	630
9	off load cable charging (cableSwitch)	A	135
10	earth fault (cable swich)	A	200
11	earth fault cable charging (cable switch)	A	115
12	Short circuit breaking current (T-off circuit breaker)	kA	20
13	Rated making capacity	kA	50
14	Rated short time current 3 sec.	kA	21
	Ambient temperature:		
15	Maximum value	°C	+ 50
16	Maximum value of 24 hour mean	°C	+ 35
17	Minimum value	°C	0
18	Altitude for erection above sea level 4m ...	1000	
19	Relative humidity	Max 95%	

2.22.2. Ring Main Unit Technical data (11KV) INDOOR

General data, enclosure and dimensions

1 Standard to which Switchgear complies	IEC &equivalent IS
2 Type of Ring Main Unit	Metal Enclosed, Panel type, Compact Module.
3 Number of phases	3
4 Whether RMU is type tested	Yes
5 Whether facility is provided with pressure relief	Yes
6 Insulating gas	SF6
7 Nominal operating gas pressure	1.4 bar abs. 20° C
8 Gas leakage rate / annum %	0.1% per annum
9 Expected operating lifetime	30 years
10 Whether facilities provided for gas monitoring can be delivered	Yes, temperature compensated manometer
11 Material used in tank construction	Stainless steel sheet

No Operations, degree of protection and colours

1 Means of switch operation	separate handle
2 Means circuit breaker operation	separate handle and push buttons
3 Rated operating sequence of Circuit Breaker	O –3min-CO-3min-CO
4 Total opening time of Circuit Breaker	approx. . 40-50ms
5 Closing time of Circuit Breaker	approx. . 30-45ms
6 Mechanical operations of switch	CO 1000
7 Mechanical operations of CO earthing switch	1000
8 Mechanical operations of circuit breaker	CO 2000
9 Principle switch / earth switch	3 position combined switch

Degree of protection:

10 High Voltage live parts,	SF6 tank IP 67
11 Front cover mechanism	IP 2X for Indoor

12 Cable covers	IP 3X for Indoor

Colours:

14 Front cover	7035
15 cable cover	7035

2.23. CIRCUIT BREAKERS

Vacuum bottles should be use as interrupters of the currents. The circuit breaker main circuit should be connected in series with a three-position disconnector –earthing switch. The operation between circuit breaker and disconnector earthing must be interlocked. Vacuum circuit breaker must self-tripping and have self-powered relay.

2.24. OTHER MAIN FEATURES

2.25. Bus bars

Comprising the 3 single phases copper bus bars and the connections to the switch or circuit breaker. The bus bar should be integrated in the cubicle Bus bars should be rated to withstand all dynamic and thermal stresses for the full length of the switchgear.

2.26. Earthing Switch

Earthing switches should be rated equal to the switchgear rating.
Earthing switches should be quick make type capable of making Rated Fault Current. Ear thing switch should be operated from the front of the cubicle by means of a removable handle.

2.27. The mechanisms

All mechanisms should be situated in the mechanism compartment behind the front covers outside the SF6-tank. The mechanism for the switch and the earthing switch is operating both switches via one common shaft. The mechanism provides independent manual operation for closing and opening of the switch, independent closing of the earthing switch and dependent opening of the earthing switch.

The mechanism for the T-off switch and earthing switch is operating both switches via one common shaft. The mechanism has stored spring energy and provide independent manual operation for closing and opening of the switch, independent closing of the ear thing switch and dependent opening of the ear thing switch. The mechanism for the vacuum circuit breaker (VCB) and disconnector- earthing switch is operating the VCB and the disconnector earthing switch via to separate shafts. The mechanism for the VCB has stored spring energy and provides independent manual operation for closing and opening of the VCB. The mechanism has a relay with related CT's and/or remote tripping device. The mechanism for the disconnector earthing switch provide independent manual operation for closing and opening of the disconnector, independent closing of the earthing switch and dependent opening of the earthing switch.

2.28. Front covers

The front cover contains the mimic diagram of the main circuit with the position indicators for the switching devices. The voltage indicators are situated on the front panels. Access to the cable bushings is in the lower part of each module.

2.29. Position indicators

The position indicators are visible through the front cover and are directly linked to the operating shaft of the switching devices.

2.30. Voltage indicator

The voltage indicators are situated on the front cover, one for each module, and indicate the voltage condition of each incoming cable. Identification of the phases is achieved with labels L1, L2 and L3 on the front of the voltage indicators. The voltage indicator satisfies the requirements of IEC61243.

2.31. Cable compartment

The Cables access in the RMU shall be from the front.
The cable bushings shall be bolted type and should be replaceable at site whenever required.

2.32. Power connection.

The cables are installed in the dedicated compartment below the mimic front cover. At the bottom of the cable compartment, an earthing bar system made of copper/GI with a minimum cross section of 120 mm^2

should be fitted. In each compartment the earthing bar should be fitted with 4 screws M10. The earthing system is connected to the tank by a copper/GI bar, which rises up to the connecting point of the tank behind the rear partition wall on the middle of the switchgear.

2.33. Interlocking.

The mechanism for the cable switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position.

The mechanism for the T-off switch should be provide a built in interlocking system to prevent operation of the switch when the earthing switch is closed, and to prevent operation of the earthing switch when the switch is in the closed position. The mechanism for the VCB and the disconnector-earthing switch should be having a built in interlocking system to prevent operation of the disconnector-earthing switch when the VCB is in the closed position.

Further is should not be possible to Open the Cable doors unless the Earthing Switch is Turned ON. In case the Cable door is accidentally left open a positive interlock shall prevent operation of Load Break Switch and Isolators / Breaker from any operation.

2.34. Current Transformers

All current transformers should be complying with IEC 60185.
Current transformers should be of dry type, with ratings and ratios as required.
Cable current transformers used in circuit breaker modules should be maximum 100mm wide. Current transformers used in metering cubicles should be having dimensions according to DIN 42600, Narrow type. Current transformer shall be placed in the cable covers so that it can be easily replaced at site without removing the bushings.

2.35. Fault Passage Indicators.

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 to avoid thefts. The FPI shall have clear display, automatic reset facility and shall be SCADA compatible.

2.36. TESTING AND CERTIFICATION.

2.36.1. TYPE TESTS.

Units should be type tested in accordance with IEC standards 60056, 60129, 60265,
60298, 60420, 60529 and 60694. The following type tests should perform on the HT Switchgear and report should submit with offer.

- Short time and peak withstand current test
- Temperature rise tests
- Dielectric tests
- Test of apparatus i.e. circuit breaker and earthing switch
- Arc fault test
- Measurement of resistance of main circuit.
- Mechanical endurance test.
- Duty cycle test.
- Internal arc test for HT chamber.
- Type test reports for above type shall be submitted with the offer.

2.36.2. ROUTINE TESTS.

Routine tests should be carried out in accordance with IEC 60298 & IS standards. These tests should be ensuring the reliability of the unit.

Below listed test should be performed as routine tests before the delivery of units;

- Withstand voltage at power frequency
- Measurement of the resistance of the main circuit

- Withstand voltage on the auxiliary circuits
- Operation of functional locks, interlocks, signalling devices and auxiliary devices
- Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism
- Verification of wiring
- Visual inspection
- Time travel characteristics measurement facility for Breaker should be available with the manufacturer to access the quality of RMU.

2.36.3. Cast Resin Dry Type Transformer

This specification covers the requirements of design, manufacture, testing and supply of cast resin dry type transformers complete with all the accessories and fittings for efficient and trouble-free operation. Make of Transformer – Schneider/ **ABB**/ Siemens/ Raychem/ **Voltamp**/ Crompton Greaves

2.36.4. CODES & STANDARDS

The equipment covered by this specification shall, unless Otherwise stated to be designed, constructed and tested in accordance with latest revisions of relevant Indian standards / IEC publications.

IS 1271 - Classification of Insulating Materials.

IS 2026 - Power transformers (part I - V)

IS 2099 - Bushing for alternating voltages above 1000 V

IS 2705 - Current transformers

IS 3202 - Code of practice for climate proofing

IS 3639 - Power transformer fittings and accessories

IS 4257 - Porcelain bushings for transformers

IS 11171 - Dry type Transformer

IS 8478 - Application guide for tap-changers

IS 10028 - Code of practice for selection, installation and maintenance of transformers.

2.43. GENERAL DESIGN FEATURES

Dry Type Cast resin Transformer (630KVA / 500KVA / 315kVA)

The distribution transformer shall be designed to comply with following features

2.37	Major Design criteria	
2.37.1	Voltage variation on supply side	+ / - 10 %
2.37.2	Frequency variation on supply side	+/ - 5 %
2.37.3	Transient condition	-20 % or +10 % combined variation of voltage and frequency
2.37.4	Service Condition	The transformer enclosure in PSS is to be designed for outdoor location with service condition as specified, but its full rating shall be available if located indoor in poorly ventilated atmosphere
2.37.5	Insulation Level	
	One-minute power frequency withstand voltage	28KV for 11KV system & 3KV for 415 V system
	Lightning impulse withstand voltage	75KV peak for 11KV system
2.37.6	Short Circuit withstand Capacity of the transformer	
2.37.6.1	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side	For 2 secs.
2.37.6.2	Single phase short circuit at secondary terminal with rated voltage maintained on other side	For 2 secs.
2.38	Overload capability	As per IEC 60076 part 12
2.39	Noise level	Shall not exceed limits as per NEMA TR-1 with all accessories running measured as per part 10 of IEC 60076 / NEMA standard
2.40	Radio Influence Voltage	Maximum 250 Microvolt
2.41	Harmonic currents	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances.
2.42	Partial Discharges	As per IEC 60076-11

		Routine test on all Units and value to be less than 10PC as per IEC			
1	Parallel operation	Not applicable			
1.1	Major Parameters				
1.1.1	Rating		630 KVA	500 KVA	315 KVA
1.1.2.	Voltage Ratio	11kv / 433 volts			
1.1.3.	Vector Group	Dyn11			
1.1.4	Percentage Impedance @120°C	4%, tolerance as per IS			

1.1.5	Losses at 120°C				
1.1.5.1	No load Loss –IS tol in KW (630KVA /500KVA/315K VA)		1.3	1.1	0.8
1.1.5.2	Load losses at principal tap- IS Tol in KW (630KVA /500KVA/315K VA)		6.1	4.2	2.6
1.1.6	Temperature rise winding: outside PSS without enclosure / inside PSS max.	80/90 ^{0}C			
1.1.7	Flux density	Maximum flux density at 10 % over excitation/overfluxing-1.9 Tesla maximum			
1.1.8	Tapping on HV winding	Off Circuit taps on HV winding , + / - 5 % in steps of 2.5 % , change of taps by link			
1.1.9	Design Clearances	Phase - phase	Phase – earth		
	11KV system	180 mm	120mm		
	415V system	25mm	25mm		
1.10	Construction & Design				
1.10.1	Core				
1.10.1.1	Material	High grade , non ageing, low loss, high permeability, grain oriented,			
		cold rolled silicon steel lamination			
1.10.1.2	Grade	Premium grade minimum M4 or better			
1.10.1.3	Lamination thickness	0.27mm (Min)			
1.10.1.4	Design Flux Density at rated conditions at principal tap	1.73 Tesla			
1.10.1.4	Maximum Flux Density at 10 % over excitation / over fluxing	1.9 Tesla maximum allowed			
1.10.1.5	Core Design Features	i) All steel sections used for supporting the core shall be thoroughly sand blasted after cutting , drilling, welding ii)Provision of lifting lugs for core coil assembly			
1.11.2	Winding				
1.11.2.1	Material	Electrolytic Copper			

1.11.2.2	Maximum Current Density allowed	Cu -3.2 Amps / Sq.mm.
1.11.2.3	Winding Insulating material	CRT -Class H minimum, free from compounds liable to ooze out, shrink or collapse. Uniforminsulation shall be applied to the windings and overall winding shall be epoxy cast resin
1.11.2.4	Tapping	Off Circuit taps on HV winding , + / - 5 % in steps of 2.5 % , change of taps by link
1.11.2.5	Essential provision for tap links	Shall be shrouded with cover made from insulating material. To prevent deposit of dust.
1.11.2.6	Design features	i) Stacks of winding to receive adequate shrinkage treatment
		ii) Connections braced to withstand shock during transport, switching, short circuit, or other transients.
		iii) Minimum out of balance force in the transformer winding at all voltage ratios.
		iv) Conductor width on edge exceeding six times its thickness
		v) The termination bus-bar coming out from winding shall be tinned Copper
		vi) Transposed at sufficient intervals.
		vii)Threaded connection with locking facility.
		viii)Winding leads rigidly supported , using guide tubes if practicable
		ix) Provision of taps as indicated in the technical particulars
1.11.2.7	Essential provision of HV and LV winding leads	Phase marking required near termination on both HV and LV side.
		Phase colour coding required on insulating sleeves on both HV and LV side.
		Phase sequence 1U, 1V, 1W from left to right looking inside from the HV side door.
		Phase sequence 2n, 2u, 2v, 2w from right to left looking inside from LV side door
		Adequate HV termination clearance.
		Provision of check nut in all HV and LV winding lead connection.
1.11.3	Vibration Isolator	Vibration isolation pads shall be installed between core and coil assembly and enclosure base assembly to prevent the transmission of structure borne vibrations.
1.11.4	Support Insulator/ terminations	
1.11.4.1	Type of HV and LV support insulators	Epoxy Resin Cast
1.11.4.2	Minimum Creepage of bushings and support Insulators	31 mm / kV
1.11.4.3	Arcing horns	Not required

1.11.4.4	Termination on HV side	By cable within main enclosure
1.11.4.5	HV side cable size	11 kV (E) grade , A2XCEWY 3C x 150 sqmm / 1C X 95 Sq.mm
1.11.4.6	Cable lugs	Long barrel medium duty Aluminium lug with knurling on inside surface. and suitable for cable size for 11 kV (E) grade , A2XCEWY 3C x 150 sqmm
1.11.4.7	HV side cable terminating busbar	Tinned copper of size 50 x 6
1.11.4.7	Termination on LV side	Suitable bus bar as per PSS spec
1.11.5	Current Transformers	
1.11.5.1	Mounting	On LV side terminal bus bars on all three phases
1.11.5.2	Maintenance requirements	Replacement should be possible without dismantling LV side support insulators
1.11.5.3	Accuracy Class	0.5
1.11.5.4	Burden	15 VA
1.11.5.5	Type	Suitable for CSS use
1.11.5.6	CT ratio	a) 315kVA – 600/5 Amps
		b)500KVA- 800/5 Amps
		c)630kVA -1200/5 Amps
1.11.6	Hardware	
1.11.6.1	External	Stainless Steel only
1.11.6.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
1.12	Gasket	Neoprene rubber based gasket across all doors & covers
1.13	Control cable specification (to be used by the vendor)	PVC insulated, extruded PVC inner sheathed, armoured, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554 part 1 minimum 2.5 sqmm for signals and 4 sqmm for CT with multistrand copper conductor
1.14	Terminal Blocks to be used by the vendor	Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit.
1.14.1	Essential provision for CT terminals	Sliding link type disconnecting terminal block screwdriver operated stud type with facility for CT terminal shorting material of housing melamine/ Nylon66
1.15.	Painting of WTI box	
1.15.1	Surface preparation	By 7 tank pretreatment process or shot blasting method
1.15.2	Finish on internal / external surfaces	Polyurethene based painting, min. Dry film thickness 80 microns
1.15.3	Insulating support material for base plate for	Bakelite shall not be used as a base plate for mounting any components, insulating material non hygroscopic insulating material like FRP shall be used.

	mounting components	
1.16	Minimum Protective devices on Transformer	
1.16.1	Surge Arrestor (Applicable for Cast Resin Transformers)	Required, Connected on Transformer Primary side on top of core coil assembly on all three phases
1.16.1.1	Type	Metal oxide
1.16.1.2	Housing	Polymeric preferable
1.16.1.3	Rating	9 KV.
1.16.1.4	Continuous operating voltage , kV rms	6.35
1.16.1.5	Maximum Continuous operating voltage, kV rms	7.65
10.16.1.6	Nominal Discharge Current, kA peak	5
1.16.1.7	Energy Absorption kJ/kV	Greater than 2.5
1.16.1.8	Creepage factor	31 mm /kV
1.16.1.9	Reference std	IS 3070 part 3 and IEC 99-4
1.16.2	Winding Temperature scanner	Required
1.16.2.1	No of RTD inputs	Four (Three for windings, One shall be spare)
1.16.2.1.1	Location of winding RTD	At location of winding where maximum temperature is expected.
1.16.2.2	No of potential free trip contacts	Two , 1 Trip contact to be wired to SCADA by PSS vendor
1.16.2.3	No of potential free Alarm contacts	Two, 1 Trip contact to be wired to SCADA by PSS vendor
1.16.2.4	Output Port for data transfer	4-20mA output’s
1.16.2.5	Auxiliary supply	240 V AC, 1 phase, 50 Hz. Tapped from LV side busbar through a MCB located inside box
1.16.2.6	Winding Temperature Scanner terminal Box	Required with RS485 Port for integrating with FRTU
1.16.2.6.1	Size	As per Manufacturer’s Standard , to be mounted on HV compartment.

1.16.2.6.2	Fixing of instrument within box	On base plate
1.16.2.6.3	Fixing of terminals within the box	On C channel available with the terminals
1.17	**Fitting and accessories**	
1.17.1	Rating & Diagram plate	Required
1.17.1.1	Material	Anodized aluminum 16SWG
1.17.1.2	Background	SATIN SILVER
1.17.1.3	Letters, diagram & border	Black
1.17.1.4	Process	Etching
1.17.1.5	Name plate details	
	Following details shall be provided on rating and diagram plate as a minimum	
	· Type of transformer i.e Cast Resin transformer etc. with winding material	
	· standard to which it is manufactured	
	· manufacturer's name;	
	· transformer serial number;	
	· month and year of manufacture	
	· rated frequency in Hz	
	· rated voltages in kV	
	· number of phases	
	· rated power in kVA	
	· type of cooling	
	· rated currents in A	
	· vector group symbol	
	· ***1.2/50μ***s wave impulse voltage withstand level in kV	
	· power frequency withstand voltage in kV	
	· impedance voltage at rated current and frequency in	
	· percentage at principal, minimum and maximum tap at highest temperature	
	· load loss at rated current at highest temperature	
	· no-load loss at rated voltage and frequency	
	· auxiliary loss	
	· continuous ambient temperature at which ratings apply	
	· winding connection diagram with taps and table of tapping voltage, current and power	
	· transport weight of transformer	
	· weight of core and windings	
	· weight of enclosure and fittings total weight	
	· tapping details	
	· phase CT details	
	· Class of insulation	
	· IP protection rating of the enclosure	
	· name of the purchaser	
	• Guarantee period	
1.17.2	Detachable Bi-directional flat Roller Assembly	Required

1.17.2.1	Roller center to center distance	Minimum 900 mm on the side of HV and LV termination Maximum 800 mm on the other side (perpendicular to HV, LV termination).
1.17.2.2	Essential provision	Roller dia. 150 mm min., roller to be fixed in such a way so that the lowermost part of the skid is above ground by at least 100 mm when the transformer is installed on roller.
1.17.3	Earthing pad on enclosure for transformer earthing complete with Stainless Steel nut, bolt, washers, spring washers etc	Required with identification plate on outside of enclosure.
1.17.4	Core, Frame to tank Earthing	NA
1.17.5	Off Circuit tapping link	Required
1.17.6	Tap link position plate	NA
1.17.7	Danger plate made of Anodized aluminum with white letters on red background on HV and LV side	
1.17.8	Skid with Haulage lugs	Required
1.17.9	Lifting lugs for complete	Required
	transformer as well as Enclosure	
1.17.9.1	Essential provision for lifting lugs	Lifting lugs for core coil assembly shall be provided in such a way that the weight shall not come on canopy while lifting. Lifting lugs for canopy/ enclosure shall be provided in such a way that the weight shall not come on canopy while lifting , it shall be born by supporting members.
1.17.10	Caution Plate for tap links	Required
1.17.11	Ventilation louvers with stainless steel wire mesh and rain water guard	Required as per Manufacturer’s design, but it is to be provided minimum required to prevent ingress of excessive dust.
1.17.12	Surge Arrestor & its Grounding bushing	Required
1.17.12.1	Essential provision	Surge arrestor shall be erected vertically in such a way that the surge arrestor can be removed at site without removing HV cable lug. Surge arrestor shall not be used for any kind of support. Surge arrestor

		grounding strip to be routed to the surge arrester grounding bushing near bottom of enclosure with proper support. Surge arrestor grounding bushing shall be identified by identification plate on outside of enclosure. Surge arrestor grounding bushing shall be supplied with all hardware to readily connect purchaser's ground lead.
1.17.13	LV additional neutral earthing bushing	Required
1.17.13 .1	Essential provision	Busbar connecting the neutral to additional neutral bushing shall be properly supported and additional neutral bushing shall be identified by identification plate on outside of enclosure. Additional neutral bushing shall be supplied with all hardware to readily connect purchaser's ground lead.
1.17.14	Winding temperature scanner	Required
1.17.15	RTD in Winding and near top of enclosure.	Required
1.17.16	Space heater inside enclosure	Thermostatically controlled space heater inside enclosure required, supply of space hater from feeder pillar through MCB fixed properly inside enclosure.
1.17.1	Mounting of space heater	By suitable spacers so that heater does not come in contact with panel wall directly.
1.17.17	Earthing link	Across all gasketted joints in the
		enclosure body.
1.18.2.	Limiting Dimensions of Cast Resin Transformers	Dimensions indicated are maximum. Manufacturer shall try the best design for optimizing the dimensions further.

	VACUUM CAST DRY TRANSFORMER		
S. No .	**Descripti on**	**UNI T**	**Parameter**
1	RATING		**315 KVA**
2	General Description		Dry Type Transforme r
3	Reference Standard		IS 11171 & IEC 60076-11
4	Installation		Outdoor
5	Duty		Continuous
6	Application		Distributio n Transforme r
7	Altitude	m	Less than / equal to 1000 m
8	Rated Power (based on AN Cooling)	kVA	315

9	Rated No-Load Voltage Ratio (HV / LV)	kV	11 / 0.433
10	Rated Frequency	Hz	50
11	Number of Phases	Nos.	3
12	Material of Winding (HV / LV)		CU / CU
13	Vector Group		Dyn11
14	Connection (HV / LV)		Delta / Star
15	Tapping		Off Circuit
16	Type of Tap Changer		Off Circuit Bolted Links
17	Tapping Range/Tap step		+5% to -5% in steps of 2.5%
18	No. of Steps	Nos.	-1
19	For HV Variation / LV Variation		HV Variation
20	Class of Insulation (HV / LV)	Class	H / H
21	Method of Cooling		AN
22	Avg. Temp. Rise of Winding	Deg. C	115 / 115
23	Ambient Temp. (Max. / Mini. / Year / Day)	Deg. C	50 / -5 / 32 / 40
24	No-Load Loss at Rated Voltage & Frequency (+15% of IS Tol.)	kW	**0.8**
25	Full-Load Loss at Rated Current, at 75 Deg. C & at Principal	kW	**2.6**
	Tap (+15% of IS Tol.)		
26	Total Loss at Rated Voltage at Principal Tapping, Rated Frequency, at 75 Deg. C & at 100% load (+10% of IS Tol.)	kW	**3.4**
27	% Impedance at Rated Current, at 75 Deg. C & at Principal Tap (±10% of IS Tol.)	%	**4**
	A. Reactance	%	3.91
	B.Resistance	%	0.83
28	No-Load Current at Rated Voltage & Frequency (as % of F.L.R.C.)(+30% IS Tol.)	%	2
29	Efficiencies at 75 Deg. C at Unity Power Factor (Reference vaule)		
	a) At Full Load	%	98.93
	b) At 3/4 Full Load	%	99.05
	c) At 1/2 Full Load	%	99.09
30	Regulation at Full Load at 75 Deg. C		
	a) At Unity Power Factor	%	0.9
	b) At 0.8 Power Factor (Lagging)	%	3.02
31	BIL (Insulation Level) :		
32	Full Wave Lightning Impulse Withstand Voltage (HV / LV)	kV peak	75 / -
33	Separate Source Power-Frequency Voltage Withstand (HV / LV)	kV rms	28/03
34	Enclosure		
35	Degree of protection of Enclosure	IP	IP44
36	Termination Arrangements		
37	HV		Cable box
38	LV		Cable box

39	Orientation between HV & LV	Deg.	180
40	Weights (Approx.)		
	Core & Winding	Kg.	1350
	Enclosure & Fittings	Kg.	650
	Total Weight	Kg.	2000
41	Over-all Dimensions (Approx)		
	Length	mm	1800
	Breadth	mm	2050
	Height (With base channel)	mm	1850
40	Fittings / Accessories		Rating & Diagram plate, Base Channel, Earthing terminals, Lifting lugs & WTI Scanner with 3 PT-100 Sensors
41	List of Tests to be conducted at Manufacturer's Works		Routine Test According to IS 11171
42	Noise Level when measured at 1 Meter Distance	dB	Noise level values shall be as per NEMA TR-1

Dry type Transformers: 500 KVA			
S. No.	**Description**	**UNIT**	**Parameter**
1	Name of Manufacturer		
2	General Description		Dry Type Transformer
3	Reference Standard		IS 11171 & IEC 60076-11
4	Installation		Outdoor
5	Duty		Continuous
6	Application		Distribution Transformer
7	Altitude	m	Less than / equal to 1000 m
8	Rated Power (based on AN Cooling)	kVA	500
9	Rated No-Load Voltage Ratio (HV / LV)	kV	11 / 0.433

10	Rated Frequency	Hz	50
11	Number of Phases	Nos.	3
12	Material of Winding (HV / LV)		CU / CU
13	Vector Group		Dyn11
14	Connection (HV / LV)		Delta / Star
15	Tapping		Off Circuit
16	Type of Tap Changer		Off Circuit Bolted Links
17	Tapping Range/Tap step		+5% to -5% in steps of 2.5%
18	No. of Steps	Nos.	-1
19	For HV Variation/ LV Variation		HV Variation
20	Class of Insulation (HV/ LV)	Class	H / H
21	Method of Cooling		AN
22	Avg. Temp. Rise of Winding	Deg. C	115 / 115
23	Ambient Temp. (Max./ Mini./ Year / Day)	Deg. C	50 / -5 / 32 / 40
24	No-Load Loss at Rated Voltage & Frequency (+15% of IS Tol.)	kW	**1.1**
25	Full-Load Loss at Rated Current, at 75 Deg. C &at Principal Tap (+15% of IS Tol.)	kW	**4.2**
26	Total Loss at Rated Voltage at Principal Tapping, Rated Frequency, at 75 Deg. C & at 100% load (+10% of IS Tol.)	kW	**5.3**
27	% Impedance at Rated Current, at 75 Deg. C & at Principal Tap (±10% of IS Tol.)	%	**4**
	A. Reactance	%	3.91
	B. Resistance	%	0.84
28	No-Load Current at Rated Voltage & Frequency (as % of F.L.R.C.)(+30% IS Tol.)	%	2
29	Efficiencies at 75 Deg. C at Unity Power Factor (Reference vaule)		
	a) At Full Load	%	98.95
	b) At 3/4 Full Load	%	99.09
	c) At 1/2 Full Load	%	99.15
30	Regulation at Full Load at 75 Deg. C		
	a) At Unity Power Factor	%	0.92
	b) At 0.8 Power Factor (Lagging)	%	3.03
31	BIL (Insulation Level) :		
32	Full Wave Lightning Impulse Withstand Voltage (HV / LV)	kV peak	75
33	Separate Source Power-Frequency Voltage Withstand (HV / LV)	kV rms	28/03
34	Enclosure		
35	Degree of protection of Enclosure	IP	IP44
36	Termination Arrangements		
37	HV		Cable box
38	LV		Bus duct
39	Orientation between HV & LV	Deg.	180
40	Weights (Approx.)		
	Core & Winding	Kg.	1750
	Enclosure & Fittings	Kg.	750

	Total Weight	Kg.	2500
41	Over-all Dimensions (Approx)		
	Length	mm	2000
	Breadth	mm	2050
	Height (With base channel)	mm	1850
40	Fittings / Accessories		Rating & Diagram plate, Base Channel, Earthing terminals, Lifting lugs & WTI Scanner with 3 PT-100 Sensors
41	List of Tests to be conducted at Manufacturer's Works		Routine Test According to IS 11171
42	Noise Level when measured at 1 Meter Distance	dB	Noise level values shall be as per NEMA TR-1

Technical Particulars of Vacuum Cast Coil (VCC)
Dry type Transformers

S. No.	Description	UNIT	Parameter
1	RATING		**630 KVA**
2	General Description		Dry Type Transformer
3	Reference Standard		IS 11171 & IEC 60076-11
4	Installation		Outdoor
5	Duty		Continuous
6	Application		Distribution Transformer
7	Altitude	m	Less than / equal to 1000 m
8	Rated Power (based on AN Cooling)	kVA	630
9	Rated No-Load Voltage Ratio (HV / LV)	kV	11 / 0.433
10	Rated Frequency	Hz	50
11	Number of Phases	Nos.	3
12	Material of Winding (HV / LV)		CU / CU
13	Vector Group		Dyn11
14	Connection (HV / LV)		Delta / Star
15	Tapping		Off Circuit
16	Type of Tap Changer		Off Circuit Bolted Links

17	Tapping Range/Tap step		+5% to -5% in steps of 2.5%
18	No. of Steps	Nos.	-1
19	For HV Variation / LV Variation		HV Variation
20	Class of Insulation (HV / LV)	Class	H / H
21	Method of Cooling		AN
22	Avg. Temp. Rise of Winding	Deg.C	115 / 115
23	Ambient Temp. (Max. / Mini. / Year / Day)	Deg.C	50 / -5 / 32 / 40
24	No-Load Loss at Rated Voltage & Frequency (+15% of IS Tol.)	kW	**1.3**
25	Full-Load Loss at Rated Current, at 75 Deg. C & at Principal Tap (+15% of IS Tol.)	kW	**6.1**
26	Total Loss at Rated Voltage at Principal Tapping, Rated Frequency, at 75 Deg. C & at 100% load (+10% of IS Tol.)	kW	**7.4**
27	% Impedance at Rated Current, at 75 Deg. C & at Principal Tap (±10% of IS Tol.)	%	**4**
	A. Reactance	%	3.88
	B.Resistance	%	0.97
28	No-Load Current at Rated Voltage & Frequency (as % of F.L.R.C.)(+30% IS Tol.)	%	2
29	Efficiencies at 75 Deg. C at Unity Power Factor (Reference vaule)		
	a) At Full Load	%	98.84
	b) At 3/4 Full Load	%	99.01
	c) At 1/2 Full Load	%	99.11
30	Regulation at Full Load at 75 Deg. C		
	a) At Unity Power Factor	%	1.04
	b) At 0.8 Power Factor (Lagging)	%	3.12
31	BIL (Insulation Level) :		
32	Full Wave Lightning Impulse Withstand Voltage (HV / LV)	kV peak	75 / -
33	Separate Source Power-Frequency Voltage Withstand (HV / LV)	kV rms	28/03
34	Enclosure		
35	Degree of protection of Enclosure	IP	**IP44**
36	Termination Arrangements		
37	HV		Cable box
38	LV		Bus duct
39	Orientation between HV & LV	Deg.	180
40	Weights (Approx.)		
	Core & Winding	Kg.	1750
	Enclosure & Fittings	Kg.	800
	Total Weight	Kg.	2550
41	Over-all Dimensions (Approx)		
	Length	mm	**2000**
	Breadth	mm	**2050**

	Height (With base channel)	mm	**1850**
42	Fittings / Accessories		Rating & Diagram plate, Base Channel, Earthing terminals, Lifting lugs & WTI Scanner with 3 PT-100 Sensors
43	List of Tests to be conducted at Manufacturer's Works		Routine Test According to IS 11171
44	Noise Level when measured at 1 Meter Distance	dB	Noise level values shall be as per NEMA TR-1

2.37. Technical parameters to be monitored through SCADA from Remote.

- Transformer healthiness : Winding temperature
- Safety parameter breach / transformer door open

2.38. L.T. Panel

2.28.1 Technical parameters to be monitored from SCADA

- Feeder data : switch ON/OFF
- Energy consumption data
- System power quality (Power factor / THD content)
- Event recording

Make of the ACB– Schneider Masterpack NW/ABB Emax/Siemens 3WL

2.28.2 System: -

a) **Declared voltage:**– 3 Phase,400V (±6%) 50 Hz,
b) **Neutral**: – Solidly earthed at substation.
c) **Busbar** – Aluminum

2.28.3 General finish: - Tropical, totally enclosed, metal-clad, weather-proof, vermin and dust proof.

2.28.4 Construction:

Enclosure: - Dead Front type of enclosure shall be able to provide the degree of Protection IP:4X.

2.28.5 Circuit Ways:

INCOMER –ACB EDO type 50KA
O/G –MCCBs with LSIG protection

2.39. GENERAL CHARACTERISTICS OF ACB

2.39.1. Conformity with Standards

The air circuit-breakers used in low voltage installations are constructed and tested in accordance with the IEC 947/IS 947 Standards and respect the following EC directives:
– "Low voltage Directive" (LVD) No. 73/23 EEC
– "Electromagnetic compatibility Directive" (EMC) No.89/336 EEC

2.39.2. Functional characteristics

– The circuit-breakers must have a rated service voltage of 690 V AC and a rated insulation voltage of 1000 V.
– The circuit-breakers must have a rated impulse withstand voltage of 8 kV.
– The rated uninterrupted current must be between 800 and 6300 A with the possibility of selection of ratings from 400 A.

– Different versions shall be available with rated ultimate short circuit breaking capacity(Icu) from 50kA at 415V and shall have rated short circuit service breaking capacity(Ics) equals to Icu.
– Different versions of circuit-breakers shall be available with rated short-time withstand current (Icw -1 sec) for 50kA for 1sec in category B.
– It must be possible to supply the circuit-breakers both from the top and bottom terminals without derating their performances and without jeopardizing their functionality.
– The mechanical life must be at least 12000 operations, without the need for maintenance of the contacts and arcing chambers.
– The electrical life at a voltage of 440 V AC must be and without the need for maintenance of the contacts and arcing chambers:

– at least 9000 operations up to 2000 A

– at least 6000 operations up to 3200 A

these values are intended to be valid only for CAT B circuit-breakers.

2.39.3. Environmental characteristics

– Operating temperature: -25 °C... +55 °C (-13 °F...158 °F)
– Storage temperature: -40 °C...+70 °C (-40 °F...158 °F)
– Altitude: operation without derating up to 2000 m a.s.l. (6600 ft), and with derating up to 5000 m a.s.l. (16500 ft)
– Suitability for use in a hot-humid environment. With regard to this, the circuit-breakers must undergo a topicalization process which makes them suitable for use in a hot-humid environment, as established by the prescriptions of the main shipping registers and in accordance with the international IEC 60068-2-30 Standards.

2.39.4. Construction characteristics

– The circuit-breaker structure must be made of steel sheet.
– There must be total segregation between power and front shield, using double insulation where suitable so as to guarantee maximum operator safety.
– Total segregation between the phases must be guaranteed for safety reasons.
– The main contacts must be separate from the arcing contacts in cat. B circuit-breakers only.
– It must be possible to inspect easily the arcing chambers easily and to check main contact wear with the circuit-breaker racked-out, by removing the arcing chambers.
– All the circuit-breakers in the range have the same height and depth with the aim of standardising the supporting structures of the switchgear and the switchgear itself as far as possible.
– The circuit-breakers must indicate the precise position of the main contacts and the condition of springs charged/discharged on the front, by means of certain and reliable signals.
– The operating mechanism must be of the stored energy type with operation by means of precharged springs fitted with anti-pumping device. The springs are charged manually by activating the front lever, or by means of a geared motor, supplied on request.
– The whole range of air circuit-breakers must be fitted with electronic protection releases. It must be allowed the interchangeability of protection releases from skilled personnel.
– ACBs shall have minimum watt losses in order to restrict temperature rise inside the breaker.
- The 4 pole ACB shall be with 100% neutral where ever specified. 50% neutral pole will not be acceptable.

2.39.5. RELEASES

1) Release (Protection functions)

– The release must not require auxiliary power supplies since the power is taken from the current transformers.
– The signals supplied by the release must not operate with power supply supplied by internal batteries. The basic version of the release must provide:
– protection against overload with trip with inverse long-time delay (L)

- protection against instantaneous short-circuit (I)
- Selective short-circuit (S)
- Earth fault (G)

The setting ranges shall be:

– Protection against overload (L)
Characteristic t=k/I2
Trip threshold I1= (0.4...1)xIn with timing adjustable from 3 to 144 sec. (value referred to a current equal to 3xI1)

– Protection against selective short-circuit (S)
Characteristics t=k and t=k/I2
Trip threshold I2= (1...10) xIn with timing adjustable from 0.1 to 0.8 sec.
(value referred to a current equal to 10xIn for curves at t=k/I2 and referred to currents >I2 for curves at t=K)

– Protection against instantaneous short-circuit (I)
Trip threshold I3= (1,5...15) xIn

– Protection against earth fault (G)
Characteristics t=k and t=k/I2
Trip threshold I4= (0.2...1) xIn with timing adjustable from 0.1 to 0.8 sec. (value referred to a current equal to 4xI4)
– Neutral protection level:
50% - 100% - 200% - excluded

All the protection functions except protection against overload must be excludable
User interface and signalling LEDs

- The release shall allow parameterisation of the trip thresholds and timing by means of dipswitches.
- alarm and trip signalling for all the protection functions by means of LEDs located on the release shall be available. No batteries or external power supplies shall be necessary for powering these indicators. The indication shall be available for not less than 48 hours after the trip, even with the circuit-breaker open
- An alarm shall indicate by means of LEDs located on the release the disconnection of opening solenoid and current transformers. A trip shall also occur, after a short time delay, when the disconnection is detected.
- It shall be possible, with the aid of external devices, to read currents, and information on last 10 trips (currents, protection tripped) occoured to the unit.

2.40. General aspects of MCCB with Thermal Base release

Standards conformity

Molded case circuit-breakers (MCCB) installed in the low voltage plant must be designed, manufactured and tested according with the international standards IEC 60947-1, IEC 60947-2, IEC 60947-3, IEC 60947-4-1, IEC 61000 or with the corresponding harmonized national standards, the CE “Low Voltage Directives” (LVD) n° 73/23 EEC and “Electromagnetic Compatibility Directive” (EMC) n° 89/336 EEC.

2.40.1. Molded case circuit breakers functional features

- Rated insulation voltage (Ui) for MCCB shall be 690 V AC or more.
- Rated Impulse withstand voltage (Uimp) for mccb’s shall be 8kV.
- Rated service voltage(Ue) for the moulded case circuit breaker shall be standard as 690V, however performance on short circuit level shall be consider based on system operating voltage.
- Rated uninterrupted current between varying from 160 and 800 A with trip units settings starting from 1 A

- Rated short circuit breaking capacity shall be considered as per bill of material and the rated service short circuit breaking capacity (Ics) shall be in 50-100% of rated ultimate short circuit breaking capacity (Icu).
- According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers must be category B, however other small rating category A shall be confirmed.
- MCCBs must be available with different ultimate short breaking capacities between 16kA and 200kA @ 380/415 V AC.
- Both line up and line down supplying must be possible without decreasing MCCBs performances or functionality
- MCCB shall confirm to current limiting type and this feature shall ensure less amount of let through energy at the time of opening on fault. The mccb shall have opening time less then 10msec for current rating upto 800A
- A test bottom for the correct functionality checking (moving contacts opening) must be place in front of the breaker.

2.40.2. Ambient characteristics

- Operating temperature: -25 °C .. +70 °C (ambient temperature)
- Storage temperature: -40 °C .. +70 °C (ambient temperature)
- Reference temperature for setting the thermal element of the thermo magnetic trip unit: +40 °C
- Maximum relative humidity: 98%
- Maximum altitude: 2000 m above sea level, 5000 m above sea level with derating
- Suitability for being used in hot-humid places.

2.40.3. Construction characteristics

- The range of moulded case circuit-breakers must cover a range of rated uninterrupted currents from 160 to 800 A.
- By means of the double insulation technique, moulded case circuit-breakers must guarantee complete separation between the power circuits and the auxiliary circuits.
- Moulded case circuit-breakers must have an operating lever which always indicates the exact position of the circuit-breaker contacts (positive operation), by means of safe and reliable signals (I= closed, O= open, yellow-green line= open due to trip unit).
- Moulded case circuit-breakers must be suitable for isolation in compliance with § 7.2.7 of the IEC 60947-2 Standard. This indication must be clearly and indelibly marked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in a position where it is visible with the circuit-breaker installed.
- Moulded case circuit-breakers with rated uninterrupted current up to 250 A shall have a 45 mm high face which makes them suitable for installation on modular panels.
- For the front parts of the circuit-breakers the degree of protection of at least IP20 (excluding the terminals) must be guaranteed.

2.40.4. Protection trip units

2.40.4.1. Thermomagnetic overcurrent trip units

- Thermomagnetic trip units shall be fitted with protection threshold against overload (whose thermal element must consist of a bimetal) and with protection threshold against short circuit.
- The protection threshold against overload must be continuously adjustable starting from 0.7 times the rated current of the trip unit and up to its rated value.
- The reference temperature for setting the thermal element of the protection trip unit is 40°C. The temperature performance of the trip unit must be indicated as the temperature varies.
- The protection threshold against short-circuit can be either the fixed or adjustable type with continuity from 5 and up to 10 times the rated current of the trip unit. For current rating upto 250Amps, magnetic threshold be minimum of 10 times of rated current.

2.40.4.2. Magnetic only overcurrent trip units

- The overcurrent trip units with magnetic only threshold shall be suitable for protection against short-circuit.

- The adjustable magnetic only trip units (suitable for motor protection) shall only be available in the three-pole version, whereas those with fixed threshold shall also be available in the four-pole version.
- The adjustable magnetic only trip units must be available for circuit-breakers up to 250 A with an upper magnetic threshold equal to Im =3200

OR

2.41. General aspects of MCCB with microprocessor based release

Standards conformity

Molded case circuit-breakers (MCCB) installed in the low voltage plant must be designed, manufactured and tested according with the international standards IEC 60947-1, IEC 60947-2, IEC 60947-3, IEC 60947-4-1, IEC 61000 or with the corresponding harmonized national standards, the CE "Low Voltage Directives" (LVD) n° 73/23 EEC and "Electromagnetic Compatibility Directive" (EMC) n° 89/336 EEC.

2.41.1. Molded case circuit breakers functional features

- Rated insulation voltage (Ui) for MCCB shall be 800 VAC or more.
- Rated Impulse withstand voltage (Uimp) for mccb's shall be 8kV.
- Rated service voltage(Ue) for the moulded case circuit breaker shall be standard as 690V, however performance on short circuit level shall be consider based on system operating voltage.
- Rated uninterrupted current between varying from 160 and 3200 A with trip units settings starting from 10A
- Rated short circuit breaking capacity shall be considered as per bill of material and the rated service short circuit breaking capacity (Ics) shall be in 100% of rated ultimate short circuit breaking capacity (Icu). (Ics=Icu)
- According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers must be category B, however other small rating category A shall be confirmed.
- MCCBs must be available with different ultimate short breaking capacities between 16kA and 200kA @ 380/415 V AC.
- Both line up and line down supplying must be possible without decreasing MCCBs performances or functionality
- MCCB shall confirms to current limiting type and this feature shall ensure less amount of let through energy at the time of opening on fault. The mccb shall have opening time less then 10msec for current rating upto 630A, and less them 15msec for current rating upto 1600Amps.
- A test bottom for the correct functionality checking (moving contacts opening) must be place in front of the breaker.

2.41.2. Ambient characteristics

- Operating temperature: -25 °C . +70 °C (ambient temperature)
- Storage temperature: -40 °C .. +70 °C (ambient temperature)
- Maximum relative humidity: 98%
- Maximum altitude: 2000 m above sea level, 5000 m above sea level with derating
- Suitability for being used in hot-humid places.
- Circuit-breakers fitted with electronic trip units must comply with the prescriptions of the International Standards on electromagnetic compatibility.

2.41.3. Construction characteristics

- The range of moulded case circuit-breakers must cover a range of rated uninterrupted currents from 160 to 3200 A.
- By means of the double insulation technique, moulded case circuit-breakers must guarantee complete separation between the power circuits and the auxiliary circuits.
- Moulded case circuit-breakers must have an operating lever which always indicates the exact position of the circuit-breaker contacts (positive operation), by means of safe and reliable signals (I= closed, O= open, yellow-green line= open due to trip unit).
- Moulded case circuit-breakers must be suitable for isolation in compliance with § 7.2.7 of the IEC 60947-2 Standard. This indication must be clearly and indelibly marked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in a position where it is visible with the circuit-breaker installed.

- Moulded case circuit-breakers with rated uninterrupted current up to 250 A shall have a 45mm high face which makes them suitable for installation on modular panels.
- The same depth must be guaranteed from 320 A up to 1000 A, in order to standardize both switchboards and their supports.
- All the installation positions must be possible without jeopardizing the function of the apparatus. Starting from 630 A up to 1600 A the withdrawable version shall be mounted and operated horizontally.
- For the front parts of the circuit-breakers the degree of protection of at least IP20 (excluding the terminals) must be guaranteed.

2.41.4. Protection trip units

- From the 250 A size circuit-breakers, the trip unit must be interchangeable.

Electronic overcurrent releases

- The electronic overcurrent trip units must be self-supplied and must be able to guarantee correct operation of the protection functions even in the presence of a single phase supplied with a current value equal to 20% of the phase current.
- They must be unaffected by electromagnetic interference in compliance with the EMC directive on the matter.
- The basic version shall be fitted with protection functions against overload (function L) and against short-circuit. The latter function can either be of the instantaneous type (function I) or, alternatively, with intentional delay (function S). The function of protection against short circuit must be excludable. A basic version shall also be provided with only the protection threshold against instantaneous short-circuit which cannot be excluded.
- The minimum performances of the protection functions of the electronic protection trip unit for distribution, where present, must be:

    1. Function **L**: adjustable trip threshold I1= (0.4...1) x In, trip curves for the basic version with times from 3 to 12 seconds – 2 different trip curves - (at 6 times the set threshold). Cannot be excluded.
    2. Function **S**: adjustable trip threshold I2= (1...10) x In, trip curves for the basic version with times from 0.1 to 0.25 seconds – 2 different trip curves – (at 8 times the rated current of the trip unit.Can be excluded.
    3. Function **I**: adjustable trip threshold I3= (1...10) x In for the basic version (instantaneous trip). Can be excluded.

- All the protection functions must be characterized by threshold and time tolerances according to the International Standards.
- The size of the current sensors must be a minimum of 10 A to a maximum of 3200 A so as to cover the widest possible current range.
- The LT and HT Switchgear used in the Package Substation should be of same make.

TYPE / ROUTINE TEST ON PACKAGE SUBSTATION

2.42. TYPE TESTS FOR THE PACKAGE SUBSTATION:

2.42.1. The Package Substations offered must be type tested as per IEC 61330/62271-202. The copy of type test summary should be submitted along with the tender. CSS manufactured in JV consortium shall not be accepted.

2.42.2. **Routine Tests**: The routine tests shall be made on each complete prefabricated substation.

a) Voltage tests on auxiliary circuit.
b) Functional test.
c) Verification of complete wiring.

2.42.3. **Test Witness:** Routine test shall be performed in presence of USCL's representative if

so desired by the USCL. The Contractor shall give at least fifteen (15) days advance notice of the date when the tests are to be carried out.

2.42.4. Test Certificates:

Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of the Owner.

2.43. Performance Certificate to Qualify Technical Bid:

Packaged Substation Enclosure:

- Tests to verify the degree of protection.
- Arcing due to internal fault
- Test to prove enclosure class - Temperature rise of the transformer inside the
- enclosure.
- Short circuit test to prove the capability of the earthing circuits to be subjected to the rated peak and the rated short time withstand currents.
- Tests to verify the withstand of the enclosure of the prefabricated substation against mechanical stress.

TECHNICAL SPECIFICATION FOR 11 kV XLPE 3 CORE UG CABLE

1.0 SCOPE:

The scope of this specification covers the design, manufacture, stage inspection at works, inspection and testing the finished 11 kV Three Core, stranded, compact circular, Aluminum, water blocked conductor, conductor screened with extruded semiconducting compound, water tree retardant (TR) XLPE insulated, insulation screened with extruded semi conducting compound with copper as metallic part, dry cured & dry cooled using triple extrusion through common triple cross head (single point triple extrusion), in combination with water blocking tape , cores laid up with non-hygroscopic fillers including Centre filler, PVC ST2 inner sheathed, , galvanized steel strip/GI wire armored and overall black PE ST 7 sheathed cable conforming to IS:7098 (Part-2) 1985/IEC with latest amendments and as per specification detailed.

2.0 RATED VOLTAGE:

The rated voltage of the cable shall be 11 kV AC with the highest system voltage of 12 kV between phases of the effectively earthed three-phase transmission system.

3.0 APPLICABLE STANDARDS:

Unless otherwise stipulated in the specifications, the latest version of the following Standards shall be applicable:

3.1.1 IS 7098 (Part 2) – Cross-linked Polyethylene (XLPE) insulation for Cables
3.1.2 IS 8130 – Conductors for insulated electrical cables and flexible cords
3.1.3 IS 10810 (series) – Methods of tests for cables
3.1.4 IEC 60502-2 for properties of PE ST 7
3.1.5 IS 3975-Specification for mild steel wires, strips and tapes for armouring of cables
3.1.6 IS 5831 – Specification for PVC insulation sheath for electric cables
3.1.7 IS 10462 – Fictitious calculation method for determination of dimensions of protective coverings of cables Part 1 - Elastomeric and thermoplastic insulated cables

CONSTRUCTION:

4.0 **Conductor:** The cable conductor shall be made from H2 Grade Aluminum to form compacted stranded circular conductor having resistance within the limits specified in IS: 8130/1984 and any amendment thereof. The wires shall be laid up together with a suitable right hand lay.
The conductor shall be water blocked using semi conducting **water swellable** tape over compacted conductor and shall pass the water penetration test as per IEC-60502-2.

4.1 **Conductor Screen:** The conductor screen shall be extruded semiconductor XLPE, extruded by triple extrusion method in the same operation as along with the insulation and insulation screen.,

the IS: 7098 Part 2, The semiconductor shall be suitable for operating temperature of the cable and shall be compatible with the insulation.

4.2 **Insulation:** The insulation shall be water Tree Retardant (TR) Cross Linked Polyethylene (XLPE) insulation applied by extrusion and shall conform to the following requirements:

S. No.	**Properties**	**Requirements**
1.	Tensile Strength	12.5N/mm², Min.
2.	Elongation to break	200 percent, Min
3.	Aging in air oven:	
	d) Treatment: Temperature:	135 ±3°C
	Duration:	7 days
	e) Tensile Strength variation:	±25 percent, Max
	f) Elongation variation:	±25 percent, Max
4.	Hot set:	
	d) Treatment: Temperature:	200±3°C
	Time under load	15 min
	Mechanical stress	20N/cm²
	e) Elongation under load	175 percent, Max
	Permanent elongation (set)	
	f) after cooling	15 percent, Max
5.	Shrinkage:	
	b) Treatment: Temperature	130±3°C
	Duration	1 hour
	b) Shrinkage	4 percent, Max
6.	Water absorption	
	(Gravimetric):	85±2°C
	c) Treatment: Temperature:	14 days
	Duration:	1 mg/cm², Max
	d) Water absorbed	
7.	Volume Resistivity	
	c) at 27°C	$1x10^{14}$ ohm-cm, Min
	d) at 90°C	$1x10^{12}$ ohm-cm, Min
8.	Thermal Resistivity	350 degrees C cm/W
9.	Power factor at maximum conductor temperature	0.008
10.	Dielectric strength	22 kV/mm

4.3 The XLPE insulation should be suitable for specified system voltage. The extrusion should be a True triple extrusion with thickness and concentricity control of all the three layers.

4.4 The curing process of XLPE insulation should be dry cured and dry cooled. The manufacturing process shall ensure that insulations shall be free from voids. Minimum degree of crosslinking shall be 75%.

4.5 The insulation shall withstand mechanical and thermal stresses under steady state and transient operating conditions.

4.6 The extrusion method should give very smooth interface between semi-conducting screen and insulation.

4.7 The insulation of the cable shall be compatible with the continuous conductor temperature of 90°C, short time overload temperature of 130°C & short circuit temperature of 250°C.

4.8 The average thickness of the insulation shall not be less than as specified in IS: 7098-II. The insulation shall be so applied that it fits closely on conductor screening and it shall be possible to remove it without damaging the conductor.

4.9 The eccentricity of the insulation shall be less than 10% and ovality shall be less than 5%.

1. **Insulation Screen:** To confine electrical field to the insulation, semi-conducting XLPE shield shall be put over the insulation. The insulation shield shall be extruded in the same operation as the conductor shield and the insulation by triple extrusion and shall be as IS: 7098 Part 2,Copper Tape of 10% Overlap, water blocking tape shall be applied over the semiconducting compound.

2. **Inner Sheath:** The sheath shall be extruded PVC Type ST2, suitable to withstand the site conditions and the desired temperature. It should be of adequate thickness as specified in IS: 7098-II, consistent quality and free from all defects.

Armour: Armoring shall be applied over the inner sheath with single galvanized steel flat strips / GI Wires complying with the requirements of IS: 3975/1979 for 3- Core Cables

Minimum armour coverage shall be 90%. A joint in any wire shall be at least 300 mm from the nearest joint in any other armour wire in the complete cable and shall be as per IS: 7098 Part 2, IS: 3975, IEC:60502 Part – 2, BS: 6622, BS: 7835.

5. Outer Sheath: Extruded HDPE ST-7 outer sheath as per IEC 60502-2, for HV cables. The outer sheath shall be applied over armoring with suitable additives to prevent attack by rodents and termites. Outer sheathing shall be designed to offer high degree of mechanical protection and shall also be heat, oils, chemicals, abrasion and weather resistant. Common acids, alkalis, saline solutions etc., shall not have adverse effects on the sheathing material used.

The underground cables shall be manufactured to the highest quality, best workmanship with scientific material management and quality control. The manufacturer shall furnish the quality plan, giving in detail the quality control procedure/ management system.

The cable shall be suitable for laying in covered trenches and/or buried underground to meet the outdoor application purposes.

6.0 DESIGN CRITERIA:

6.1 The cables that are covered in these specifications are intended for use outdoor, under the climatic conditions and installation conditions described in the technical specification.

6.2 Any technical feature, not specifically mentioned here, but is necessary, for the good performance of the product, shall be incorporated in the design. Such features shall be clearly brought out under Technical deviations schedule only, in the offer made by the bidder, giving technical reasons, and justifying the need to incorporate these features.

6.3 For continuous operation of the cables, at specified rating, the maximum conductor temperature shall be limited to the permissible value as per the relevant standard, generally not exceeding 90°C under normal operation and 250°C under short – circuit conditions.

6.4 The materials used for outer sheaths shall be resistant to oils, acids and alkalis.

6.5 The cables shall have the mechanical strength required, during handling and laying.

6.6 The cables shall be designed to withstand the thermo-mechanical forces and electrical stresses during normal operation and transient conditions.

7 INNER SHEATH (COMMON COVERING ONLY FOR 3-CORE CABLES):

7.1 The laid-up cores shall be provided with PVC ST 2 inner sheath applied by extrusion. It shall be ensured that the shape is as circular as possible. The inner sheath shall be so applied that it fits closely on the laid-up cores and it shall be possible to remove it without damage to the insulation.

7.2 The thickness of the inner sheath (common covering) shall be as per IS 10462 (Part 1)

7.3 When one or more layers of binder tapes are applied over the laid-up cores, the thickness of such tapes shall not be construed as a part of inner sheath.

8 ARMOURING:

Armouring shall be applied over the inner sheath with galvanized steel flat strip/GI wire complying with the requirements of IS: 3975/1979 for 3-Core cables. The dimensions of the galvanized steel flat strips/GI wire shall be as specified in the IS: 7098/Part-II/1985.

9 OUTER SHEATH:

The outer sheath shall be applied by extrusion. It shall be applied over the armouring and shall consist of HDPE ST 7 compound, conforming to the requirements of IEC 60502-2 for lines and FR PVC ST2 for substation. The minimum thickness of the sheath shall be as per IS 10462 (Part 1).

10 IDENTIFICATION:

The outer sheath shall have the following information embossed or indented on it; the manufacturer's name or trade mark, the voltage grade, the year of manufacture. The identification shall repeat at every meter of the along the length of the cable. Outer sheath of cable shall be black in permanent colour.

11 INSPECTION AND QUALITY CONTROL:

The Bidder shall furnish a complete and detailed quality plan for the manufacturing process of the cable. All raw materials shall conform to relevant applicable standards and tested for compliance to quality and requirement.

The following type tests shall be conducted on the cable.

No.	**Test**	**Requirement**
	Tests on conductor ii) Resistance test	 IS:8130
	Tests for armoured wires and strips Test for thickness of insulation and sheath Physical tests for insulation: vi) Tensile strength and elongation at break vii) Aging in air oven viii) Hot test ix) Shrinkage test x) Water absorption (gravimetric)	975
	Physical tests for outer sheath viii) Tensile strength and elongation at break ix) Aging in air oven x) Shrinkage test xi) Hot deformation xii) Thermal Stability for FR ST 2 xiii) Carbon black content for PE ST 7 vii) Abrasion Resistance test for PE ST 7	IS: 5831 for FR PVC/ IEC 60502-2 for PE ST 7
	Partial discharge test	
	Bending test	
	Dielectric power factor test As a function of voltage As a function of temperature	
	Insulation resistance	

	(Volume resistivity) test	
	Heating cycle test	
	Impulse withstand test	
	High voltage test	
	Flammability test	
	Void & Contamination Test	IS 7098 (Part-3)
	Degree of Cross linking of XLPE	
	Wafer Boil Test	
	Oxygen Index and Temperature Index for FR PVC ST 2	

11.1 The following test shall be performed successively on the same test sample of completed cable, not less than 10 M in length between the test accessories:

11.1.1 Partial discharge test.
11.1.2 Bending test followed by partial discharge test.
11.1.3 Dielectric power factor as a function of voltage.
11.1.4 Dielectric power factor as a function of temperature.
11.1.5 Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests.
11.1.6 Impulse withstand test
11.1.7 High voltage test.

12 ACCEPTANCE TEST:

12.1.1 The sampling plan for acceptance test shall be as per IS 7098 part-II, Appendix „A".

12.2 The following shall constitute the acceptance test:

12.2.1 Conductor resistance test
12.2.2 Test for thickness of insulation
12.2.3 Test for thickness of inner and outer sheath
12.2.4 Hot-set test for insulation
12.2.5 Tensile strength and elongation at break test for insulation and outer sheath
12.2.6 Partial discharge test (on full drum length) - (shall be less than 2PC)
12.2.7 High voltage test
12.2.8 Insulation resistance (volume resistivity) test
12.2.9 Void & Contamination Test
12.2.10 Wafer Boil Test
12.2.11 Degree of Cross linking of XLPE
12.2.12 Oxygen and Temperature Index for FR PVC ST 2
12.2.13 Abrasion Resistance Test for PE ST 7
12.2.14 Carbon Black content for PE ST 7
12.2.15 Water penetration test as per IEC 60502-2

13 ROUTINE TEST:

13.1.1 The following shall constitute routine tests:
13.1.2 Conductor resistance test
13.1.3 Partial discharge test on full drum length
13.1.4 High voltage test

TECHNICAL SPECIFICATIONS FOR LT UPTO (1100 V) XLPE INSULATED UNDERGROUND CABLES

1.0 SCOPE:

1.1 The scope of this specification covers the design, manufacture inspection and testing the finished ISI marked LT (1100 volts, 31/2/4C x25 Sq.mm to 400 Sq.mm power cables stranded Aluminium / Copper conductor, XLPE Insulation, inner sheath must be extruded type of PVC ST2, aluminium flat strip armoured, Overall PVC Sheathed cable confirming to IS 7098/P1/88.

2.0 RATED VOLTAGE:

2.1 The rated voltage of the cable shall be 1100 Volts AC with the highest system voltage of 1100 Volts between phases of the effectively earthed three-phase transmission system.

2.2 The cables shall be capable of operating continuously under the system frequency variation of ± 3 Hz, voltage variation of ± 10% and a combine d frequency – voltage variation of ± 10%.

3.0 APPLICABLE STANDARDS:

3.1 Unless otherwise stipulated in the specifications, the latest version of the following Standards shall be applicable:

a. IS 7098 (Part 1)-Cross-linked Polyethylene insulation for Cables.
b. IS 8130-Conductors for insulated electrical cables and flexible cords.
c. IS 10810(series)-Methods of tests for cables.
d. IS 10418-Drums for electric cables.
e. IS 3975-Specification for mild steel wires, strips and tapes for armouring of cables.
f. IS 5831-Specification for PVC insulation sheath for electric cables.
g. IS 10462-Fictitious calculation method for determination of dimensions of protective coverings of cables Part 1 - Elastomeric and thermoplastic insulated cables.

SPECIFICATIONS OF FEEDER PILLARS:

Sub feeder pillar panels shall be suitable for AC 440 V, 50 HZ supply, fabricated with 14-gauge galvanised steel sheet duly pre-treated and pure polyester thick powder coated 80 micron thickness using Siemens gray colour shade no. RAL-7032 / any other colour if required by client. The feeder pillar shall be double door in cubical formation, compartmentalized in form with front open able doors. The door shall be provided with concealed hinges and with brazing wherever required to avoid deformation and shall be earthed. All the door shall have heavy duty door locks, and shall be sealed with neoprene gaskets. The feeder pillar shall be IP 55, outdoor type weather, dust and vermin proof having canopy type tapered roof self-standing type as per approved GA diagram. The feeder pillar shall have lifting hooks and base channel of size 50 x 40 x 6 mm. The feeder pillar shall be complete with bus bars, wiring, cabling of proper ratings (not less than 1.5 times the rating of respective switchgears, control gear etc.) for inter connection between switch gear, control gear, metering, safety relays, indicators etc. as per the approved single line diagram. The feeder pillar shall have proper arrangement for termination of all incoming and out goings cables. All the bus bars shall be supported on epoxy supports and shall be insulated with colour coded heat shrinkable sleeves. Feeder pillar shall be as per the space available at site. It shall have earthing bolts at both sides inter connected with 50x5 mm Al earthing bus along the width of feeder pillar. Note: -The GA drawing for panel should be approved by consultant / engineer in charge before fabrication. The feeder pillar shall have space and proper arrangements for installation of incoming and outgoing MCCBs with R, Y, B LED type indicating lamps. HRC fuse bases, MCBs etc. complete with interconnection provisions with providing wiring and bus bars with required hardware, sleeves, ferrules, supporters, locks etc. Panel shall have proper space and arrangements for termination of incomer loop in loop out cables, outgoing service cables, with proper offsets in bus bars for cable terminations. The feeder pillar should have anti-theft tamper proof feature to automatically send SMS alert if door opening is attempted by unauthorised person.

LED LIGHTING FIXTURE:

QUALITY CONTROL & TESTING INFRASTRUCTURE

The manufacturer should possess the all in-house testing facilities & equipment's carry out electrical, photometric & environment related measurements and tests as per BIS standards and shall provide calibration reports of the same.

INSPECTION & TESTING:

The supplier shall give the inspection notice before or at least 10 days prior to the last date of supply of material. The material will be dispatched by the supplier after inspection by the representative of USCL. The supplier is required to dispatch the material within 10 days from the date of acceptance of material. In case the time taken in dispatch the material exceeds 10 days, the excess period shall be counted for levy of penalty. **USCL's representative will visit the manufacturer's work and witness the tests as per specifications on each type of lighting fixtures as per the samples selected by USCL's representative.** The sample of the material may also be sent to the government approved **NABL laboratory** at the cost of supplier for any kind of specific test required by USCL. Supplier shall submit the schedule with date, time & venue of the inspection to USCL in writing for the inspection of the material. USCL is authorized to get the material tested from the approved laboratory at the supplier cost for any kind of specific test if required. The contractor needs to make arrangements for Factory Inspection at his own cost for Luminaires, Brackets. INSPECTION WILL BE CARRIED OUT AT MANUFACTURER PREMISISONLY. It will not be permitted at vendor's place.

WARRANTY:

The Lighting Fixtures should be supplied with 5 years Guarantee against any manufacturing defect and failure at site. In case of any failure of complete fixture or LED module or driver or any other part of fixture, same shall be replaced within two days.

TESTS REPORTS TO BE SUBMITTED BY CONTRACTOR ALONG WITH THE SAMPLE OF STREET LIGHT FIXTURE AS PER APPROVED MAKE & TENDER SPECIFICATIONS WITHIN 15 DAYS FROM THE RECIPT OF ORDER.

(i) The bidder shall submit the LM-80 test report of the offered lighting fixtures, confirming to the applicable IEC/PAS 62717 for LED Modules Performance and LM-79 confirming to the applicable IEC/PAS 62722-2-1 for LED Luminaries Performance/ USCL Specification, with the bid. The test report must clearly indicate model, Cat. No. and wattage of fixture.

(ii) TESTING PARAMETERS TO BE COVERED IN THE TEST REPORT: The LM-80 test report should cover the specifications of the offered equipments / items as per the applicable IEC/PAS 62717 for LED Modules Performance and LM-79 / IS 16105 test report should covered IEC/PAS 62722-2-1 for LED Luminaries Performance/ USCL Specification on the following parameters clearly (at standard 230 Volts +/- 10%, 50 Hz, AC power supply):

- Power Factor
- Luminous Efficacy (Lumens /watt) of the Lamp
- System lumen efficacy
- Colour Rendering Index (CRI)
- Colour Temperature of the Lamp
- Ingress Protection Level (IP Level)
- Power consumption of the Complete System.
- Electrical/ Insulation Resistance Test
- Electrical and Photometric Measurements Test Report (IES LM 79)
- LED Lumen Maintenance Test Report (IES LM 80)

LED STREET LIGHT LUMINAIRES:

1. CODES & STANDARDS: -

- IEC 60529 Classification of degree of protections provided by enclosures (IP Codes)
- EN 55015 / CISPR15 Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipment.
- IEC 62031 LED modules for general lighting-Safety requirements
- EN 61547 Equipment for general lighting purposes–EMC immunity requirement.
- IEC 60598-Part-2, Sec-3, Luminaries for road and street lighting.
- IEC 60598-2-1 Fixed general-purpose luminaries
- IEC 60598-1 Luminaries - General requirement and tests
- IEC 61000-3-2 Electro Magnetic compatibility (EMC)- Limits for Harmonic current emission –– (equipment input current ≤ 16 A per phase.
- IEC 60068-2-38 Environmental Testing: Test Z- AD: composite temperature/ humidity cyclic test
- IEC 61347-2-13 Lamp control gear: particular requirements for DC or AC supplied electronic control gear for LED modules.
- IS 10322 Specification for the luminaries
- LM 79 LED luminaire photometry measurement.
- LM 80 Lumen Maintenance
- IEC 62384 DC or AC supplied electronic control gear for LED modules performance requirements.
- RoHS (Reduction of Hazardous Substances)
- IEC 61347-1 ed. 2.0 for Lamp control gear - Part 1: General and safety requirements
- IEC 61000-4-5 Electromagnetic Compatibility (EMC) – Surge Immunity Test.
- IS 1944, IS 13383, IS 16103, IS 16105, IS 16106, IS 16102

2. ELECTRONIC COMPONENTS: -

The electronic components used shall be as follows:

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

3. LED MODULES: -

ANSI rated LEDs from reputed makes such as LG/ Nichia, Japan / Cree, USA / Bridgelux, USA / Lumiled USA / Osram/Citizen Japan / Philips should be provided.

LEDs shall have optical grade polycarbonate / PMMA lens to provide street light distribution. LED optical lens should be mechanically fixed to MCPCB and should not be fixed by glue. Individual or cluster of LEDs should be provided with Optical Grade Polycarbonate lens with street light optical distribution.

The LED shall be compliant with LM80-08 standard.
Useful L70 life of 50000 Hrs with 70% lumen maintenance at 35 deg. C ambient temperature. (Complete LM 80 test report for LED should be submitted).
LED Type: High power SMD LED.
Power of each LED: 1W or more
Compliance: RoHS
LED lumen output: The output of LED shall be at least 140 lumen per watt.

4. INGRESS PROTECTION: -

Ingress protection should be IP 66. The fixture should have double-wall construction with silicone gasket designed for IP66 without using any glue to prevent breakdown of the water and dust proof seal for both the LED & the driver compartments.

5. The Fixture light output (lux) shall be constant. The voltage variations / fluctuations in the specified voltage range shall not impinge upon the lux levels it produces. Maximum +/-2% is allowed throughout the input voltage range.
6. CURRENT: - The LEDs shall be driven at 0.5A to 1A.
7. FIXTURE EFFICACY:> or = 100 Lum/watt.
8. CCT: -4500K to 5500K
9. CRI: - Minimum 70.
10. OPERATING VOLTAGE**: -** 140V to 270V ac
11. OPERATING TEMPERATURE**:** - 0 Deg. C to 50 Deg. C
12. P.F:-> **0.9**
13. DRIVER: -

Isolated type, multistage Constant Current Constant Voltage topology driver suitable to operate in input voltage range of 140V to 270V (nominal rated voltage – 240V) with minimum 3KV surge protection, Power factor greater than 0.9 and total harmonic distortion (THD) of less than 20% should be integral to the luminaire. Short Circuit protection should be such that it recovers automatically after fault condition is removed.

14. SURGE PROTECTION**:** - Internal Surge protection ≥ 3KV with an External surge protection of 10KV (DM / CM) should be put in the Luminaire to ensure protection against surge arising from power line.
15. TEMPERATURE RISE: -The fixture body temperature shall not exceed 30 Deg. C from ambient even after continuous operation for 24 hrs.
16. The fixture shall work on single phase three wire system (phase, neutral & earth).
17. The maximum tolerance in wattage of fixture will be within the wattage range mentioned in the item schedule.

SWITCHING PANEL:

A standalone unit to be placed at feeder level containing Cluster Energy Meter, Relay Controller Unit along with MCB.

Enclosure should be made of MS Galvanized powder coated or SMC material with IP 65 and shall have proper lock arrangement.

It shall be protected by an MCB at its AC mains input.

Lamp load connection shall be through an output MCB.

Separate Chamber for Input/output MCB and Change over Circuit for maintenance and manual operation.

Door open detection provision, even in case of power failure.

It should be complete with all required switching and protecting devices, contactors, timers, relays, wiring, pipe earthing, surge protection device, required software, web server, hosting, etc.

All switchgear shall be tested at site as per the manufacturer's recommendations and shall include the minimum following tests:

- Visual inspection for dimensional check-up, completeness of the equipment as per the manufacturer's documents, furnishing the list of missing components, if any, tightness of all the terminals/equipment, etc.
- Measuring I.R. value.
- High voltage test.
- Testing of protective relays with primary and secondary injection test, wherever applicable.
- Simulation test for all the interlocks, annunciations and for the correct operations of the switchgear.
- Testing of oil for de-electric strength, wherever applicable.
- Any other tests as recommended by Site Engineers/ Site –in-Charge.
- All the switchgears shall be cleaned with vacuum cleaners before commissioning.
- Plugging/ Sealing of all the unused cut outs for the cable glands in the equipment.

- All panels shall be double earthed with two separate earthing pits.

APPROVED MAKES:

Description	Make
1. Compact Packaged substation (CSS):	Siemens /ABB / Schneider
(Note: HT and LT switchgear in the CSS should be of same make)	
2. **Dry type transformer in CSS or stand alone:**	Siemens/ ABB/ Schneider/ Raychem / Voltamp/ Crompton Greaves
3. HT switchgear:	Siemens / ABB / Schneider / CG Lucy
4. LT switchgear:	Siemens / ABB / Schneider / Legrand / L&T
5. HT and LT cables:	RPG / Ravin / CCI / Finolex / Havells/ Universal /KEI / Polycab / Gloster
6. **HT Cable end termination and jointing Kits:**	Raychem / 3M
7. LED Street lighting fixtures	Philips / Bajaj / Keselec Schreder / Wipro / Havells /GE Lighting / Crompton Greaves / HPL / Disano / Neri or Any other national or multinational & internationally reputed brand with good presence in India, upon prior approval by USCL Engineer Incharge/Consulting engr.
8. Poles and brackets	Bajaj / Valmont / Transrail / Keselec Shreder
9. Wire	Polycab / Finolex / Havells / RR / Ravin/ RPG
10. Switchgear, timer, contactor etc for Street Lighting Switching Panel	L&T/ ABB/Siemens / Schneider MG /Legrand
11. Power factor Improvement Capacitors and APFC relays	EPCOS / Unistar/ Neptune / Shreem

Anything not covered in the above specifications, will be governed by: --

1. **MPUADD Specifications:** (The soft copy of the specifications is available at departmental website http://www.mpurban.gov.in/StandardSchedule.asp)

2. **MPPKVVCO.LTD SPECIFICATIONS FOR ELECTRICAL WORKS**: *The Provisions of General/ Special Conditions of Contract, those specified elsewhere in the bid document, as well as execution drawings and notes, or other specifications issued in writing by the employer shall form part of the technical specifications of this work.*

ANNEXURE – F

(See clause 3 of Section 2-ITB)

PROCEDURE FOR PARTICIPATION IN E-TENDERING

1. Registration of Bidders on e-Tendering System

   All the PWD registered bidders 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 from MP Online. The password for the new portal is communicated to the bidders registered email ID. For more details, may contact M/s Tata consultancy Services Corporate Block, 5th floor, DB city Bhopal-462011, email id: eproc_helpdesk@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 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 https://cca.gov.in.

   Note:

   i. It may take up to 7 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 https://cca.gov.in.

   ii. Bids can be submitted till bid submission end date. Bidder will require digital signature at the time of 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 has to authorize a specific individual through Authority Letter. Unless the certificate 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 Information Technology Act 2000. This Authorized 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 have a 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 time schedule (Key dates) of the bid of their side for tasks and responsibilities to participate in the bid, as all the stages of each bid are locked before the start time and date and after the end time and date for the relevant stage if the bid as set by the Department.

5. Preparation and Submission of Bids

   The bidders have to prepare their bids online, encrypt their bid data in Bid forms and submit Bid 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 singing of the same by the Digital Signature of their authorized representatives.

6. Purchase of Bid Document

   For purchasing of the bid document bidders have to pay Service Charge online only which is Rs. [as per Bid Data Sheet]. 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 Debit/Credit card. Net banking or NEFT Challan through the payment gateway provided on the portal.

7. Withdrawal, Substitution and Modification of Bids

   Bidder can withdraw and modify bid till the bid 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
- USCL 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 submission & opening of tender happens to be a holiday, the due date shall be shifted to the next working day for which no prior intimation will be given.
- USCL reserves the right for extension of due date of opening of technical bid.

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

JOINT VENTURE (J.V.)

If J.V. is allowed following conditions and requirements must be fulfilled –

1. No. of partners in a joint venture shall not exceed 2 (Two). The partners shall comply with the following requirements:

a. One of the partners shall be nominated as being Lead Partner, and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;

b. The bid and, in case of successful bid, the Agreement, shall be signed so as to be legally binding on all partners;

c. The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the contract, including payment, shall be done exclusively with the partner in charge;

d. All the partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under [c] above, as well as in the bid and in the Agreement [in case of successful bid];

e. Bidder shall submit the joint venture agreement indicating precisely the role and responsibilities of all the members of JV in respect of planning, design, construction equipment, key personnel, work execution, and financing of the project including Operation and Maintenance of the works. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the employer;

f. A copy of the Joint Venture Agreement entered into by the partners shall be submitted originally in **envelope – A** and scanned copy should also be uploaded online with the bid.

g. The joint venture agreement shall be registered at the time of agreement, so as to be legally valid and binding on all partners.

2. All the partners should meet out the minimum qualifying criteria required for the bid and collectively must meet the criteria specified in full. Failure to comply with this requirement will result in rejection of the joint venture's bid.

3. The performance security of joint venture shall be in the name of the partner Lead partner/joint venture.

4. Attach the power of attorney of the partners authorizing the Bid signatory (i.e.) on behalf of the joint venture

5. An individual Bidder cannot at the same time be member of a Joint Venture applying for this Bid. Further, a member of a particular Bidder Joint Venture cannot be member of any other Bidder Joint Venture applying for this bid.

6. A copy of the Joint Venture agreement entered into by the partners made on Rs. 1000/- Non-judicial stamp duly notarized shall be submitted with the bid. However, at the time of agreement bidder shall get the joint venture agreement registered, so as to be legally valid and binding on all partners.

7. Furnish details of participation proposed in the joint venture as below:

DETAILS OF PARTICIPATION IN THE JOINT VENTURE

PARTICIPATION DETAILS	FIRM 'A' (Lead partner)	FIRM 'B'	FIRM 'C'
Financial			
Name of the Banker(s)			
Planning			
Construction Equipment			
Key personnel			
Execution of Work (Give details on contribution of each)			

7. The partners of J.V. should satisfy the qualification criteria as below,

a. The Lead Partner must have the share of minimum 51% in the J.V.

b. The other partner(s) must have a share of minimum 26% in the J.V.

c. The lead partner and the other partners must also meet 51% and 26% of the all qualification criteria respectively except for the requirement of work experience described in Annexure 'C'. However, both the partners must satisfy the full (100%) qualification criteria jointly. For this purpose, the qualification of individual partners shall be added (for annual average turnover, for Bid Capacity Only).

d. All the partners shall have the positive net worth as per audited balance sheet of last financial years

8. For the meeting the minimum qualification criteria of experience of similar nature work,

i. Out of 3 similar works of value not less than the amount equal to 20% of Probable Amount of Contract(PAC), at least 2 works must be done by lead partner and one work to be done by other partner,

Or

ii. Out of 2 similar works of value not less than the amount equal to 30% of PAC, at least 1(one) work must be done by lead partner and 1 (one) work to be done by other partner,

Or

iii. In case of one similar work of value not less than the amount equal to 50% of PAC, the lead partner must satisfy the criteria. However, the other partner must satisfy the criteria in (i) above i.e., at least one work of value not less than the amount equal to 20% of PAC.

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	
	Details of Authorized Representative	
10.	Name	
11.	Designation	
12.	Postal Address	
13.	Telephone Number with STD Code	
14.	Fax Number with STD Code	
15.	Mobile Number	
16.	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 should 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	Three
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	Two
5	Sr. Electrical Engineer with degree in Electrical Engineering and 10 yrs working experience	One
6	Site Engineer with Degree/Diploma in Electrical Engineering having minimum 5(for Degree holders) / 7 (for Diploma holders) years' experience	One

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

S. No.	Details	Penalty to be computed on Per Month basis
1	Project Manager with Master's degree in Civil Engineering having minimum relevant post qualification experience of 15 years	Rs. 100,000/- p.m.
	Sr. Electrical Engineer with degree in Electrical Engineering and 10 yrs working experience	Rs. 85,000/- 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. 75,000/- p.m.
3	Quality Control / Quality Assurance Engineer with Degree in Civil Engineering having minimum 5 years of relevant experience	Rs. 60,000/- p.m.
4	Traffic Manager / Safety Officer having 5 years' experience in Road Safety and Management	Rs. 50,000/- 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 / MPUADD 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	RMC plant with electronic control having capacity minimum 30 cum/Hr	3		
2	Fixed-form Paver with electronic sensor	1		
3	Vibratory Roller	2		
4	Static roller having minimum 8-10 Ton capacity (2)	2		
5	Motor Grader	2		
6	Loader with Back Hoe	2		
7	Tipper Truck	6		

The successful bidder within 45 days from date of issue of work order shall submit request to the Engineer in charge for inspection of RMC plant conforming to M.O.R.T.&H. specification (located within 30 Km. from the city limits) and machinery. If the bidder does not have their own RMC Plant, then he shall submit the notarized agreement with the plant owner that the plant owner is ready to supply him the RMC for this work.

After Inspection, Engineer In charge may accept the request as it is or instruct for some changes if required in the plant and/or 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 RMC plant and machinery.

ANNEXURE – J
(See clause 14 of Section 2 of ITB)

FINANCIAL BID

(TO BE CONTAINED IN ENVELOPE C – ONLINE ONLY)

NAME OF WORK: _____
(Name of the work as appearing in the bid for the work)

I/We do hereby BID to execution of the above work within the time specified at the rate (In figures) _____(In words)_____percent below / above or at par based on the Bill of Quantities and item wise rates given therein in all respects and in accordance with the specifications, designs, drawings and instructions in writing in all respects in accordance with such conditions so far as applicable.

I/We have visited the site of work and am/are fully aware of all the difficulties and conditions likely to affect carrying out the work. I/We have fully acquainted myself/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, I/We hereby agree to abide by and fulfil 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, Ujjain Smart City Limited, Ujjain or his successors in office the sums of money mentioned in the said conditions.

Note:

Only one rate of percentage above or below or at par based on the Bill of Quantities and item wise rates given therein shall be quoted.

Percentage 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 sign the agreement his earnest money deposit shall be forfeited.

In case the percentage "above" or "below" is not given by a bidder, his bid shall be treated as non-responsive.

All duties, taxes, and other levies payable by the bidder shall be included in the percentage quoted by the bidder.

Signature of
Bidder Name
of Bidder

The above bid is hereby accepted by me on behalf of the Executive Director, UJJAIN Smart City Ltd., Ujjain, dated the_____day of_____20_ _

_____

Signature of Officer by whom accepted

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 DIRECTOR

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 further agree that no change or addition to or other modification of the terms of the Contract of the Works to be performed thereunder 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 till issue of physical completion certificate.

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 “Executive Director” 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 Ujjain Smart City Limited, Ujjain 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.

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. SCOPE OF PROJECT

2.1 Scope of the Project

Under this Agreement, the scope of the Project (the "Scope of the Project") shall mean and include:

(a) Investigation, survey, detailed design and construction work for Improvement of Roads consisting of Up gradation, Augmentation, Foot path & Cycle track works, Utility Ducts, Road Markings, Traffic signage, underground storm water drainage, shifting of electrical poles and overhead power supply lines, underground electrical cable laying with installation and commissioning of allied electrical infrastructure and other Miscellaneous works shall be done on the selected Road segments (total 25 Km length) of various road widths in ABD Area whereas retrofitting of existing open drains, retrofitting of present water supply lines shall be carried out with other Miscellaneous works. Under this tender Scope of work of contactor also include Maintenance of Tendered works for Period of Five years with Preparation of Working Drawings, Procurement and Construction Basis

(b) Maintenance of the Project in accordance with the provisions of this Agreement and in conformity with the requirements.

(c) Performance and fulfilment of all other obligations of the Contractor in accordance with the provisions of this Agreement and matters incidental there to or necessary for the performance of any or all of the obligations of the Contractor under this Agreement.

(d) If due to any unavoidable circumstances, it needs to shift the location of project partly or fully, the contractor shall carry out the work partly or fully at another alternative location without any extra claim. The expenditure towards preliminary activities if carried out by the contractor shall be reimbursed by USCL. (Actual expenditure or payment shown in Schedule of Payment-pre-construction activities-as per stage of work carried out by the contractor whichever is less).

(e) Scope of work contained in the paragraphs mentioned below is only indicative and not exhaustive. In addition, the contractor shall be responsible for executing all items required for completing the work as per direction of Engineer-in-charge. The price quoted shall include all the items and covers all details as may be required to meet the purpose and intents of the contract.

(f) The proposal including design- drawing and estimates are for reference, contractor is supposed to carry out all sorts of investigations like site surveys, topographical surveys, hydrological surveys, geo-technical investigations, scanning roads for assessment and identifications of services and utilities laid down previously (like CCTV Cables, OFC Cables, Telecom Cables, Electrical Cables, water supply lines, gas pipe lines etc.). The contractor is responsible to take out aforesaid services, restore them and shift them in the corresponding infrastructure created for respective services. The scope of work includes dismantling old work and create new facilities after design and approval from

the Engineer in charge.

(g) The scope of work is not limited only as mentioned in above paras, but also include to address any exigency generated during tendered work execution and no extra cost shall be paid for the same.

(h) No extra payment shall be paid for time overrun.

2.2 SCOPE of Work

2.2.1 Scope of Work

1 Contractors are requested to visit the site prior to fill/submit the tender and check all the necessary attributes/matters related for completion of this project.

2 All the activities required to be carried out for successful and timely completion of this project shall be carried out by the successful contractor

2.2.2 (A) DETAIL SCOPE OF WORK CIVIL COMPONENTS:

The works under Contract comprises the construction of proposed improvement of roads , Junction, storm water drainage works, construction of new carriageway, construction of utility ducts, cross drains, culverts, foot path, cycle track, Traffic Signages, Road Markings, retrofitting of water supply lines and Miscellaneous works and Maintenance of Tendered works for Period of Five years

Details and drawings given in tender document is for information purpose only and successful bidder shall undertake confirmatory survey for accuracy and completeness of data. It is in scope of successful Bidder to undertake all Site surveys, Geotechnical investigations, Underground Utility Surveying and Scanning of the roads for utility shifting, obtaining all required approvals from the relevant authorities, Carry out Design and Drawings for all the components of the work as per Employers requirement and submit the same to client for review and approval, Prepare Good for Construction Drawings, submit maintenance manual to client for approval before start of Maintenance period.

The successful bidder shall have to prepare and submit 'As Built Drawings' depicting the exact construction carried out on site, in soft and hard copy format.

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

The scope of work also includes:

2.2.3 Construction and completion of the following:

2.2.3.1 Site clearance, demolition works, earthworks, temporary works, traffic diversion, barricading the construction site, utility shifting and all ancillary works deemed necessary for the carrying out of temporary & permanent construction works.

2.2.3.2 Widening/ re-cambering/ raising/ milling down & overlaying of existing carriageways, flexible/ rigid pavement at grade road intersections & accesses to adjoining developments.

2.2.3.3 Tree cutting (if any) as indicated in the drawings.

2.2.3.4 Construction of Utility ducts, cross drains as per approved drawing.

2.2.3.5 Retrofitting the existing roads as per the proposed road sections w.r.t. carriageways, provision of footpath, cycle track, services lanes.

2.2.3.6 Installing RPM, making road markings along the road edge, road centre line & as per IRC guidelines, bus stop marking, cycle track marking, construction of medians & speed breakers, & junction improvements as per the drawings & in accordance with the Employer's requirements and to the satisfaction of the Engineer in charge.

2.2.3.7 Construction of footpaths, kerbs, railings, vehicular impact guardrails and other road related facilities as per the guidelines of IRC in accordance with the Employer's requirements and to the satisfaction of the Engineer in charge.

2.2.3.8 Supply and installation of new traffic signage, directional signage, street name signs

& re- sitting of such existing signs & other road signs to be retained, inclusive of support & foundation as per Employers Requirement.

2.2.3.9 Supply and installation of new Electric poles and light fittings as per approved Drawings;

2.2.3.10 All other works and services ancillary or related to the full completion of the Works in accordance with the Employer 's requirements

2.2.4 The Contractor shall ascertain, determine and verify the locations of all utility services by scanning the roads in the vicinity of the Works, and co-ordinate with utility agencies for the diversion of affected services and the laying of new services. The Contractor shall support and protect services that need not be diverted or pending diversion and remove all abandoned services. Contractor shall be responsible for relocation, reconstruction, reconfiguration of driveways, site accesses, temporary and permanent drains, pipe conduits and necessary connections for public lighting and traffic lighting, earth works, turfing, environmental assessments, necessary safety measures and protection works, sewer lines etc.

2.2.5 The Contractor 's responsibility for the design and build works includes the submissions to relevant government authorities / technical departments for obtaining all necessary clearances/approvals.

2.2.6 The Contractor shall co-ordinate and interfaces his works with that of all other contractors, subcontractors, utility services, statutory authorities, etc. and achieve the completion of the Works to the satisfaction of the Engineer

2.2.7 The Contractor shall verify the proposed road reserve, cadastral boundary and contract boundary and all dimensions on Site prior to submission of Tender. The Contractor is responsible for clarifying any discrepancy between the Drawings and actual condition on Site.

2.2.8 The Contractor shall make good all works including road surfaces, drains, concrete slabs, gratings, kerbs, pavements, turfing, railing, fence, boundary wall, etc. affected or damaged during the course of construction, to the satisfaction of the Engineer. The costs of making good all these defects shall be borne solely by the Contractor and deemed included in his Contract Sum

2.2.9 All works specified shall include the provision of all labour, tools, equipment, material, traffic control, transport and everything else necessary for the satisfactory completion of the Work by the Contractor to the satisfaction of the Engineer.

2.2.10 Description of the Works involved in this Contract is given in the Specifications for the guidance of the Contractor. The Contractor shall be solely and fully responsible for investigating and Ensuring the actual extent and nature of the works comprised in the contract prior to submission of his tender.

2.2.11 Construction management and the quality of the works shall comply with the drawings, specification and employer's requirement.

SALIENT FEATURES OF ROADS FOR IMPROVEMENT AND OTHER DEVELOPMENT

S.No.	Name of Road	Width	Length
R1	Preety Nagar to Bima Hospital Chauraha	8M	1043 M
R2	Ganeshwari Mata Mandir Chauraha to Bridge Zero Point	12M	459 M
R3	Sandhipani Nagar Chauraha to Shree Nageshwar Parshawanath	12M	263 M
R4	Shree Nageshwar Parshawanath to Bailpateshwar Tiraha	12M	403 M
R5	Shree Nageshwar Parshawanath to Koyal Phatak Chauraha	10M	454 M
R6	Dewas Gate Chauraha to Chamunda Mata Cahuraha	12M	835 M
R7	Hanuman Mandir Tiraha to Hanuman Prasad Fuel Station	8M	154 M

R8	Nikas Chauraha to Ankpat Chauraha	15 M	1600 M
R9	Dewas Gate Chauraha to Daulatganj Chauraha	12M	482 M
R10	Dudh Talai teraha to Tilak Marg	6-8M	269 M
R11	Indore Gate to Daulat Ganj Chauraha	15M	333 M
R12	Daulatganj Chauraha to Mhakaleshwar Temple	10M	880 M
R13	Indore Gate to Hari Phatak Bridge	18M	623 M
R14	Nagori Mohalla Chauraha to Gada Pulia Chauraha	6 -8M	623 M
R15	Upkeshwar Chauraha to Beagm Bagh Chauraha	6 -8M	492 M
R16	Shree Kabir Ashram Tiraha to Mahakal Ghati Chauraha	6 -8M	315 M
R17	Yanti Guest House to Bhadoria Car Parking	6 -8M	107 M
R18	Mahakal Ghati Chauraha to Rudrasagar	18M	311 M
R19	Mahakaleshwar Chauraha to Hari Phatak Bridge	15M	545 M
R20	JaiSinghpura Marg to Triveni Museum Tiraha	8M	731 M
R21	Triveni Museum Tiraha to Chanalal Jaisingh Chauraha	6 -8M	338 M
R22	Rudrasagar Road 1	12M	773 M
R23	Rudrasagar Road 2	12M	979 M
R24	Bhagatsingh marg double lane to Radha Swami Asharam	8M	736 M
R25	Char Dham Mandit to Shri Hatkeshwar Dham	15M	709 M
R26	Bhagar Singh Marg to Harsiddhi Chauraha	18M	1208 M
R27	Harisidhi Marg to Shree Laxmi Narsingh Temple	12M	166 M
R28	Begambag Colony to Harisidhi Churaha	8M	422 M
R29	Harisidhi Churaha to Police Thana Mahakaal	8M	88 M
R30	Mahakaal Chauraha to Kamri Marg Chauraha	8M	592 M
R31	Tanki Chauraha to Anant Nagar Chauraha	8M	894 M
R32	Anant Nagar Chauraha to KD Gate	8M	633 M
R33	Dani Gate to Ram Ghat	8M	269 M
R34	Vighnharta Ganpati Mandir to Shri Venkteshwar Dharamshala	8M	501 M
R35	Shri Venkteshwar Dharamshala to Kartik Chawk	8M	299 M
R36	Chaubees Khamba to Vighnharta Ganpati Mandir	6-8M	207 M
R37	Shivaji Tiraha to Police Thana Mahakaal	6-8M	162 M
R38	Ma Chamunda Traders to Mahadev Uphar Gruh	6-8M	56 M
R39	Gudri Chauraha to Mansarovar Guest House	6-8M	561 M
R40	Pandriba Tiraha to Shiv Temple	6-8M	372 M
R41	R41 to Ram Ghat	6-8M	505 M
R42	Kartik Chawk to Dani Gate	6-8M	158 M
R43	Shri Venkteshwar Dharamshala	6-8M	119 M
R44	Chatri Chawk to Kanthal Chauraha	6-8M	403 M
R45	Tanki Chawk to Teliwada Chauraha	6-8M	456 M

R46	Tanki Chawk to RNT Road Chauraha	6-8M	209 M
R47	Nikas Chauraha to K D Gate Chauraha	6-8 M	532 M
R48	KD Gate Chauraha to Kamri Marg Chauraha	10M	414 M
R49	Gopal Mandir to Chattri Chauraha	12M	94 M
R50	Around Chatri Chawk	8M	204 M
R51	Kanthal Chauraha to Nikas Chauraha	10M	413 M

Salient features of different roads with respect to their width are as follows:

1. Salient Features of 18 M wide roads R13, R18, & R26

Approximate Length of the Road	2645 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	4.50m
Width of Bus Lanes (on each side of median)	3.50m
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	2.50m
Width of cycle Lanes (on each side of median)	1.50m

2. Salient Features of 15 m wide roads R8, R11, R19, R25

Approximate Length of the Road	3187 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	3.00m
Width of Bus Lanes (on each side of median)	3.50m
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	NA
Width of cycle Lanes (on each side of median)	NA

3. Salient Features of 12 M wide roads - R2, R3, R4, R6, R9, R22, R23, R27

Approximate Length of the Road	4454 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	1.25m
Width of Bus Lanes (on each side of median)	NA
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	NA
Width of cycle Lanes (on each side of median)	1.25m

4. Salient Features of 10m wide roads - R5, R12, R48, R51

Approximate Length of the Road	2160 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	2.00m
Width of Bus Lanes (on each side of median)	NA
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	NA
Width of cycle Lanes (on each side of median)	NA

5. Salient Features of 8M wide roads - R1, R7, R20, R24, R28, R29, R30, R31, R32, R33, R34, R35, R50

Approximate Length of the Road	6568 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	1.00m
Width of Bus Lanes (on each side of median)	NA
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	NA
Width of cycle Lanes (on each side of median)	NA

6. Salient Features of 6-8 M wide roads - R10, R14, R15, R16, R17, R21, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47

Approximate Length of the Road	5982 mtrs.
No. of MV Lanes (On each side of median)	1 Lanes (Lane width as per the UTIPEC and IRC guidelines of MOUD)
Pedestrian Footpath width (on each side of median)	NA
Width of Bus Lanes (on each side of median)	NA
Width of Service Lanes (on each side of median)	NA
Width of Parking Lanes (on each side of median)	NA
Width of cycle Lanes (on each side of median)	NA

Guidelines with regard to use of materials in the work:

a) The contractor shall produce samples of the materials for approval of the Engineer in charge (EIC). The materials of the makes, out of the above as approved by the EIC shall be used on the work.

b) In respect of materials for which makes are not specified, the make/brand will be decided by the EIC.

c) Before bulk purchase of quantities of materials, it is the responsibility of the Contractor to get the samples of materials approved from consultant and EIC.

d) All cost towards the testing shall be borne by the contractor.

e) For all the material of approved brands necessary testing as per IS standards shall be done by the agency and no extra payment shall be paid for that.

2.3. (B) SCOPE OF WORK ELECTRICAL COMPONENT

SCOPE OF BID

The detailed description of work, hereinafter 'work', is **"Underground Cabling Works with Compact type Sub-Stations / Dry Transformers for ABD area Ujjain."** Detailed scope of work is as under.

a. Sourcing of 11KV feeders through underground cables from the existing 33/11KV Grid Installations or from Double Pole structure (DP) at the starting point of the roads from where existing 11KV power distribution feeder enters the roads.

b. Adjacent to this DP a double VCB type 11KV Ring Main Unit (RMU) will be installed. These VCBs will get 11KV input power from the DP and output of these two VCBs will be two nos ring main cable feeders of 11KV power distribution system on the roads. OR these UG feeders will be charged from 33/11KV grid substations of MPPKVVCL as per working drawings issued to the contractor from time to time.

c. 1KV cable of 3Cx300 sq.mm Al. conductor, XLPE insulated and armoured will be laid in the underground RCC trench or in RCC/ HDPE pipes.

d. On every 400 to 500 mitres distance on this road a compact substation (CSS) or dry transformers of 11/0.433 KV of 315KVA / 500KVA / 630KVA will be installed.

e. The LT power output from the CSS / dry transformers will be supplied to the various LT Feeder Pillars placed approx. 75 to 80 metres apart along the road. There will be 3 to 4 feeder pillars per CSS / dry transformers.

f. The feeder pillars will be looped with 3.5Cx 300 / 150 sq. mm. Al. conductor, XLPE insulated armoured underground cables laid in the RCC trench/ pipe. One no. standby cable will be laid in LT system.

g. The Feeder pillar shall comprise MCCB as incomer and HRC fuse/ MCCB as the outgoings to the various consumers.

h. LT underground cable will be provided as the service cable to the individual consumers along the road. Service cable will be laid inside the HDPE pipes.

i. Separate underground LT cables of 3.5Cx300 sqm will be laid from the CSS/ dry transformers to the existing LT overhead line system on the by lanes of the road. Care should be taken that the maximum length of LT circuit should not exceed 400 to 450 metres.

j. In the narrow streets where there is no space for installation of feeder, the LT Busbar Looping Box shall be installed at a common area of residential or commercial building. This Looping Box shall be charged with LT UG feeder cable in LILO system. The outgoing of looping box shall feed power to the existing meter panel/ boxes.

k. Earthing of CSS / dry transformers, feeder pillars should be done as per IS code.

l. CSS / dry transformer substation will be equipped with stare of art SCADA system with SACDA software for achieving functions:

   i. Complete remote wireless ON/OFF operation of 11KV VCBs, Isolators and LT ACB/ MCCBs from central control room.

   ii. Fault alarm and reset from remote wireless system to central control room.

   iii. Data acquisition from relays and meters and reporting through energy management software via wireless to the server at central control room.

   iv. Anti theft system in the doors of feeder pillars should be installed to generate automatic SMS alert upon unauthorised tampering.

   v. Entire SCADA must be enabled for the OFC cable communication also.

m. Dismantling of existing 11KV and LT overhead lines, transformer DP etc on these roads and depositing the same to the authority or MPPKVVCL stores under receipt from them.

n. Installation of LED type street lighting as per specifications with smart controls.

Table: Summary of Main Items included in scope of work

SN	ITEM	UNIT	QTY
1.	33/11KV XLPE Cable	Km	35 Km
2.	Main LT Cable	Km	56 Km

3.	Compact Type Packaged Substations:		
i	630 KVA	Nos.	12
ii	500 KVA	Nos.	5
iii	315 KVA	Nos.	20
4.	Dry Type Transformers		
i	630 KVA	Nos.	25
ii	500 KVA	Nos.	9
iii	315 KVA	Nos.	19
5.	Ring Main Units	Nos.	100
6.	Street Light Fixtures	Nos.	2200
7.	Feeder Pillars and LT boxes	Nos.	863

2.3.2. General Quality of Work:

The work shall have to be executed in accordance with the drawings, 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.

2.3.3. One Bid per Bidder

2.3.3.1. The bidder can be an individual entity or a joint venture (if permitted as per Bid Data sheet). In case J.V. is permitted, the requirement of joint venture shall be as per the Bid Data Sheet.

2.3.3.2. 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.

2.3.4. 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 ULB.

2.3.5. 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.

3. INTERPRETATIONS AND DOCUMENTS

3.1 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;

3.2 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

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 as 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.

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.

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- 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 leviable until the contractor makes such delays good. However, the Engineer-in-charge shall 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.

16. CONTRACTOR'S QUOTED PERCENTAGE

The contractor’s quoted percentage rate referred to in the "Bid for works" will be deducted/ added from/to the net amount of the bill after deducting the cost of material supplied by the department.

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 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.

b. If the item is not in the priced BOQ and is included in the 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 minus/plus the percentage 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 (d). 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.

22. 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 contractor 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 Rates quoted by the contractor shall be excluding GST.

25.3 The liability, if any, on account of quarry fees, royalties, octroi and any other taxes and duties in respect of materials actually consumed on public work, shall be borne by the Contractor.

25.4 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 judgmental 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 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 shall issue a certificate for value of the work accepted on final measurements, less advance payments and penalty as indicated in the Contract Data. The amount so arrived at shall be determined by the Engineer-in- charge and shall be final and binding on both the parties.

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 50% amount of Security deposit shall be refunded after completion of one year of defect liability period (DLP is 2 years in this project) and remaining amount shall be paid in two equal instalments after 6 months interval.

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. MOBMOILIZATION AND CONSTRUCTION MACHINERY ADVANCE

32.1 Payment of advances shall be applicable if provided in Contract Data Sheet.

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 a nationalized/ scheduled bank, 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.

32.2 The rate of interest shall be as per Contract data.

32.3 The construction machinery advance, if applicable, shall be limited to 80% of the cost of new construction machinery.

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 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.

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 32.1 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.

40. CONSTRUCTION SAFETY

The contractor should be well conversant with technical as well as administrative and legal aspects of safety and judicial pronouncements. The contractor shall all time take all reasonable precautions and safety measures to maintain safety of personal and property. The contactor shall, at his own expenses and throughout the period of the contract ensure appropriate and suitable arrangements for health, safety and hygiene requirements for surroundings. The state and central government prevailing all the statutes in this regard must be complied in letter and spirit throughout the period of contract.

41. 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 nay 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.

42. DEATH OR PERMANENT INVALIDITY OF CONTRACTOR

If the Contractor is an individual or a proprietary concern, partnership concern, dies during the currency of the contract or becomes permanently incapacitated, where the surviving partners are only minors, the contract shall be closed without levying any damages/compensation as provided for in clause 28.2 of the contract agreement However, if the competent authority is satisfied about the competence of the survivors, then the competent authority shall enter into a fresh agreement for the remaining work strictly on the same terms and conditions under which the contract was awarded.

43. JURISDICTION

This contract has been entered into in+ the State of Madhya Pradesh and its validity, construction, interpretation and legal effect shall be subjected to the exclusive jurisdiction of the courts in Ujjain or of the courts at the place where this agreement is entered into. No other jurisdiction shall be applicable.

44. MONTHLY RA BILLS

The payments certificate shall be regulated as per the clause 34 of the contract.

44.1 Upon the signing of agreement, the Engineer shall decide the date of submission of monthly statement (RA Bills) as mentioned in clause 34 (a).

44.2 The engineer shall check contractor's monthly statement (RA bills) and certify the amount to be paid to the contractor within 7 days on submission of monthly statements (RA Bills).

44.3 The employer shall ensure the payment to the contractor as per clause 34 (d), (e), (f) & (g) within 10 days of submission of monthly statements (RA Bills).

[End of GCC]

CONTRACT DATA SHEET

Clause Reference	Particulars	Data
1.14	Employer	Ujjain Smart City Limited, Ujjain
1.15	Engineer	Engineer as notified by employer
1.16	Engineer in Charge	Superintending Engineer of USCL
1.22	Stipulated period of completion	30 Months including rainy season
3	Language & Law of Contract	English and 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.	Executive Director, USCL
5	Subcontracting permitted for contract value	Up to 10% by the approval of the Employer
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	Executive Director, USCL, Ujjain
	Appellate Authority for deciding dispute under Dispute resolution system	Executive Director, USCL, Ujjain
13	Period of submission of updated construction program	15 days after signing of contract agreement and every month thereafter.
	Amount to be withheld for not submitting construction program in prescribed period	As per rule
14	Competent authority for granting time permission	Executive Director, USCL, Ujjain
15	Milestones laid down for the contract	-
	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 Lab	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	24 months after physical completion of the work
21	Competent authority for determining the rate	Executive Director, USCL, Ujjain
27	Any other condition for breach of contract	-
28	Penalty	a. Penalty shall be recovered from a Security deposit as per clause 30 of General Conditions of Contract; and

Clause Reference	Particulars	Data
		b. Compensation imposed as per clause 15 from 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	For F.M. only
31.2 (4)	Weightages of Component in the work	As per Annexure R
32	32.1 Mobilization and Construction Machinery Advance applicable	Yes, Mobilization and Construction Machinery Advance shall be payable.
	32.2 If yes, unconditional Bank Guarantee	As per format in Annexure S1
	32.3 If Yes Rate of Interest	As per notified bank rate on the date of inviting tender.
	32.4 If Yes, Type and Amount that can be paid	1. Mobilization advance - Not more than 10 % of contract amount.
	32.5 If Yes, Recovery of Payment	Recovery of Mobilization and/or Construction Machinery advance shall commence when 10% of the Contract Amount is executed and recovery of total advance shall be done on pro-rata basis and shall be completed by the time work equivalent to 80% of the Contract Amount is executed. In addition to the recovery of principal amount, recovery of interest shall be carried out as calculated on the outstanding amount of principal at the close of each month. The interest shall be accrued from the day of payment of advance and the recovery of interest shall commence when 10% of the Contract Amount is executed and shall be completed by the time work equivalent to 80% of the Contract Amount is executed.
33	33.1 Secured Advance Payable	No secured Advance shall be payable
34	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
35	Competent Authority	Executive Director, USCL
36	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)

DRAWINGS

1. Layout plan of Project roads
2. Cross section of 18m wide road
3. Cross section of 15m wide road
4. Cross section of 12m wide road
5. Cross section of 10m wide road
6. Cross section of 8m wide road
7. Cross section of below 8m wide road
8. Cross sections for underground Infrastructure 18m wide road
9. Cross sections for underground Infrastructure 15m and 12m wide roads
10. Cross sections for underground Infrastructure 10m wide road
11. Cross sections for underground Infrastructure 8m wide road
12. Cross sections for underground Infrastructure less than 8 wide road
13. Cross section details of Rigid Pavement
14. Bedding Details of RCC NP4 Storm Water Pipe
15. G. A. Drawing of RCC Storm Water Manhole/Chamber with grating
16. Details of 1.0 m wide Central Median
17. Details of Electrical Duct Chambers (HT, LT, and Feeder Pillar Box)
18. G. A. Drawing of RCC Chamber (for Service Cables and OFC Cables)
19. Typical CS of RCC Box culvert
20. Typical CS of RCC Pipe culvert

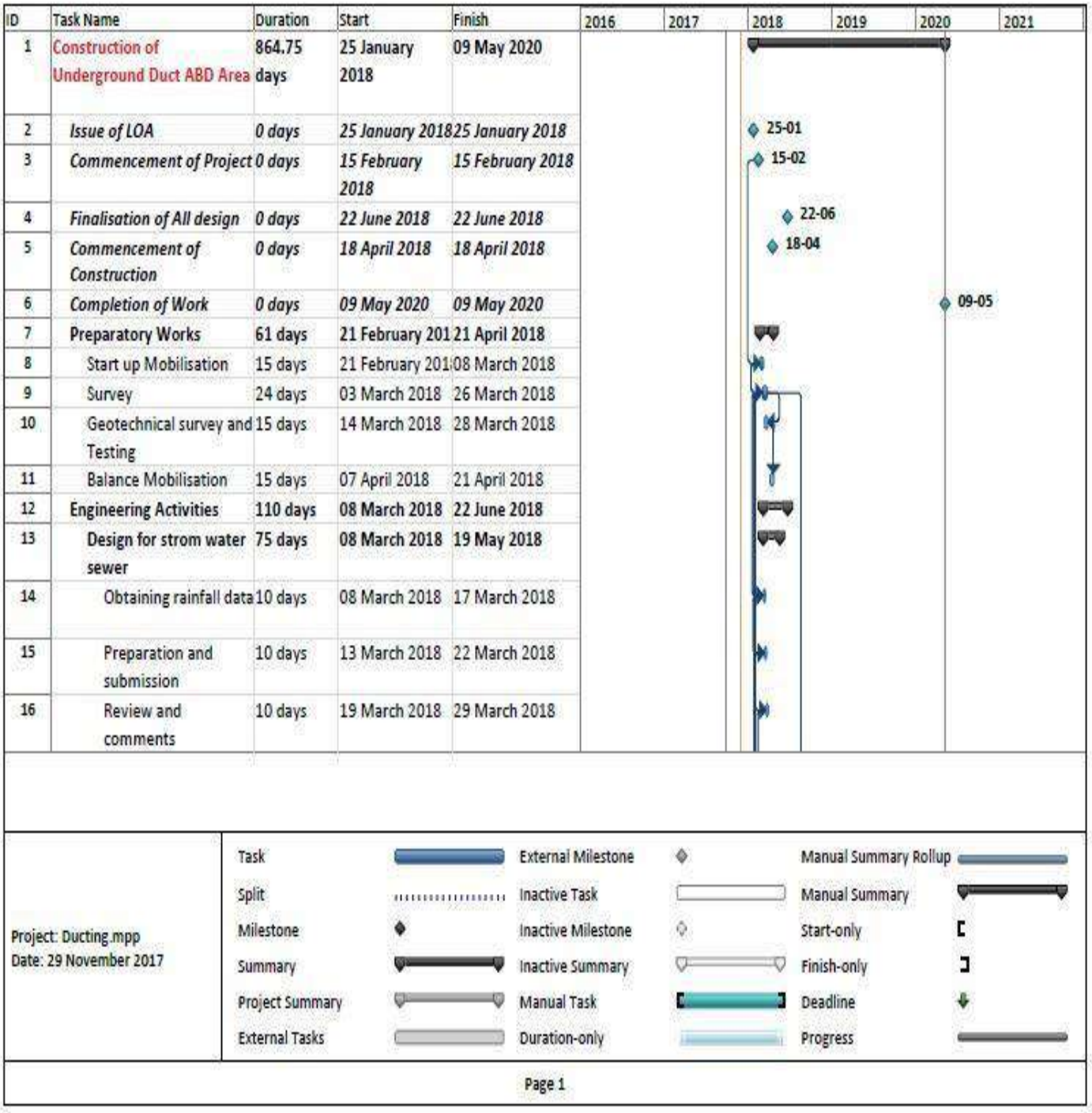
Note: The drawings enclosed in this document are for contractor's reference and guidance only. The contractor has to investigate, carryout survey, redesign all project components and execute the work accordingly. Drawings attached at the end of the document.

ANNEXURE – O

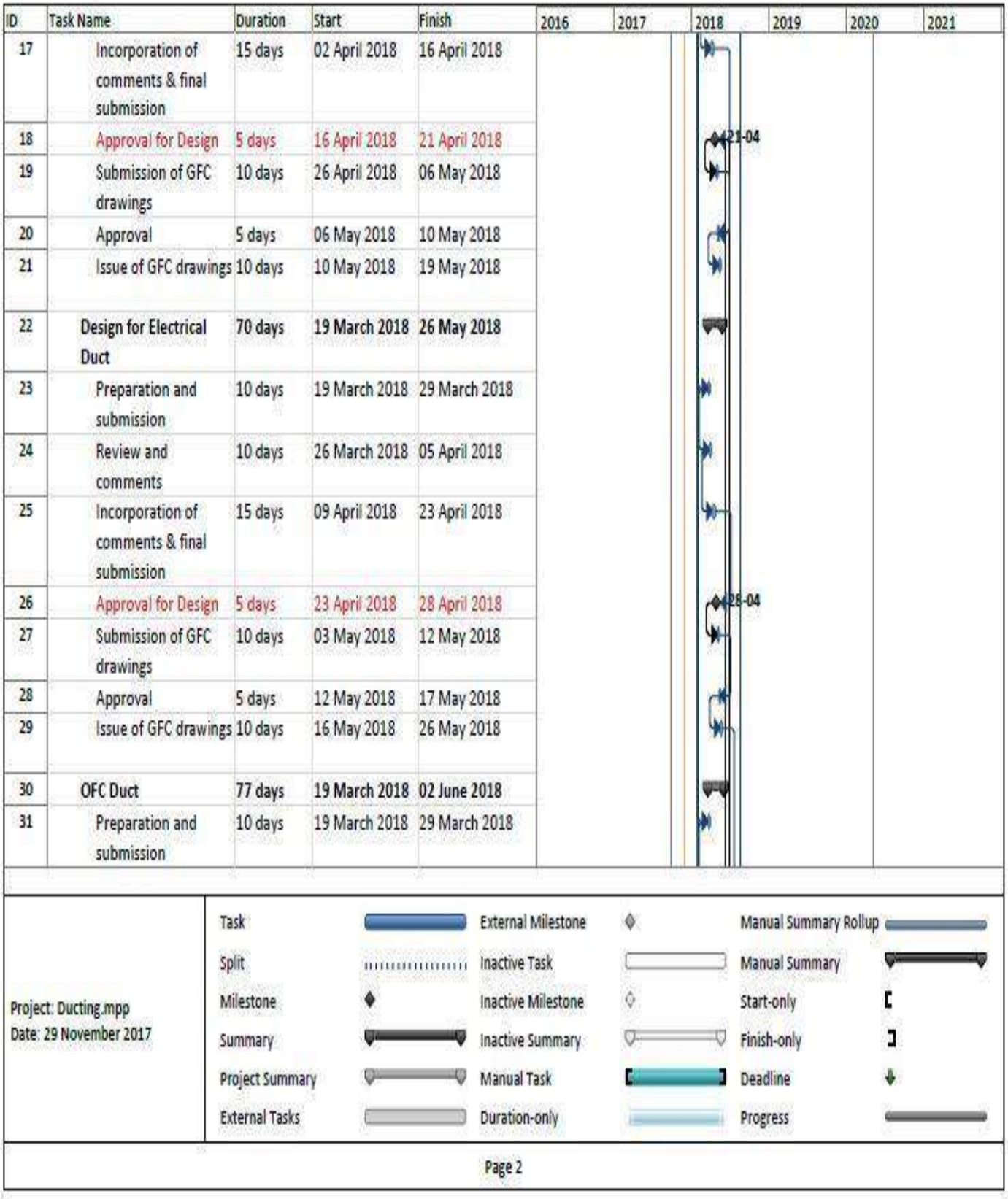
(See clause 13 of Section 3 of GCC)

DETAILS OF MILESTONE

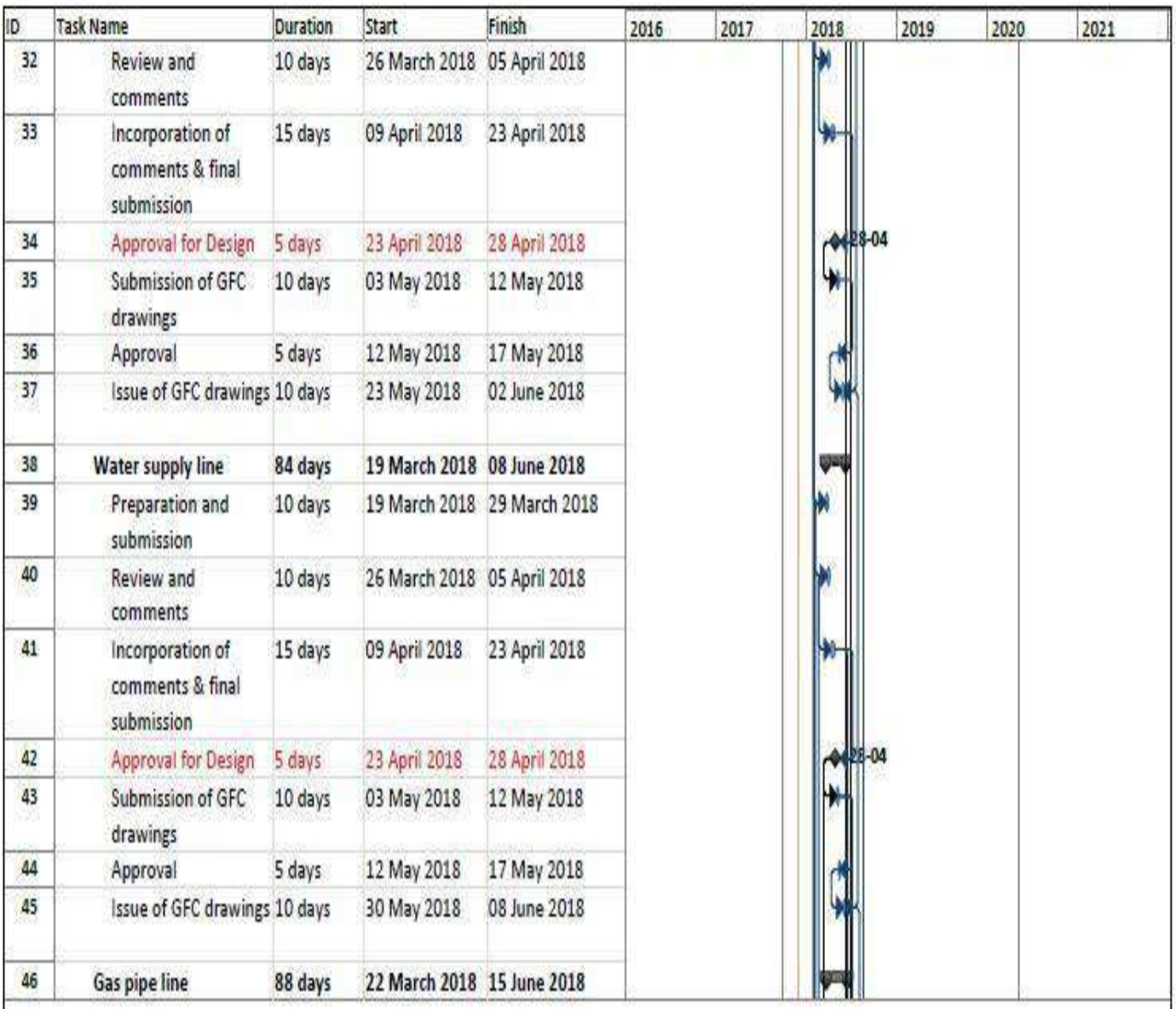
ID	Task Name	Duration	Start	Finish
1	Construction of Underground Duct ABD Area	864.75 days	25 January 2018	09 May 2020
2	*Issue of LOA*	*0 days*	*25 January 2018*	*25 January 2018*
3	*Commencement of Project*	*0 days*	*15 February 2018*	*15 February 2018*
4	*Finalisation of All design*	*0 days*	*22 June 2018*	*22 June 2018*
5	*Commencement of Construction*	*0 days*	*18 April 2018*	*18 April 2018*
6	*Completion of Work*	*0 days*	*09 May 2020*	*09 May 2020*
7	Preparatory Works	61 days	21 February 201	21 April 2018
8	Start up Mobilisation	15 days	21 February 201	08 March 2018
9	Survey	24 days	03 March 2018	26 March 2018
10	Geotechnical survey and Testing	15 days	14 March 2018	28 March 2018
11	Balance Mobilisation	15 days	07 April 2018	21 April 2018
12	Engineering Activities	110 days	08 March 2018	22 June 2018
13	Design for strom water sewer	75 days	08 March 2018	19 May 2018
14	Obtaining rainfall data	10 days	08 March 2018	17 March 2018
15	Preparation and submission	10 days	13 March 2018	22 March 2018
16	Review and comments	10 days	19 March 2018	29 March 2018



ID	Task Name	Duration	Start	Finish
17	Incorporation of comments & final submission	15 days	02 April 2018	16 April 2018
18	Approval for Design	5 days	16 April 2018	21 April 2018
19	Submission of GFC drawings	10 days	26 April 2018	06 May 2018
20	Approval	5 days	06 May 2018	10 May 2018
21	Issue of GFC drawings	10 days	10 May 2018	19 May 2018
22	**Design for Electrical Duct**	**70 days**	**19 March 2018**	**26 May 2018**
23	Preparation and submission	10 days	19 March 2018	29 March 2018
24	Review and comments	10 days	26 March 2018	05 April 2018
25	Incorporation of comments & final submission	15 days	09 April 2018	23 April 2018
26	Approval for Design	5 days	23 April 2018	28 April 2018
27	Submission of GFC drawings	10 days	03 May 2018	12 May 2018
28	Approval	5 days	12 May 2018	17 May 2018
29	Issue of GFC drawings	10 days	16 May 2018	26 May 2018
30	**OFC Duct**	**77 days**	**19 March 2018**	**02 June 2018**
31	Preparation and submission	10 days	19 March 2018	29 March 2018



ID	Task Name	Duration	Start	Finish
32	Review and comments	10 days	26 March 2018	05 April 2018
33	Incorporation of comments & final submission	15 days	09 April 2018	23 April 2018
34	Approval for Design	5 days	23 April 2018	28 April 2018
35	Submission of GFC drawings	10 days	03 May 2018	12 May 2018
36	Approval	5 days	12 May 2018	17 May 2018
37	Issue of GFC drawings	10 days	23 May 2018	02 June 2018
38	**Water supply line**	**84 days**	**19 March 2018**	**08 June 2018**
39	Preparation and submission	10 days	19 March 2018	29 March 2018
40	Review and comments	10 days	26 March 2018	05 April 2018
41	Incorporation of comments & final submission	15 days	09 April 2018	23 April 2018
42	Approval for Design	5 days	23 April 2018	28 April 2018
43	Submission of GFC drawings	10 days	03 May 2018	12 May 2018
44	Approval	5 days	12 May 2018	17 May 2018
45	Issue of GFC drawings	10 days	30 May 2018	08 June 2018
46	**Gas pipe line**	**88 days**	**22 March 2018**	**15 June 2018**



ID	Task Name	Duration	Start	Finish
47	Preparation and submission	10 days	22 March 2018	01 April 2018
48	Review and comments	10 days	26 March 2018	05 April 2018
49	Incorporation of comments & final submission	15 days	09 April 2018	23 April 2018
50	Approval for Design	5 days	23 April 2018	28 April 2018
51	Submission of GFC drawings	10 days	03 May 2018	12 May 2018
52	Approval	5 days	12 May 2018	17 May 2018
53	Issue of GFC drawings	10 days	06 June 2018	15 June 2018
54	**Re Construction of Road**	**98 days**	**19 March 2018**	**22 June 2018**
55	Preparation and submission	10 days	19 March 2018	29 March 2018
56	Review and comments	10 days	26 March 2018	05 April 2018
57	Incorporation of comments & final submission	15 days	09 April 2018	23 April 2018
58	Approval for Design	5 days	23 April 2018	28 April 2018
59	Submission of GFC drawings	10 days	03 May 2018	12 May 2018
60	Approval	5 days	12 May 2018	17 May 2018

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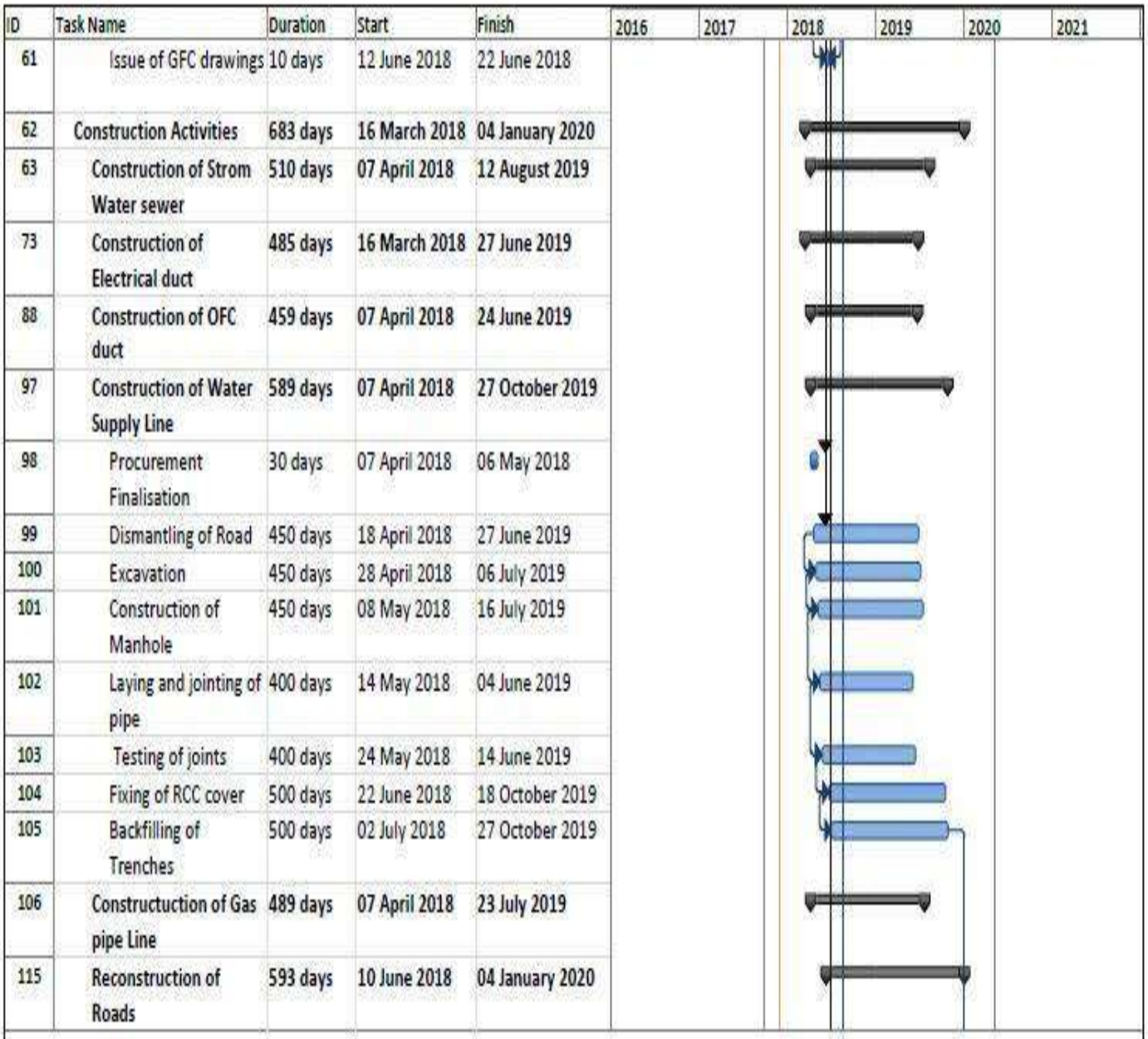
ID	Task Name	Duration	Start	Finish
61	Issue of GFC drawings	10 days	12 June 2018	22 June 2018
62	Construction Activities	683 days	16 March 2018	04 January 2020
63	Construction of Strom Water sewer	510 days	07 April 2018	12 August 2019
73	Construction of Electrical duct	485 days	16 March 2018	27 June 2019
88	Construction of OFC duct	459 days	07 April 2018	24 June 2019
97	Construction of Water Supply Line	589 days	07 April 2018	27 October 2019
98	Procurement Finalisation	30 days	07 April 2018	06 May 2018
99	Dismantling of Road	450 days	18 April 2018	27 June 2019
100	Excavation	450 days	28 April 2018	06 July 2019
101	Construction of Manhole	450 days	08 May 2018	16 July 2019
102	Laying and jointing of pipe	400 days	14 May 2018	04 June 2019
103	Testing of joints	400 days	24 May 2018	14 June 2019
104	Fixing of RCC cover	500 days	22 June 2018	18 October 2019
105	Backfilling of Trenches	500 days	02 July 2018	27 October 2019
106	Constructuction of Gas pipe Line	489 days	07 April 2018	23 July 2019
115	Reconstruction of Roads	593 days	10 June 2018	04 January 2020



Project: Ducting.mpp
Date: 29 November 2017

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress

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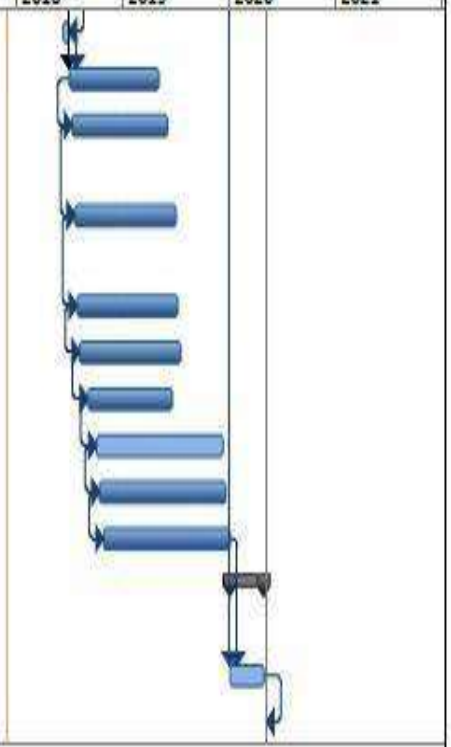
ID	Task Name	Duration	Start	Finish
116	Site Clearance	21 days	10 June 2018	01 July 2018
117	Dismantling of Road	320 days	01 July 2018	05 May 2019
118	Preparing of Subbase	340 days	10 July 2018	03 June 2019
119	Preparation of Subgrade	360 days	20 July 2018	02 July 2019
120	Preparation of DLC	360 days	27 July 2018	09 July 2019
121	Laying of PQC	360 days	05 August 2018	19 July 2019
122	Filling for Shoulders	300 days	03 September 2018	20 June 2019
123	Fixing of kerbs	450 days	02 October 2018	11 December 2019
124	Paver Block Fixing	450 days	12 October 2018	20 December 2019
125	Finishing works	450 days	27 October 2018	04 January 2020
126	**Testing and Commissioning**	**120 days**	**04 January 2020**	**29 April 2020**
127	Intergarted run	120 days	04 January 2020	29 April 2020
128	Completion of work	1 day	09 May 2020	09 May 2020



Project: Ducting.mpp
Date: 29 November 2017

Task		External Milestone		Manual Summary Rollup	
Split		Inactive Task		Manual Summary	
Milestone		Inactive Milestone		Start-only	
Summary		Inactive Summary		Finish-only	
Project Summary		Manual Task		Deadline	
External Tasks		Duration-only		Progress	

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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 -

i. 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.

In case the work is not completed within the stipulated period of completion along with all such extensions which are not 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 maximum of 10% of contract price.

The decision of Executive Director, USCL shall be final and binding upon both the parties.

ANNEXURE – Q
List of Equipment for Quality Control Laboratory

As per Annexure I (Form I-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 after 12 months only from work commencement date
- 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 B a n k) o f _____[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_____20___

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 120 days or more.

ANNEXURE – S2

BANK GUARANTEE FORMAT
FOR EARNEST MONEY DEPOSIT

UNCONDITIONAL AND IRREVOCABLE BANK GUARANTEE
Bank Guarantee No.: _____ Dated: _____ Issuer of Bank Guarantee:

_____
(Name of the Bank)

_____

_____

(hereinafter referred to as the "Bank")
Beneficiary of Bank Guarantee:
UJJAIN Smart City Limited (hereinafter referred to as the "Authority")

Nature of Bank Guarantee:
Unconditional and irrevocable Bank Guarantee.
Context of Bank Guarantee:
Whereas the Ujjain Smart City Limited (the "Authority") has invited bids by its Request for Bid dated …… (the "RFP") for the Insert the name of the Project ("Project") in Ujjain, Madhya Pradesh. Whereas in accordance with the terms of the RFP, ……. <insert name of Bidder> is submitting a bid for the Project in ……. <Ujjain>, and is required to submit a security of Rs._____(Rupees_____ Only) with respect to the same.

Operative part of the Bank Guarantee:

1. At the request of the (Insert the name of the Bidder), we _____ _____(name and address of the bank), hereinafter referred to as the "Bank"), do hereby unconditionally and irrevocably affirm and undertake that we are the Guarantor and are responsible to the USCL i.e. the beneficiary on behalf of the Bidder, up to a total sum of Rs._____(Rupees_____ Only), such sum being payable by us to the USCL immediately upon receipt of first written demand from USCL.
2. We unconditionally and irrevocably undertake to pay to the USCL on an immediate basis, upon receipt of first written demand from the USCL and without any cavil or argument or delaying tactics or reference by us to Bidder and without any need for the USCL to convey to us any reasons for invocation of the Guarantee or to prove the failure on the part of the Bidder to repay the amount of_____or to show grounds or reasons for the demand or the sum specified therein, the entire sum or sums within the limits of Rs. (Rupees_____Only). We hereby waive the necessity of the USCL demanding the said amount from Bidder prior to serving the Demand Notice upon us.
3. We further agree and affirm that no change or addition to or other modification to the terms of the Agreement, shall in any way release us from any liability under this unconditional and irrevocable Guarantee and we hereby waive notice of any such change, addition or modification. We further agree that the USCL shall be the sole

and the exclusive judge to determine that whether or not any sum or sums are due and payable to him by Concessionaire, which are recoverable by the USCL by invocation of this Guarantee.

4. This Guarantee will not be discharged due to the change in constitution of the Bank or the Bidder. We undertake not to withdraw or revoke this Guarantee during its currency/ validity period, except with the previous written consent of the USCL.
5. We unconditionally and irrevocably undertake to pay to the USCL, any amount so demanded not exceeding Rs. _____(Rupees_____Only),

   notwithstanding any dispute or disputes raised by Bidder or anyone else in any suit or proceedings before any dispute review expert, arbitrator, court, tribunal or other authority, our liability under this Guarantee being absolute, unconditional and unequivocal. The payment so made by us under this Guarantee to the USCL, shall be a valid discharge of our liability for payment under this Guarantee and the Bidder shall have no claim against us for making such payment.
6. This unconditional and irrevocable Guarantee shall remain in full force and effect and shall remain valid until_____(180 days from the Bid due date).

Notwithstanding any contained herein:

1. Our liability under this Bank Guarantee shall not exceed Rs._____(Rupees - _____Only).
2. This unconditional and irrevocable Bank Guarantee shall be valid for a period of 180 days from_____(Bid Due Date).
   We are liable to pay the guaranteed amount or any part thereof under this unconditional and irrevocable Bank Guarantee only and only if Ujjain Smart City Limited (USCL) serves upon us a written claim or demand on or before _____.

_____
Authorized Signatory for Bank

ANNEXURE – T
(See clause 33 of Section 3 of GCC)

BANK GUARANTEE FORM FOR SECURED ADVANCE

INDENTURE FOR SECURED ADVANCES

This indenture made the _____ day of _____ 20__ BETWEEN _____(hereinafter called the contractor which expression shall where the context so admits or implies be deemed to include his executors, administrators and assigns) or the one part and the Employer of the other part.

Whereas by an agreement dated_____(hereinafter called the said agreement)

the contractor has agreed.

AND WHEREAS the contractor has applied to the Employer that he may be allowed advanced on the security of materials absolutely belonging to him and brought by him to the site of the works the subject of the said agreement for use in the construction of such of the works as he has undertaken to executive at rates fixed for the finished work (inclusive of the cost of materials and labour and other charges)

AND WHEREAS the Employer has agreed to advance to the Contractor the sum of Rupees _____ on the security of materials, the quantities and other particulars of which are detailed in Accounts of Secured Advance attached to the Running Account Bill for the said works signed by the Contractor on_____and the Employer has reserved to himself the option of making any further advance or advances on the authority of other materials brought by the Contractor to the site of the said works.

Now THIS INDENTURE WITNESSETH that in pursuance of the said agreement and in consideration of the sum of Rupees_____on or before the execution of these presents paid to the Contractor by the Employer (the receipt where of the Contractor doth hereby ‘acknowledge) and of such further advances (if any) as may be made to him as a for said the Contractor doth hereby covenant and agree with the President and declare as follows:

That the said sum of Rupees_____so advanced by the Employer to

(1) the Contractor as aforesaid and all or any further sum of sums advanced as aforesaid shall be employed by the Contractor in or towards expending the execution of the said works and for no other purpose whatsoever.

(2) That the materials details in the said Account of Secured Advances which have been offered to and accepted by the Employer as security are absolutely the Contractor’s own propriety and free from encumbrances of any kind and the contractor will not make any application for or receive a further advance, on the security Of materials which are not absolutely his own property and free from encumbrances of any kind and the Contractor indemnified the Employer against all claims to any materials in respect of which an advance has be made to him as aforesaid.

(3) That the materials detailed in the said account of Secured Advances and all other materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereafter called the said materials) shall be used by the Contractor solely in the execution of the said works in accordance with the directions of the Engineer.

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

(5) That the said materials shall not be removed from the site of the said works except with the written permission of the Engineer or an officer authorized by him on that behalf.

(6) That the advances shall be repayable in full when or before the Contract receives payment from the Employer of the price payable to him for the said works under the terms and provisions of the said agreement. Provided that if any intermediate payments are made to the Contractor on account of work done than on the occasion of each such payment the Employer-will be at liberty to make a recovery from the Contractor's bill for such payment by deducting there from the value of the said materials than actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amounts of the advances made under these presents were calculated.

(7) That if the Contractor shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents the total amount of the advance or advances that may still be owing of the Employer shall immediately on the happening of such default were payable by the Contractor to be the Employer together with interest thereon at twelve percent per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default

of the Contractor and the Contractor hereby covenants and agrees with the Employer to reply and pay the same respectively to him accordingly.

(8) That the Contractor hereby charges all the said materials with the repayment to the Employer of the said sum of Rupees_____and any further sum of sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the power contained therein if and whenever the covenant for payment and repayment here-in before contained shall become enforceable and the money owing shall not be paid in accordance there with the Employer may at any time thereafter adopt all or any of the following courses as he may deem best:

a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the contractor in accordance with the provision in that behalf contained in the said agreement debiting the contractor with the actual cost of effecting such completion and the amount due to the contractor with the value of work done as if he had carried it out in accordance with the said agreement and at the rates thereby provided. If the balance is against the contractor, he is to pay same to the Employer on demand.

b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale retain all the sums aforesaid repayable or

repayable to the Employer under these presents and pay over the surplus (if any) to the Contractor.

c) Deduct all or any part of the moneys owing out of the security deposit or any sum due to the Contractor under the said agreement.

(9) That except in the event of such default on the part of the contractor as aforesaid interest on the said advance shall not be payable.

(10) That in the event of any conflict between the provisions of these presents and the said agreement the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction or effect of these presents the settlement of which has not been here-in-before expressly provided for the same shall be referred to the Employer whose decision shall be final and the provision of the Indian Arbitration Act for the time being in force shall apply to any such reference.

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
Ujjain Smart City Limited, Ujjain

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 data/information provided with the Bid document in the form of detailed project report is meant for the reference and guidance only to the bidders. The successful bidder 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 prepare the proposal and get the approval of same from the employer. The Employer shall not be responsible for the accuracy/adequacy of the data/information provided and interpretation thereof on the same 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. 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 UMC 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)

4. 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.

Contractor shall keep provision of compensatory plantation in lieu of trees cut down in the process of development and construction. The contractor shall compensate plantation of 10 trees against felling/cutting of each mature tree. The area for compensatory tree plantation shall be decided in consultation with the employer. The contractor shall be responsible for protection, up-keeping, and watch & ward of the said compensatory plantation till 5 years of Projects defect liability period.

5. 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.

6. 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 minimize impacts on local communities.

7. 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.

8. 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.

9. Arrangement for Traffic During Construction

9.1 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 an 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 with required safety devices. 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

9.2 Passage of Traffic along a Part of the Existing Carriageway under improvement

a. 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.

b. 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.

9.3 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.

9.4 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.

10. 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.

11. 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.

12. 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

USCL at his risk and cost.

13. 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.

14. Safety Guidelines

i. Proper and correct lifting methods shall be adopted.

ii. All lifting tools, tackles and wire 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 USCL 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

i. 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.

ii. Safe cross walkways are to be provided at distances not more than 30 meters along a continuous trenching for pipelines etc.

iii. 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.

iv. 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.

v. Install Barricading as per IS code with the marking "Ujjain Smart City Works".

B. ELECTRICAL WORKS

i. 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.

ii. Hard hats (safety helmets) made out of insulating material to be used by personnel working in 'live' areas like substations, etc.

iii. Safety boots, necessary hand-gloves as required, shall be used.

iv. 'Earthing' 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.

v. The areas of working during nights shall be properly illuminated with floodlights and hand- Hard hats (safety helmets), safety belts, eye goggles, face shields, safety boots, hand- gloves, respirators, etc as required/ directed shall be used.

vi. Proper, correct and safe lifting methods shall be adopted

vii. 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.

viii. 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.

ix. Usage of hoisting belts/ safety belts is must for personnel working at higher elevations.

x. Only safe gangways / walkways shall be used for movement of personnel. Short cuts shall be avoided.

xi. Check connections to headman anchors before hoisting.

xii. All live wires to be crossed during hoisting shall be made dead near the vicinity of the area during hoisting/ rigging.

xiii. Avoid keeping the loads supported by hoisting equipments for an unreasonable length of time.

xiv. Ropes, cables, and slings must be protected with pads or wooden blocks at sharp edges.

xv. lamps as per the demand of the job.

xvi. Danger signals and safety tags in the live areas shall be demonstrated properly. All connections to be switched off after the working hours.

xvii. Isolation switches and main switches shall be accessible easily. Necessary precautions should be taken while excavating earthing pits.

xviii. All works shall be carried out in strict accordance to the norms, procedure and specifications issued and enforced by BIS in Relevant Indian Standard specifications and code of Practices with up to date amendments and revisions, latest edition of National building code and National electric code. In addition, the installation shall comply in all respects with the requirements of Indian. Electricity Act 2003 and Indian Electricity Rule 1956 with up to date amendments and revisions and special requirements if any of the M.P. State Electricity Board or Chief Electrical Advisor to Government of Madhya Pradesh cum Chief Electrical Inspector and his subordinate office.

xix. The contractor shall make his own arrangements for supply of water and electricity at his expense required for execution of work. The USCL shall neither make any such arrangements nor shall make any payments in this regard.

xx. The contractor has to construct at his own cost his site office and store at site on a suitable place and location as permitted by USCL. The USCL shall not provide any place for storage of equipments required for work. No amount shall be paid to the contractor in this regard.

xxi. Proper upkeep and maintenance and safety of store and stocks of materials brought at site shall be the sole responsibility of the contractor. The materials got damaged due to negligence of its up keeping at site or due to mishandling shall have to be replaced by the contractor at his own cost. On discovery of such damages the USCL shall recover the amount paid through the running bills to the contractor and shall only be reimbursed after the replacement of the same. The USCL shall also not be responsible for theft of materials from site and the contractor has to replace all such materials at his own cost. No compensation whatsoever shall be payable to the contractor on above grounds.

xxii. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delay in commencement or execution for work whatever the cause of delay may be including delay arising out of other materials, supply of materials, transportation for any matter related with MPPKVV Co. Ltd. & Electrical Safety Department or any other reasons whatsoever, the USCL shall not be liable for any claim in respect thereof.

xxiii. The contractor shall finalize the layout of work, physically at site, and get approved by MPPKVV Co. Ltd. Before placing orders for material. Approval of above layout by MPPKVV Co. Ltd. shall be general and shall not absolve the contractor with responsibility of its correctness.

xxiv. The contractor shall within specified period from the date of issue of work order shall prepare all relevant drawings to be submitted to the applicable office of Electrical Inspector MP Govt or any other competent office for approval. All required sanctions and approvals form the above offices shall have to be obtained by the contractor within the above stipulated period at his own cost.

xxv. Rate quoted shall be applicable for works at all height unless otherwise specified in the schedule of quantities.

xxvi. The contractor shall submit the drawing in three sets to USCL for this work duly approved by the Office of the electrical Inspector MP govt. and MPPKVV Co. Ltd. Within specified days from the date of work order. The approval of these drawing will be general and will not absolve the contractor of the Responsibility of the correctness of those drawings.

xxvii. The contractor shall submit test reports of the equipment to be supplied and drawings for approval of the Engineer in Charge before supplying the equipment. The successful tenderer shall also submit the purchase bill of all items as required and directed at no cost.

xxviii.(A) The contractor shall have to arrange all free of cost facilities for the inspection, such as employ or material labour etc. and any fees payable to Government or any competent authority at his own cost. The contractor shall arrange to obtain all sanctions from the concerning office of MPPKVV Co. Ltd. and from the elect. inspector Govt. of M.P. at his own cost. Any fees in respect of above work paid by the contractor shall not be reimbursed or refunded by the USCL and no claim for compensation shall be entertained in this regard. Copy of all such sanctions have to be submitted to Engineer In charge USCL.

xxix.(B) The contractor has to arrange factory inspection of all major items as required by Engineer in Charge at the manufacturer's works before dispatch of material. Date of inspection should be informed 15 days in advance to USCL. The contractor has to get any equipment or complete installation checked and tested by any Government/ Semi Government/ Private authority such as CPRI, BHEL, NABL laboratory, Testing department of MPPKVV Co. Ltd. etc. at his own cost. He shall also provide free of cost all labour, material, equipments etc. for the purpose of above testing. The contractor shall not be entitled for any compensation on this ground. If required by Engineer in Charge contractor will have to arrange for third party inspection of entire installation done by him and he will have to rectify / repair / replace any defects pointed out by inspection agency.

(C) The consultant appointed by USCL is authorized for following:

a) To visit the site from time to time to inspect the quality of work.

b) To issue working drawings with specifications to the contractor.

c) Technically guide the contractor if required.

d) To accompany USCL officials for factory inspections of material if required.

xxx. The contractor shall be responsible for removal of all defects and shall make rectification in the work at his own cost if any at the time of handing over the installation to MPVV Co. Ltd. without any claim for compensation.

xxxi. It shall be the duty of the contractor to arrange all clearances from Electrical Inspector MP Govt, to coordinate and peruse the officers of MPPKVV Co. Ltd. for periodical inspections during the currency of contract and final inspection of the work and get the complete installation electrically charged. No extra payment shall be made to the contractor in above account.

xxxii. The contractor at his own cost and efforts shall arrange periodical inspection of work by various officers of MPPKVV Co. Ltd. during course of execution of work and any instruction issued by the officers of MPPKVV Co. Ltd. shall be communicated to USCL in writing by the contractor and prior permission shall be taken from USCL before its compliance.

xxxiii. The contractor should note that any delay / on the part of MPPKVV Co. Ltd. on any account what so ever shall not be entertained as a reason for time extensions in case of delay in completion of the work covered under this entire contract. The tenderer should therefore be aware and should not that execution and timely completion of External Electrification work in full coordination with other development and construction works covered under the scope of contract shall be sole responsibility of successful tenderer.

xxxiv. The complete installation shall be guaranteed for 5 years of defects liability period after physical completion of work. The date of handing over the installation to MPPKVV Co. Ltd. by contractor shall be the date of completion of physical work.

xxxv. The contractor has to quote his rates in strict accordance to the list of approved make of materials. The tenderer has to ensure before filling up the rates regarding their availability and period of delivery.

xxxvi. The contractor shall note that during the execution of works there is likelihood in change of layout, specification and change in quantities of items entered in the schedule of items for which the contractor has tendered his rates. The increase or decrease in the quantities of such items may be up to any extent and the tenderer shall not be entitled to any compensation for any loss suffered by him on account or procurement of additional quantities of such items due to such changes.

xxxvii. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delay in commencement or execution of work whatever the cause of delay may be including delay arising out of other materials or any reasons whatever and the USCL shall not be liable for any claim in respect thereof.

xxxviii. All dismantled material to be deposited at M.P.P.K.V.V.C.L. store by the contractor without any extra cost.

xxxix. The contractor shall if required arrange for temporary mobile / trolley mounted distribution substations of required capacity to give supply to the areas being fed from the existing pole mounted transformer / transformers being removed. This will be necessary at the places where new transformer / CSS are to be installed at the same place from where pole mounted existing transformer / transformers are being removed. No extra payment shall be made for the temporary mobile / trolley substations and associated temporary HT and LT cabling done for charging the same. The contractor shall be responsible for all necessary statutory permissions required for this purpose.

xl. Successful Tenderer should have A-Class Electrical license issued by M.P. Licensing Board. The license must be submitted at the time of agreement.

C. GENERAL

i. 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.

ii. Proper communication and alertness on the job is to be ensured.

iii. Manholes and openings for ducts etc shall be kept properly covered.

iv. Correct tools and tackles should be used for every work. Make shift tools and tackles will result in accidents.

v. Fire-fighting equipment shall be placed at designated locations and kept unobstructed.

vi. Do not use loose clothing, neckties, and etc. while on the job.

vii. Safety precautions recommended by the manufacturers/ vendors shall be strictly adhered to.

viii. All machinery, tools and tackles shall be maintained properly, and clearly.

15. Encumbrances in Construction Area, including Trees and Utilities -

i. 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.

ii. 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.

iii. 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.

iv. 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.

v. 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.

16. 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 UMC officials and supply two copies of colour record photographs mounted in the albums including negatives with specification and these shall be kept by Employer.

17. 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 UMC officials at selected points of project site giving such information as considered necessary for public awareness/ information.

18. 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 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.

19. Execution of work according to Time Schedule

i. 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.

ii. 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.

iii. 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.

iv. 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.

20. Working Procedure

The Contractor shall be required to adopt a Working Procedure based on the following:

i. 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.

ii. 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 USCL from time to time.

iii. 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.

iv. Provide for all temporary arrangements essential to allow normal operations / living conditions for people as well as businesses.

21. Coordination with other Contractors

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 contractors will need to work simultaneously and ensure proper mutual coordination to avoid any hardships to the community. USCL reserves the right to require each Contractor to schedule the order of performance of their Work in such a manner as will minimize interference with work of any of the parties involved. As shown in the table below, three contractors will need to work simultaneously.

Description of Work	Responsibility	Implementation Strategy
1. Roads widening /improvement and laying of Footpath, Central Divider, RCC Cable Duct, HDPE Pipe Ducts for OFC, Telecom Lines and Gas Pipeline, RCC Pipes for Storm Water Drainage and Chambers, including appurtenances signages, road markings and adjunct structures.	Contractor 1	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.
a. Water supply network (transmission /distribution) including all appurtenances and structures – upto house connections	Contractor 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.
b. Sewerage pipes and manholes – upto house connections	Contractor 2	
c. Treated Sewage Effluent supply network including appurtenances and structures – upto supply / discharge points.	Contractor 2	
d. Power cables (HV / LV), Substations, Distribution Boxes / Feeder Pillars etc. upto house connections and Street-lighting.	Contractor 3	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.

22. Material Storage

All materials shall be stored as per IS:4082.

Section 4

Bill of Quantities

This section contains the following tables:

1. General abstract of all components of the project and given in Table 4.1 consisting the corresponding cost and percentage with respect to the total project cost.

2. Table 4.2 bills of quantities for civil components of the project.

3. Table 4.3 bills of quantities for electrical components of the project.

TABLE 4.1 GENERAL ABSTRACT FOR PROJECT COMPONENTS

S. No.	Items	Percentage of contract value	Cost
1	Geotechnical investigation, survey, scanning roads for existing services such as water supply lines, gas pipeline, OFC cables, CCTV camera cables and power supply lines and designing road, water supply, underground storm water drainage, utility ducts and for electrification works in ABD area.	@.5% of the contract value.	₹12,000,000
2	Civil Infrastructure Work consisting:	48%	
a	Utility ducts for power supply and OFC cable laying, and construction of pole foundation,		₹477,145,581.00
b	Road re-construction including footpath		₹ 450,630,385.00
c	Retrofitting of surface drains.		₹ 224,601,957.00
3 a	Construction of underground storm water drainage system	27%	₹ 432,095,389.00
3 b	Retrofitting of existing water supply		₹ 218,857,248.00
4	Underground power supply cable laying and providing, installation and commissioning of allied electrical infrastructure.	25%	₹ 599,043,615.00
		TOTAL	₹ 2,414,386,045.88

(A) CIVIL WORKS

TABLE 4.2 BILL OF QUANTITIES FOR CIVIL COMPONENTS:

UJJAIN SMART CITY LTD.					
BILL OF THE QUANTITIES					
COST ABSTRACT FOR LAYING OF STROM SEWER DUCT IN ABD AREA					
S.NO	**DESCRIPTION**	**UOM**	**QUANTITY**	**RATE**	**AMOUNT**
A	**EARTHWORK**				
1	Earth work in Excavation for pipe trench in all kinds of soil and 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. (Volume I Item No. 15.1 UADD SOR 2012)	Cum	202780	₹ 116.28	₹ 23,579,258.00
2	Extra for every additional lift of 1.5m or part there of (Volume I, Item No. 15.4 UADD SOR 2012)	Cum	62411	₹ 4.50	₹ 280,850.00
3	Filling with moorum for pipe bedding or over the pipe including supply of moorum. (Volume I, Item No. 15.9 UADD SOR)	Cum	111844	₹ 562.50	₹ 62,912,250.00
B	**CONCRETE WORKS**				
4	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & shuttering.				
	In Plinth & foundation	Cum	1174	₹ 3,235.50	₹ 3,799,124.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF STROM SEWER DUCT IN ABD AREA

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
5	Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centering, shuttering, finishing and including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in- charge. M-20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement				
	Cement Concrete grade M-20	Cum	5470	₹ 4,848.30	₹ 26,518,365.00
6	Supplying and fiitting and placeing uncoated HYSD bar reinforcement in foundation complete as per drawing and technical specification and relavant clauses of Section.(Volume I item no 15.22(E) UADD SOR 2012)				
i	In foundations	kgs	464918	₹ 49.50	₹ 23,013,432.00
C	**MISCELLANEOUS WORKS**				
7	Construction of circular type of manhole 1500 mm internal dia. at bottom, 560 mm dia at top, total depth of manhole 2650mm in brick masonry with 1:5 cement mortar (1 cement : 5 fine sand), 12 mm thick Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. 30 cm thick foundation in Cement concrete grade M-7.5 (Nominal Mix) with stone aggregate 40 mm nominal size, RCC Cement Concrete grade M-20 (Nominal Mix) with 20mm Nominal size on top slab and making channel in cement concrete grade M-15 (Nominal Mix) with stone aggregate 20 mm nominal size neatly finished, curing fixing of ISI marked reinforced concrete heavy duty cover (including transportation of cover) complete. as per standard design (Drawing No. 15) (Volume I, Item No. 14 UADD SOR)	nos	1170	₹ 21,834.00	₹ 25,545,780.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF STROM SEWER DUCT IN ABD AREA

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
8	Dismanting of flexible pavments and disposal of Dismantled materials upto a lead of 1000 m ,stacking serviceable and unserviciable material separately and as per relavant clauses of section 200. (Volume III ITEM NO. 2.4 UADD SOR 2012)				
i	Bituminous courses	Cum	7469	₹ 322.20	₹ 2,406,641.00
9	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead. (Volume I Item No. 15.16.1 UADD SOR 2012)	Cum	17356	₹ 632.70	₹ 10,980,888.00
10	Providing and Laying non-pressure (NP4) RCC socket & spigot pipes with rubber gasket jointi ncluding testing of joints. [Conforming to IS ;458-1988, ISI marked laying as per IS 783:1985) (Volume I Item No. 13.3 UADD SOR 2012)				
	450mm dia	m	3292	₹ 2,023.20	₹ 6,660,374.00
	500mm dia	m	758	₹ 2,244.60	₹ 1,701,407.00
	600mm dia	m	5756	₹ 3,160.80	₹ 18,193,565.00
	700mm dia	m	2480	₹ 3,804.30	₹ 9,434,664.00
	800mm dia	m	10228	₹ 4,896.00	₹ 50,076,288.00
	900mm dia	m	156	₹ 5,969.70	₹ 931,273.00
	1000mmdia	m	8524	₹ 6,367.50	₹ 54,276,570.00
	1200 mm dia	m	2269	₹ 8,647.20	₹ 19,620,497.00
	1400 mm dia	m	4062	₹ 11,036.70	₹ 44,831,075.00
	1600 mm dia	m	2759	₹ 13,162.50	₹ 36,315,338.00
11	Providing First class Bedding Below Hume pipes with Granular Material as per Clause 2904 of specifications (Volume III Item No. 14.18 UADD SOR 2012)	Cum	8157	₹ 440.10	₹ 3,589,896.00
12	Providing and Fixing ISI marked RCC Manhole Cover.				
	600mm dia extra heavy duty.	Nos.	1256	₹ 1,495.80	₹ 1,877,977.00
13	Steel work is welded in built-up section tee & frame i/c cutting hoisting/fixing and painting with red lead paint. (i) In R.S. Joint in flat iron /angle / channel / bar.	Kgs	89370	₹ 62.10	₹ 5,549,877.00
	TOTAL COST				**₹ 432,095,389.00**

Rupees Forty-Three Crores Twenty Lakhs Ninety-Five Thousand Three Hundred Eighty-Nine only

UJJAIN SMART CITY LTD.					
BILL OF THE QUANTITIES					
COST ABSTRACT FOR RETROFITTING OF EXISTING WATER SUPPLY LINE					
S.NO	**DESCRIPTION**	**UOM**	**QUANTITY**	**RATE**	**AMOUNT**
1	Dismantling C.I. pipes including excavation and refilling trenches after taking out the pipes, manually/ by mechanical means breaking lead caulked joints, melting of lead and making into blocks including stacking of pipes, lead at site within 50 meter lead as per direction of Engineer- in-charge				
i	Above 150 mm dia up to 300 mm dia.	Rm	16000	₹ 101.70	₹ 1,627,200.00
ii	Above 300 mm diameter	Rm	7400	₹ 136.80	₹ 1,012,320.00
2	Dismantling of C.I. sluice valve including stacking of useful materials within a lead of 50 meters.				
	Up to 150 mm diameter	Each	10	₹ 58.50	₹ 585.00
	Above 150 mm diameter	Each	10	₹ 202.50	₹ 2,025.00
3	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)				
i	350mm diameter		2000	₹ 3,488.40	₹ 6,976,800.00
ii	400mm diameter		800	₹ 4,351.50	₹ 3,481,200.00
4	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) 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)				
i	400mm diameter	Rm	500	₹ 4,948.20	₹ 2,474,100.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR RETROFITTING OF EXISTING WATER SUPPLY LINE

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
5	Providing, laying, Jointing & field testing of High Density Polyethylene pipes, (HDPE) confirming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of Teflon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion				
	110mm dia		54000	₹ 280.80	₹ 15,163,200.00
	160 mm dia		24480	₹ 898.20	₹ 21,987,936.00
	200 mm dia		36120	₹ 1,404.00	₹ 50,712,480.00
	250 mm dia		24120	₹ 2,172.60	₹ 52,403,112.00
	315 mm dia		10000	₹ 3,430.80	₹ 34,308,000.00
	400mm dia		6000	₹ 3,658.50	₹ 21,951,000.00
6	Providing and fixing GM or brass ferrules confirming to IS-2692/1984 (Reaffirmed 2005), tested to 21.09 kg/sq.cm. i/c boring and tapping the main				
	15mm	Each	5000	₹ 297.00	₹ 1,485,000.00
7	Supply & Installation of Domestic Water Meters of inferential type, multijet, magnetically coupled, having dry dial, straight reading Class B conforming to is : 779/1994, ISO and EEC approved, including transportation to site, storage,safety, installation installation taxes. Dia in mm as per specifications including all.				
	15mm	Each	5000	₹ 1,036.80	₹ 5,184,000.00
8	Chamber 50x45x60cm with 500x450mm CI Horizontal grating with	Each	30	₹ 2,943.00	₹ 88,290.00
	TOTAL				**₹ 218,857,248.00**
	Rupees Twenty one crores Eighty Eight Lakhs Fifty Seven Thousand Two Hundred Forty Eight.				

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF ELECTRICAL LINE DUCT IN ABD AREA(HDPE)

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
A	**EARTHWORK**				
1	Earth work in Excavation for pipe trench in all kinds of soil and 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. (Volume I, Item No. 15.1 UADD SOR 2012) .	Cum	100709	₹ 116.28	₹ 11,710,412.00
	Extra for every additional lift of 1.5m or part there of (Volume I, Item No. 15.4 UADD SOR 2012) .	Cum	18000	₹ 4.50	₹ 81,000.00
2	Filling with moorum for pipe bedding or over the pipe including supply of moorum. (Volume I Item No. 15.9 UADD SOR 2012)	Cum	83093	₹ 562.50	₹ 46,739,813.00
3	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & shuttering.(item no15.18 page 153 Vol -1 UADD SOR)	cum	2086	₹ 3,235.50	₹ 6,749,253.00
4	Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centering, shuttering, finishing and including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in- charge. M-20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement (item no15.19 page 153 Vol -1 UADD SOR)				
i	Cement Concrete grade M-20	Cum	5873	₹ 4,848.30	₹ 28,475,937.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF ELECTRICAL LINE DUCT IN ABD AREA(HDPE)

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
6	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage (Iten 15.22a page no 155 Volume 1 UADD SOR)				
i	In foundations	Kgs	413961	₹ 49.50	₹ 20,491,071.00
7	Dismanting of flexible pavments and disposal of Dismantled materials upto a lead of 1000 m ,stacking serviceable and unserviciable material separately and as per relavant clauses of section 200. ITEM NO. 2.4 Volume III UADD SOR 2012 (R&B)				
i	Bituminous courses	Cum	5024	₹ 322.20	₹ 1,618,810.00
8	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead.(item 15.16.1 page 152 Volume 1)	Cum	10012	₹ 632.70	₹ 6,334,732.00
9	Providing, laying, Jointing & field testing of High Density Polyethylene pipes, (HDPE) confirming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of Teflon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion machine (50mm and above fusion jointed and below 50 mm mechanical jointed (6kg/sqcm).Item No. 8.1 Volume I UADD SOR 2012	rm			
i	75mm dia		176040	₹ 143.10	₹ 25,191,324.00
iii	250 mm dia		168472	₹ 1,411.20	₹ 237,747,686.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF ELECTRICAL LINE DUCT IN ABD AREA(HDPE)

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
10	Providing and Laying non-pressure (NP3) RCC socket & spigot pipes with rubber gasket jointi ncluding testing of joints. [Conforming to IS ;458-1988, ISI marked laying as per IS 783:1985) (Volume I Item No. 13.3 UADD SOR 2012)				
i	300mm dia	m	7200	₹ 744.30	₹ 5,358,960.00
11	Providing and Fixing ISI marked RCC Manhole Cover.				
	600mm dia extra heavy duty .	Nos.	4081	₹ 1,495.80	₹ 6,104,360.00
	450x600mm	Nos.	1224	₹ 3,045.60	₹ 3,728,728.00
	600x900	Nos.	2857	₹ 3,052.80	₹ 8,720,934.00
	TOTAL				**₹ 409,053,020.00**
	Rupees Forty Crores Ninety Lakhs Fifty Three thousand and Twenty only				

UJJAIN SMART CITY LTD.					
BILL OF THE QUANTITIES					
COST ABSTRACT FOR LAYING OF OFC LINE IN ABD AREA					
S.NO	**DESCRIPTION**	**UOM**	**QUANTITY**	**RATE**	**AMOUNT**
A	**EARTHWORK**				
1	Earth work in Excavation for pipe trench in all kinds of soil and 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. (Volume I Item No. 15.1 UADD SOR 2012)	Cum	14715.00	₹ 116.28	₹ 1,711,060.00
2	Filling with moorum for pipe bedding or over the pipe including supply of moorum. (Volume I, Item No. 15.9 UADD SOR)	Cum	13664.00	₹ 562.50	₹ 7,686,000.00
3	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone including cost of centering & shuttering.				
i	PCC in foundation	Cum	40.00	₹ 2,890.80	₹ 115,632.00
4	Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centering, shuttering, finishing and including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge. M-20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement			₹ 0.00	
i	Cement Concrete grade M-20	Cum	649	₹ 4,848.30	₹ 3,148,173.00

UJJAIN SMART CITY LTD.					
BILL OF THE QUANTITIES					
COST ABSTRACT FOR LAYING OF OFC LINE IN ABD AREA					
S.NO	**DESCRIPTION**	**UOM**	**QUANTITY**	**RATE**	**AMOUNT**
5	Supplying and fiitting and placeing uncoated HYSD bar reinforcement in foundation complete as per drawing and technical specification and relavant clauses of Section.Volume I item no 15.22(E) UADD SOR 2012				
i	In foundations	Sqm	20038.73	₹ 49.50	₹ 991,917.00
6	Dismanting of flexible pavments and disposal of Dismantled materials upto a lead of 1000 m ,stacking serviceable and unserviciable material separately and as per relavant clauses of section 200. ITEM NO. 2.4 Volume III UADD SOR 2012 (R&B)				
i	Bituminous courses	Cum	2895.00	₹ 322.20	₹ 932,769.00
7	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead. (Volume I Item No. 15.16.1 UADD SOR 2012)	Cum	2318.9	₹ 632.70	₹ 1,467,155.00
8	Providing, laying, Jointing & field testing of High Density Polyethylene pipes, (HDPE) confirming to IS 4984/ 14151/ 12786/ 13488 with necessary jointing material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of Teflon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic Jacks/ But fusion machine (50mm and above fusion jointed and below 50 mm mechanical jointed (6kg/sqcm).Item No. 8.1 Volume I UADD SOR 2012	rm	781379.20	₹ 66.60	₹ 52,039,855.00
9	Providing and Fixing ISI marked RCC Manhole Cover.				
	600mm dia extra heavy duty .	Nos.	250	₹ 1,495.80	₹ 373,950.00
	TOTAL				**₹ 68,092,561.00**

Rupees Six crores Eighty Lakhs Ninety Two Thousand Five Hundred Sixty One Only.

UJJAIN SMART CITY LTD.						
BILL OF QUANTITIES						
RETROFITTING OF EXISTING OPEN STROM WATER DRAINS						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
1	15.3	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 meters lead as per direction of Engineer-in-	cum	7366	₹ 624.60	₹ 4,600,804.00
2	3.16	Excavation in all kinds of soil for drainage work by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5m in width including disposal of excavated earth, lead upto 50m and lift				
i	a)	upto 1.5m, disposed earth to be levelled and neatly dressed.	cum	30333	₹ 89.10	₹ 2,702,670.00
3	6.10.4	Providing and laying cement concrete grade 1:3:6 with 40mm graded crushed stone aggregate, (M-10 nominal mix) including the cost of centering and shuttering. Compacting with appropriate method, finishing and curing and as per relevant clauses of section.603.				
i	a)	PCC Grade M10 with 40 mm maximum size of aggregate	Cum	3553	₹ 2,597.40	₹ 9,228,562.00

UJJAIN SMART CITY LTD.						
BILL OF QUANTITIES						
RETROFITTING OF EXISTING OPEN STROM WATER DRAINS						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
4	15.19	Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centering, shuttering, finishing and including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in- charge. M-20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement.	cum	8104	₹ 4,848.30	₹ 39,290,623.00
5	15.22 E	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage	`ton	283333.00	₹ 49.50	₹ 14,024,984.00
6	15.22 (D)	Steel work is welded in built-up section tee & frame i/c cutting hoisting/fixing and painting with red lead paint. (i) In R.S. Joint in flat iron /angle / channel / bar	kg	1347666.00	₹ 60.30	₹ 81,264,260.00
7	14.9.4	Providing & fixing of ISI marked pre cast reinforced cement concretemanhole cover including frame and transporting at site, cost of all material etc.	Nos	24073	₹ 3,052.80	₹ 73,490,054.00
TOTAL COST						₹ 224,601,957.00
Rupees Twenty two crores Forty Six Lakhs One thousand Nine Hundred Fifty Seven Only						

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

COST ABSTRACT FOR LAYING OF GAS PIPE LINE

S.NO	DESCRIPTION	UOM	QUANTITY	RATE	AMOUNT
1	Providing and Supplying Blue MDPE pipes conforming to ISO 4427:1996 manufactured from virgin resin PE 80 Food grade compounded Raw Material having Blue Colour only with quality assurance certificate from quality agencies like WRC/ CIPET (India)/ DVGM/KIWA/SPGN etc. for usage in Drinking Water System The cost shall include testing of all materials, all taxes Central, State, Municipal, Inspection charges, transportation upto site, transitinsurance, loading, unloading, stacking etc. complete.UADD SOR ITEM 8.11.1				
	PN 16 (SDR 9)				
i	110mm dia	Rm	50000	₹ 473.40	₹ 23,670,000.00
	TOTAL				₹ 23,670,000.00
	RUPEES TWO CRORES THIRTY-SIX LAKHS SEVENTY THOUSAND ONLY				

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
1		**DISMANTLING**				
A	2.4	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 meter, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200. (Ref. Spacification 2012 part 3 roads and bridges)				
(i)	a)	Bituminous courses	Cum	7515.00	₹ 322.20	₹ 2,421,333.00
(ii)	b)	Granular courses	Cum	11273.00	₹ 222.30	₹ 2,505,988.00
B	2.5	Dismantling of cement concrete pavement i/c breaking in to pieces not exceeding 0.02 cum in volume and stock piling at designated locations and disposal of dismantled materials up to a lead upto 1000 meter, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200 (Ref. Specification 2012 part 3 roads and bridges)				
(i)	a)	Concrete Pavement	Cum	18492.00	₹ 644.40	₹ 11,916,245.00
(ii)	b)	Granular courses	Cum	6798.00	₹ 222.30	₹ 1,511,195.00
			(A)			**₹ 18,354,761.00**
2		**EARTH WORK EXACAVTION**				
A	3.1	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto 1000 meters and as per relevant clauses of section-300.				
(i)	a)	In all kind of Soil	Cum	8642.8	₹ 88.20	₹ 762,295.00
(ii)	3.6	Excavation for roadway in marshy soil with hydraulic excavator including cutting and loading in tippers and disposal with in all lifts and lead upto 1000 meters, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections and as per relevant clauses of section-300.	Cum	1525.2	₹ 124.20	₹ 189,430.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
3		**CARRIAGE OF MATERIALS**				
A	1	Loading and unloading of Excavated & Dismantled stone boulder / stone aggregates / sand / kanker / moorum/ Sand. (Placing tipper at loading point, loading with front end loader, dumping, turning for return trip, excluding time for haulage and return trip)				
a	1.1	Transportation of material				
i)	i)	For a lead upto 1 Km.	Cum			
ii)	ii)	For a lead upto 2 Km.	Cum			
iii)	iii)	For a lead upto 3 Km.	Cum	54246	₹ 79.20	₹ 4,296,283.00
iv)	iv)	For a lead upto 4 Km.	Cum			
v)	v)	For a lead upto 5 Km.	Cum			
vi)	vi)	Beyond 5 Kms. and upto 10 Kms. (Add for every 1 Km)	Cum			
vii)	vii)	Beyond 10 Kms. and upto 20 Kms. (Add for every 1 Km)	Cum			
			(B)			**₹ 5,248,008.00**
4		**SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS**				
A	4.1	Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with on prepared surface, mixing by mix in place method at OMC, and compacting with vibratory roller to achieve the desired density, complete in all respect and as per relevant clauses of section-400.				
a	(i)	for grading- II Material in Carriage way	Cum	37582.00	₹ 552.60	₹ 20,767,813.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
5		**CEMENT CONCRETE PAVEMENTS**				
A	6.1	Construction of dry lean cement concrete Sub-base over a prepared sub-grade with coarse and fine aggregate conforming to IS: 383, the size of coarse aggregate not exceeding 25mm, aggregate cement ratio not to exceed 15:1, aggregate gradation after blending to be as per table of MORTH Specifications 600-1, cement content not to be less than 200 kg/cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant, transported to site, laid with paver with electronic sensor/mechanical paver, compacting with 8-10 tonnes vibratory roller, finishing and curing and as per relevant clauses of section-603.	Cum	28186.00	₹ 2,443.50	₹ 68,872,491.00
	6.2	Deduct from Item No.6.1 above if paver with Electronic sensor, vibratory roller are not used and laying, compaction is done by any other method	Cum		₹ 171.00	
B	6.3	Construction of dowel jointed, plain cement concrete pavement in M-40 grade concrete over a prepared sub base with 43 or higher grade cement, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design, transported to site, laid with a fixed form or slip form paver with electronic sensor, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, placing of dowel bar and tie rod, admixtures as approved, curing compound, finishing to lines and grades as per approved drawings as per IRC-15	cum	44478.00	₹ 4,312.80	₹ 191,824,718.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
		2002 and as per relevant clauses of section-602 of of MORTH specifications complete but excluding cost of steel in dowel bar & tie rod etc..				
	6.4	Deduct from Item No.6.3 above if paver with electronic sensor is not used and laying, compaction is done by any other method (The acceptance criteria regarding level, thickness, surface regularity, texture finish, strength of concrete and all other quality control measures shall be the same as in case of machine laid work.)	cum		₹ 301.50	
C	6.12	Add extra in Item No.- 6.3 & 6.5 above for the cost of steel in dowel bar and tie rod etc. required as per design.				
a	6.12.1	Mild Steel dowel bars	MT	416.437	₹ 43,065.00	₹ 17,933,838.00
	6.12.2	Tor steel tie rod	MT	31.075	₹ 47,520.00	₹ 1,476,685.00
			(C)			**₹ 300,875,545.00**
6		**CONSTRUCTION OF PEDASTRIAN WAY**				
A	3.11	Construction of Embankment/Sub grade/ earth shoulders, as per clause 305 & its sub-clauses, Where required but with approved materials/soil like morrum CBR value not less then 7% i/c all lead & lifts i/c excavation, cost of watering, compaction and maintenance of surface during construction to ensure shedding & preventing ponding of water (clause 305.3.6) shaping & dressing (clause 305.3.7), finishing etc. complete but excluding scarifying existing granular/bituminous road surface vide clause 305.6.	Cum	12176.00	₹ 244.80	₹ 2,980,685.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
B	8.1	Construction of cement concrete kerb with top and bottom width 115 and 165 mm respectively, 250 mm high in M 20 grade PCC on M-10 grade foundation 150 mm thick, foundation having 50 mm projection beyond kerb stone, kerb stone laid with kerb laying machine, foundation concrete laid manually, all complete and as per clause 408 of specifications.				
(a)	A.	Using Concrete Mixer	meter	38028.12	₹ 168.30	₹ 6,400,133.00
C	11.46	Providing and laying 60 mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction and of approved size and design/shape laid in required colour and pattern over and including 50 mm thick compacted bed of course sand, filling the joints with coarse sand etc. all complete as per the direction of Engineer-in-charge.	Sqm	86970.35	₹ 466.20	₹ 40,545,577.00
			(D)			**₹ 49,926,395.00**
7		**TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES**				
A	8.3	Providing and fixing of retro-reflectorized cautionary, mandatory and informatorily sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm (height from crown level of the road and bottom of the sign board shall not be less than 1.5 m.) firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification.				
i)	i)	90 cm equilateral triangle	Each	100	₹ 3,343.50	₹ 334,350.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
ii)	ii)	60 cm equilateral triangle	Each	100	₹ 2,239.20	₹ 223,920.00
iii)	iii)	60 cm circular	Each	100	₹ 2,961.90	₹ 296,190.00
iv)	iv)	80 cm x 60 cm rectangular	Each	100	₹ 4,083.30	₹ 408,330.00
v)	v)	60 cm x 45 cm rectangular	Each	100	₹ 2,888.10	₹ 288,810.00
vi)	vi)	60 cm x 60 cm square	Each	100	₹ 3,400.20	₹ 340,020.00
vii)	vii)	90 cm high octagon	Each	100	₹ 5,176.80	₹ 517,680.00
B	8.4	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorized sign asper IRC:67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75x75x6 mm (height from crown level of the road and bottom of the sign board shall not be less than 1.5 m.) firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification.	sqm	50	₹ 7,184.70	₹ 359,235.00
C	8.5	Direction and Place Identification signs with size more than 0.9 sqm size board. (Providing and erecting direction and place identification retro- reflectorized sign asper IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area exceeding 0.9 sqm supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm (height from crown level of the road and bottom of the sign board shall not be less than 1.5 m.) means of properly designed foundation with M 15 grade cement concrete45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing including painting of vertical post as per specification.	sqm	50	₹ 12,447.90	₹ 622,395.00

UJJAIN SMART CITY LTD.

BILL OF THE QUANTITIES

RETROFITTING OF ROADS ABD AREA

Sr.	UADD SOR Ref.	Description of work/ Item	Unit	Qty	Rate	Amount
D	8.6	Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces and as per relevant clauses of section-800 & I.R.C.-67 including cost of paint etc. complete.	sqm	15211.25	₹ 39.60	₹ 602,365.00
E	8.10	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 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes and as per relevant clauses of section-800.	sqm	6873.9	₹ 810.00	₹ 5,567,859.00
F	8.12	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorized panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings as per relevant clauses of section-800 of specifications.	Each	50	₹ 262.80	₹ 13,140.00
G	8.20	Supplying and installation of Road Markers/Road Stud with Lenses Reflector (Providing and fixing of road stud 100x 100 mm, dia cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lenses 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	7335.33	₹ 645.30	₹ 4,733,488.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
H	4.80	Precasting and placing in position 125 mm dia Bollards 600 mm high of required shape including providing M.S. Pipe Sleeve 50 mm dia 300 mm long in the Bollard and M.S. Pipes 40 mm dia and 450 mm long with 150x150x6mm M.S. plate welded at bottom and embedded 150mm in cement concrete grade M-10 (Nominal Mix with 20 mm maximum size of stone aggregate) including necessary excavation of size 250x 250x 450mm deep for the same in bitumen/ concrete pavement at specified spacing.	Each	2100	₹ 374.40	₹ 786,240.00
			(E)			**₹ 15,094,022.00**
8		PIPE CULVERT				
A	14.14	Providing and Laying Reinforced cement concrete pipe NP4/prestressed concrete pipe for culverts on first class bedding of granular material in single row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets and as per relevant clauses of section-2900.				
a	c)	1000 mm dia	meter			
b	d)	1200 mm dia	meter	1420	₹ 7,399.80	₹ 10,507,716.00
B	3.1	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto 1000 meters and as per relevant clauses of section-300.	cum	9702.15	₹ 88.20	₹ 855,730.00
C	14.17	Providing first class bedding below hume pipes with granular material as per clause 2904 of specifications.	cum	596.4	₹ 440.10	₹ 262,476.00
D	14.19	Plain cement concrete 1:3:6 mix with crushed stone aggregate 40mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.	cum	584.756	₹ 3,515.40	₹ 2,055,651.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
E	15.2	Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications as per relevant clauses of section 1600 of specifications..	kg	107553.5967	₹ 52.00	₹ 5,592,615.00
F	15.1	Providing and laying Reinforced/Prestressed cement concrete (mixed in concrete mixture) in super-structure as per drawing and Technical Specification and as per relevant clauses of sections 1500, 1700 and 2300 in				
a	A	RCC Grade M25 with 20 mm maximum size of aggregate				
(i)	(b)	Height upto 5m	cum	2320.848	₹ 4,394.70	₹ 10,199,431.00
G	14.9	Providing Back filling behind abutment, wing wall & return wall with Granular Material complete as per drawing and Technical specification and as per relevant clauses 305 of specifications & as per appendix 6 of IRC-78	cum	4080.157	₹ 476.10	₹ 1,942,563.00
			(F)			**₹ 31,416,182.00**
9		Box culvert				
A	3.1	Excavation for roadway in soil including loading in truck for carrying of cut earth to embankment site with all lifts and lead upto 1000 meters and as per relevant clauses of section-300.	cum	9200	₹ 88.20	₹ 811,440.00
B	14.17	Providing first class bedding below hume pipes with granular material as per clause 2904 of specifications.	cum	800	₹ 440.10	₹ 352,080.00
C	14.19	Plain cement concrete 1:3:6 mix with crushed stone aggregate 40 mm nominal size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days.	cum	600	₹ 3,515.40	₹ 2,109,240.00

UJJAIN SMART CITY LTD.						
BILL OF THE QUANTITIES						
RETROFITTING OF ROADS ABD AREA						
Sr.	**UADD SOR Ref.**	**Description of work/ Item**	**Unit**	**Qty**	**Rate**	**Amount**
D	15.2	Supplying, fitting and placing HYSD bar reinforcement in super-structure complete as per drawing and technical specifications as per relevant clauses of section 1600 of specifications.	tonne	250500	₹ 52.00	₹ 13,024,923.00
E	15.1	Providing and laying Reinforced/Prestressed cement concrete (mixed in concrete mixture) in super-structure as per drawing and Technical Specification and as per relevant clauses of sections 1500, 1700 and 2300 in				
a	A	RCC Grade M25 with 20 mm maximum size of aggregate				
(i)	(b)	Height upto 5m	cum	2505	₹ 4,394.70	₹ 11,008,724.00
F	14.9	Providing Back filling behind abutment, wing wall & return wall with Granular Material complete as per drawing and Technical specification and as per relevant clauses 305 of specifications & as per appendix 6 of IRC-78	cum	5060	₹ 476.10	₹ 2,409,066.00
			(G)			**₹ 29,715,473.00**
Total A+B+C+D+E+F+G						**₹ 450,630,386.00**
Rupees Forty Five Crores Six lakhs Thirty Thousand Three Hundred and Eighty six Only						

(B) ELECTRICAL WORKS

TABLE 4.3 BILL OF QUANTITIES FOR ELECTRICAL COMPONENTS:

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
1	Supply, Installation, Testing and Commissioning of, 33KV(E), 3C x 300 Sq. mm. Al. conductor, armoured, XLPE insulated cable having outer sheath of extruded HDPE material and insulation screen having additional feature of water sweelable tape for water ingress protection. The cable will be laid in readymade underground trench / duct / pipe etc as per site requirement. The other cable specifications should conform to IS: 7098 Part-2, 2011 with up to date amendment. The item includes providing of necessary clamps and hardware for cable laying.	Mtrs	8000	2800	22400000
2	Supply, installation, testing and commissioning of indoor termination of 33KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	4	23000	92000
3	Supply, installation, testing and commissioning of outdoor termination of 33KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	12	27000	324000
4	Supply, installation, testing and commissioning of straight through joint of 33KV cable with heat shrinkable straight through termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	3	30000	90000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
5	Supply, Installation, Testing and Commissioning of, 11KV(E), 3C x 300 Sq. mm. Al. conductor, armoured, XLPE insulated cable having outer sheath of extruded HDPE material and insulation screen having additional feature of water sweelable tape for water ingress protection. The cable will be laid in ready made underground trench / duct / pipe etc as per site requirement. The other cable specifications should conform to IS: 7098 Part-2, 2011 with up to date amendment. The item includes providing of necessary clamps and hardware for cable laying.	Mtrs	28000	1780	49840000
6	Supply, installation, testing and commissioning of indoor termination of 11KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	260	9000	2340000
7	Supply, installation, testing and commissioning of outdoor termination of 11KV cable with heat shrinkable termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	60	8000	480000
8	Supply, installation, testing and commissioning of straight through joint of 11KV cable with heat shrinkable straight through termination kit complete with lugs and other accessories for 3Cx 300 Al conductor armoured, XLPE insulated cable.	Each	2	11000	22000
9	Supply, Installation, Testing and Commissioning of Al. conductor, armoured, XLPE insulated, PVC sheathed, 1.1KV cable in ready made underground trench / duct / pipe etc as per site requirement. The other cable specifications should conform to IS: 7098 Part-1, 2011 with up to date amendment. The item includes providing of necessary clamps and hardware for cable laying. The cable size is as mentioned below:				
i	3.5Cx300 Sq.mm cable (With outer sheath of extruded HDPE material and insulation screen having additional feature of water sweellable tape for water ingress protection.)	Mtrs	5000	1350	6750000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
ii	3.5Cx150 Sq.mm cable (With outer sheath of extruded HDPE material and insulation screen having additional feature of water sweellable tape for water ingress protection.)	Mtrs	40000	700	28000000
iii	3.5Cx 95 Sq.mm cable	Mtrs	1000	422	422000
iv	3.5Cx 70 Sq.mm cable	Mtrs	10000	341	3410000
v	3.5Cx 35 Sq.mm cable	Mtrs	5000	210	1050000
vi	4 Cx 25 Sq.mm cable	Mtrs	10000	180	1800000
vii	4 Cx 16 Sq.mm cable	Mtrs	10000	135	1350000
viii	4 Cx 10 Sq.mm cable	Mtrs	15000	113	1695000
ix	4 Cx 6 Sq.mm cable	Mtrs	10000	96	960000
x	2 Cx 6 Sq.mm cable	Mtrs	20000	64	1280000
xi	2 Cx 4 Sq.mm cable	Mtrs	10000	52	520000
10	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 and heavy duty tubular lugs of following size:				
i	3.5Cx300 Sq.mm cable	Each	500	2500	1250000
ii	3.5Cx150 Sq.mm cable	Each	3500	1200	4200000
iii	3.5Cx 95 Sq.mm cable	Each	500	950	475000
iv	3.5Cx 70 Sq.mm cable	Each	250	700	175000
v	3.5Cx 35 Sq.mm cable	Each	750	400	300000
vi	4 Cx 25 Sq.mm cable	Each	1000	260	260000
vii	4 Cx 16 Sq.mm cable	Each	1500	210	315000
viii	4 Cx 10 Sq.mm cable	Each	5000	150	750000
ix	4 Cx 6 Sq.mm cable	Each	7000	125	875000
x	2 Cx 6 Sq.mm cable	Each	12000	85	1020000
xi	2 Cx 4 Sq.mm cable	Each	10000	60	600000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
11	Supplying and erecting earth pit of minimum bore dia 150 mm size, approved make safe earthing electrode consisting pipe in pipe technology as per IS 3043-1987 made of corrosion free GI pipes having outer pipe dia of 50 mm having 80-200 micron galvanising, inner pipe dia of 25 mm having 20-250 micron galvanising, connection terminal dia of 12 mm with constant OHMIC value surrounded by highly conductive compound with high charge dissipation suitable for effective and maintence free earthing.				
i	with 2 mtr. Pipe in normal soil with 25 kg (one bag) back filling compound	Each	200	8000	1600000
ii	with 2 mtr. Pipe of 80 mm outer dia, 40 mm inner dia and 14 mm terminal dia, in soft rock/marshy soil with 25 kg (one bag) back filling compound	Each	720	9500	6840000
12	Supplying and laying 50mm X 6mm G.I. strip at 0.5 metre below ground level / surface as strip earth electrode including jointing etc. as required.	Mtrs	10000	165	1650000
13	Providing and fixing 6 SWG (5.6mm) G.I. wire on surface or in recessed/concealed for loop earthing as required.	Mtrs	80000	17	1360000
14	Supply, Installation, Testing and Commissioning 11kV, **630KVA**, Outdoor Package / compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following :	Each	12	3050000	36600000
i	HT SWITCHGEAR				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	11kV 200Amps 21kA for 3 sec. SF6 insulated Copper Busbar Non-Extensible Ring Main Unit (Type CVC) consisting of Two Nos. of remote operated motorised Load Break Switches and One No. of Fixed remotely motorised operated vacuum Circuit Breaker unit with robotically welded having IP67 in SF6 encapsulated stainless steel enclosure of thickness minimum 2 mm, with series trip, self powered microprocessor based 3 Ph numerical over current relay (IDMTL + Inst.) protection..1 no., Protection CT of ratio-40/1A 2.5VA 5P10... 3 nos, gas pressure gauge etc. It should have metering unit complete with CTs, PTs. The SCADA system should communicate all faults, and electrical parameters like voltage, current, KW, Kwar, kwh, kvarh, pf etc.				
ii	TRANSFORMER				
	Three Phase, 50 Hz, Core type, two winding, 630 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.				
iii	LT PANEL				
	433V LT Indoor panel with 1000 Amps Al. Busbars 100% for Phase and 50% for Neutral , Current Density of AL- 0.8 Amp/sqmm , Fabrication using 1.5/2mm CRCA sheet steel , Ingress protection IP4X , complete with internal wiring consisting of following.				
	INCOMER FROM TRANSFORMER				
	1000 Amps 433V 4P 50Hz 80KA remote wireless signal based electrically operated Type Air Circuit Breaker (ACB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
a	400 Amps 433V 3P 50Hz 55KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 4 nos.				
b	125 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 2 nos.				
iv	OUTDOOR ENCLOSURE				
	Outdoor type enclosure having construction of Galvanised Sheet Steel of thickness minimum 2mm & . Base plate should be 4mm thick. The Enclosure shall have IP54 degree of protection for HT & LT switchgear compartment & IP23 degree of protection for Transformer compartment. The enclosure exterior shall be Powder coated. Each compartment will be provided with the door and pad locking arrangement. The Compartment illumination lamp with door operated switch shall be provided for each compartment. It should be internal arc test compliaint for 20KA for 1 sec.				
v	Interconnection & Earthing				
	Interconnection Between HT switchgear & Transformer using 40x 10 Cu busbar or 1Cx3x95Sq.mm XLPE Single core cable & Interconnection between Transformer & LT switchgear using Al.Busbars. Internal earthing connections by using 50x6 mm GI Strips.				
vi	The entire packaged / compact substation should be equipped with state of art SCADA system which will communicate with central command and control centre of mppkvvcl and smart city Ujjain's control centre and should also communicate event / fault alerts on mobile application. . The SCADA system should have all hardware like RTU, power supply, analog and digital I/O devices, battery, charger, software, modems, antenna, sensors, transducers, control wiring, PC/laptop etc.				
15	Supply, Installation, Testing and Commissioning 11kV, **500 KVA**, Outdoor Package / compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following :	Each	5	2900000	14500000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
i	HT SWITCHGEAR				
	11kV 200Amps 21kA for 3 sec. SF6 insulated Copper Busbar Non-Extensible Ring Main Unit (Type CVC) consisting of Two Nos. of remote operated motorised Load Break Switches and One No. of Fixed remotely motorised operated vacuum Circuit Breaker unit with robotically welded having IP67 in SF6 encapsulated stainless steel enclosure of thickness minimum 2.0. with series trip, self powered microprocessor based 3 Ph numerical over current relay (IDMTL + Inst.) protection..1 no., Protection CT of ratio-40/1A 2.5VA 5P10... 3 nos, gas pressure gauge etc. It should have metering unit complete with CTs, PTs. The SCADA system should communicate all faults, and electrical parameters like voltage, current, KW, Kwar, kwh, kvarh, pf etc.				
ii	TRANSFORMER				
	Three Phase, 50 Hz, Core type, two winding, 500 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.				
iii	LT PANEL				
	433V LT Indoor panel with 800 Amps Al. Busbars 100% for Phase and 50% for Neutral , Current Density of AL- 0.8 Amp/sqmm , Fabrication using 1.5/2mm CRCA sheet steel , Ingress protection IP4X , complete with internal wiring consisting of following.				
	INCOMER FROM TRANSFORMER				
	800 Amps 433V 4P 50Hz 50KA remote wireless signal based electrically operated Type Air Circuit Breaker (ACB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
a	400 Amps 433V 3P 50Hz 55 KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 3 nos.				
b	125 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port……2 nos.				
iv	OUTDOOR ENCLOSURE				
	Outdoor type enclosure having construction of Galvanised Sheet Steel of thickness minimum 2mm & . Base plate should be 4mm thick. The Enclosure shall have IP54 degree of protection for HT & LT switchgear compartment & IP23 degree of protection for Transformer compartment. The enclosure exterior shall be Powder coated. Each compartment will be provided with the door and pad locking arrangement. The Compartment illumination lamp with door operated switch shall be provided for each compartment. It should be internal arc test compliaint for 20KA for 1 sec.				
v	Interconnection & Earthing				
	Interconnection Between HT switchgear & Transformer using 40x 10 Cu busbar or 1Cx3x95Sq.mm XLPE Single core cable & Interconnection between Transformer & LT switchgear using Al.Busbars. Internal earthing connections by using 50x6 mm GI Strips.				
vi	The entire packaged / compact substation should be equipped with state of art SCADA system which will communicate with central command and control centre of mppkvvcl and smart city Ujjain's control centre and should also communicate event / fault alerts on mobile application. . The SCADA system should have all hardware like RTU, power supply, analog and digital I/O devices, battery, charger, software, modems, antenna, sensors, transducers, control wiring, PC/laptop etc.				
16	Supply, Installation, Testing and Commissioning 11kV, **315 KVA**, Outdoor Package / compact Sub-Station (in compliance IEC 62271-202) shall be consisting of following :	Each	20	2400000	48000000
i	HT SWITCHGEAR				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	11kV 200Amps 21kA for 3 sec. SF6 insulated Copper Busbar Non-Extensible Ring Main Unit (Type CVC) consisting of Two Nos. of remote operated motorised Load Break Switches and One No. of Fixed remotely motorised operated vacuum Circuit Breaker unit with robotically welded having IP67 in SF6 encapsulated stainless steel enclosure of thickness minimum 2.0. with series trip, self powered microprocessor based 3 Ph numerical over current relay (IDMTL + Inst.) protection..1 no., Protection CT of ratio-25/1A 2.5VA 5P10... 3 nos, gas pressure gauge etc. It should have metering unit complete with CTs, PTs. The SCADA system should communicate all faults, and electrical parameters like voltage, current, KW, Kwar, kwh, kvarh, pf etc.				
ii	TRANSFORMER				
	Three Phase, 50 Hz, Core type, two winding, 315 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.				
iii	LT PANEL				
	433V LT Indoor panel with 630 Amps Al. Busbars 100% for Phase and 50% for Neutral , Current Density of AL- 0.8 Amp/sqmm , Fabrication using 1.5/2mm CRCA sheet steel , Ingress protection IP4X , complete with internal wiring consisting of following.				
	INCOMER FROM TRANSFORMER				
	630 Amps 433V 4P 50Hz 50KA remote wireless signal based electrically operated Type Moulded Case Circuit Breaker (MCCB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
a	250 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 3 nos.				
b	100 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 2 nos.				
iv	OUTDOOR ENCLOSURE				
	Outdoor type enclosure having construction of Galvanised Sheet Steel of thickness minimum 2mm & . Base plate should be 4mm thick. The Enclosure shall have IP54 degree of protection for HT & LT switchgear compartment & IP23 degree of protection for Transformer compartment. The enclosure exterior shall be Powder coated. Each compartment will be provided with the door and pad locking arrangement. The Compartment illumination lamp with door operated switch shall be provided for each compartment. It should be internal arc test compliaint for 20KA for 1 sec.				
v	Interconnection & Earthing				
	Interconnection Between HT switchgear & Transformer using 40x 10 Cu busbar or 1Cx3x95Sq.mm XLPE Single core cable & Interconnection between Transformer & LT switchgear using Al.Busbars. Internal earthing connections by using 50x6 mm GI Strips.				
vi	The entire packaged / compact substation should be equipped with state of art SCADA system which will communicate with central command and control centre of mppkvvcl and smart city Ujjain's control centre and should also communicate event / fault alerts on mobile application. . The SCADA system should have all hardware like RTU, power supply, analog and digital I/O devices, battery, charger, software, modems, antenna, sensors, transducers, control wiring, PC/laptop etc.				
	DRY TRANSFORMERS				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
17	Supply, Installation, Testing and Commissioning of outdoor type, three Phase, 50 Hz, Core type, two winding, 630 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.	Each	25	1450000	36250000
18	Supply, Installation, Testing and Commissioning of outdoor type, three Phase, 50 Hz, Core type, two winding, 500 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.	Each	9	1265000	11385000
19	Supply, Installation, Testing and Commissioning of outdoor type, three Phase, 50 Hz, Core type, two winding, 315 KVA 11KV/433V DYn11 cast resin dry type, AN type transformer. The transformer be copper wound and class F insulated. The off ckt tap changer should be +5 % to –5 % in step of 2.5% each. The transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise. It should be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.	Each	19	1000000	19000000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
20	Supply, Installation, testing and commissioning of outdoor type 3-way Non-Extensible Ring Main Unit (Type CVC)11kV 630 Amps 21kA for 3 sec. SF6 insulated Copper Busbar consisting of Two Nos. of remote SCADA operated motorised Load Break Switches and One No. of Fixed remotely motorised operated vacuum Circuit Breaker unit with robotically welded having IP67 in SF6 encapsulated stainless steel enclosure of thickness minimum 2.0. with series trip, self powered microprocessor based 3 Ph numerical over current relay (IDMTL + Inst.) protection..1 no., Protection CT of ratio- 40 or 25/1A (As per transformer rating) 2.5VA 5P10... 3 nos, gas pressure gauge etc.	Each	53	468000	24804000
21	Supply, Installation, testing and commissioning of 4-way Non-Extensible Ring Main Unit (Type CVVC) 11kV 630 Amps 21kA for 3 sec. SF6 insulated Copper Busbar consisting of Two Nos. of remote operated motorised Load Break Switches and two Nos. of Fixed remotely motorised SCADA operated vacuum Circuit Breaker unit with robotically welded having IP67 in SF6 encapsulated stainless steel enclosure of thickness minimum 2.0. with series trip, self powered microprocessor based 3 Ph numerical over current relays (IDMTL + Inst.) protection..1 no., Protection CT of ratio- as per site application, 2.5VA 5P10... 3 nos, gas pressure gauge etc.	Each	16	670000	10720000
22	Supply, installation, testing and commissioning of SF6 insulated 11KV , 630A, outdoor type, non extensible, non motorised Ring Main Unit having **three nos. load break isolators** suitable for termination of 11KV cable on each isolator.	Each	5	300000	1500000
23	Supply, installation, testing and commissioning of SF6 insulated 11KV, 630A, outdoor type, non extensible, non motorised Ring Main Unit having **four nos. load break isolators** suitable for termination of 11KV cable on each isolator.	Each	20	390000	7800000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
24	Supply, installation, testing and commissioning of SF6 insulated 11KV, 630A, 21KA, outdoor type, non extensible, non motorised Ring Main Unit having one no. metering unit and one no. motorised VCB with complete remote SCADA control, protection & metering suitable for termination of 11KV cable on each isolator. It should have metering unit complete with CTs, PTs. The SCADA system should communicate all faults, and electrical parameters like voltage, current, KW, Kwar, kwh, kvarh, pf etc.	Each	6	375000	2250000
25	Supply,installation,testing and commissioning of outdoor type feeder pillar panels suitable for AC 440v, 50HZ supply, fabricated with 14 gauge galvanised steel sheet duly pre-treated and pure polyester thick powder coated and pure polyester thick powder coated 80 micron thickness using siemens grey colour shade no.RAL-7032/any other colour shade no.RAL-7032/Any other colour if required by cubical formation, compartmentalized in form with front open able doors. The door shall be provided with concealed hinges and with brazing wherever required to avoid deformation and shall be earthed. All the door shall have heavy duty door locks, and shall be sealed with neoprene gaskets. the feeder pillar shall be IP 55, outdoor type weather, dust and vermin proof having canopy type tapered roof self-standing type as per approved GA Diagram. Panels shall have lifting hooks and base channel of size 50x40x6 mm				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	The feeder pillar shall be complete with bus bars, wiring cabling of proper ratings (not less than 1.5 times the rating of respective switchgears, control gear etc.) for inter connection between switch gear, control gear, metering, safety relays, indicators etc. as per the approved single line diagram. the feeder pillar shall have proper arrangement for termination of all incoming and outgoing cables. all the bus bars shall be supported on epoxy supports and shall be insulated with colour coded heat shrinkable sleeves. Feeder pillar shall be as per the space available at site. It shall have earthing bolts at both sides inter connected with 50x5 mm al earthing bus along width of feeder pillar. NOTE :- The GA drawing for panel should be approved by consultant/ engineer in charge before fabrication. The feeder pillar shall have space and proper arrangements for installation of incoming and outgoing MCCBs with R,Y,B LED type indicating lamps.				
	HRC fuse bases, MCBs etc. Complete with interconnection provisions with providing wiring and bus bars with required hardware,sleeves,ferrules,supporters,locks etc. Panel shall have proper space and arrangements for termination of incomer loop in loop out cables, outgoing service cables, with proper offsets in bus bars for cable terminations. The feeder pillar should have anti theft tamper proof feature to automatically send SMS alert if door opening is attempted by unauthorised person. Feeder pillar shall be comprising of following items:				
i	**TYPE- A**	Each	200	112000	22400000
	Rating of incomer MCCB TPN 63A, 25 KA (Adjustable thermal O/L with Ics=100%Icu).				
	Outgoings 32A 25KA SP MCCB 12Nos. & 25A 25KA SP MCCB 18Nos.				
	Note: The width of feeder pillar should be as minimum as possible, preferably not more than 800mm.				
ii	**TYPE -B**	Each	150	165000	24750000
	Rating of incomer MCCB TPN 100A, 25 KA (Adjustable thermal O/L with Ics=100%Icu).				
	Outgoings 32A 25KA SP MCCB 24Nos. & 25A 25KA SP MCCB 24Nos.				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	Note: The width of feeder pillar should be as minimum as possible, preferably not more than 800mm.				
iii	**TYPE -C**	Each	100	45000	4500000
	Rating of incomer MCCB TPN 125A, 25 KA (Adjustable thermal O/L with Ics=100%Icu).				
	Outgoings- 100A TPN MCCB 25KA 1Nos. , 32A 25KA SP MCCB 3Nos. & 25A 25KA SP MCCB 3Nos.				
	Note: The width of feeder pillar should be as minimum as possible, preferably not more than 800mm.				
iv	**TYPE -D**	Each	100	69000	6900000
	Rating of incomer MCCB TPN 125A, 25 KA (Adjustable thermal O/L with Ics=100%Icu).				
	Outgoings 25A 25KA SP MCCB 9Nos. & 20A 25KA SP MCCB 9Nos.				
	Note: The width of feeder pillar should be as minimum as possible, preferably not more than 800mm.				
v	**Main LT Panel for 630KVA Dry type transformer comprising of following:**	Each	25	350000	8750000
	INCOMER FROM TRANSFORMER				
	1000 Amps 433V 4P 50Hz 50KA remote wireless signal based electrically operated Type Air Circuit Breaker (ACB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				
a	400 Amps 433V 3P 50Hz 55KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracyclass 1.0 and communication port…… 4 nos.				
b	125 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracyclass 1.0 and communication port…… 2 nos.				
vi	**Main LT Panel for 500KVA Dry type transformer comprising of following:**	Each	9	328000	2952000
	INCOMER FROM TRANSFORMER				

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	800 Amps 433V 4P 50Hz 50KA remote wireless signal based electrically operated Type Air Circuit Breaker (ACB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				
a	400 Amps 433V 3P 50Hz 55KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port……3 nos.				
b	125 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 2 nos.				
vii	**Main LT Panel for 315 KVA Dry type transformer comprising of following:**	Each	19	235000	4465000
	INCOMER FROM TRANSFORMER				
	630 Amps 433V 4P 50Hz 50KA remote wireless signal based electrically operated Type Moulded Case Circuit Breaker (MCCB) with microprocessor based overcurrent, short circuit Fault & earth fault Release, Digital Load Manager meter having SCADA communication facility and accuracy class 0.5, complete with required CTs and protection.				
	OUTGOINGS				
a	250 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with microprocessor based release release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 3 nos.				
b	100 Amps 433V 3P 50Hz 36KA, TPN Moulded Case Circuit Breaker (MCCB) with thermal magnetic release for over current and magnetic short circuit. Multi function meter of accuracy class 1.0 and communication port…… 2 nos.				
26	supply,installation,testing and commissioning of weather proof type bus bar looping box suitable for AC 440v, 50HZ supply, fabricated with 14 gauge galvanised steel sheet duly pre-treated and pure polyester thick powder coated and pure polyester thick powder coated 80 micron thickness using siemens grey colour shade no.RAL-7032/any other colour shade no.RAL-7032/Any other colour if				

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	required by cubical formation, compartmentalized in form with front open able doors. The door shall be provided with concealed hinges and with brazing wherever required to avoid deformation and shall be earthed. All the door shall have heavy duty door locks, and shall be sealed with neoprene gaskets. The bus bar looping box should be weather, dust and vermin proof as per approved GA Diagram.				
	The bus bar looping box shall be complete with bus bars, wiring cabling of proper ratings (not less than 1.5 times the rating of respective switchgears, control gear etc.) for inter connection between switch gear single line diagram. the box shall have proper arrangement for termination of all incoming and outgoing cables. All the bus bars shall be supported on epoxy supports and shall be insulated with colour coded heat shrinkable sleeves. The box shall be as per the space available at site. It shall have earthing bolts at both sides inter connected with 25x3 mm al earthing bus along width of box.				
	The box shall comprise of following items:				
i	Type A	Each	70	17500	1225000
	Incomer- 63A TPN MCCB, 25KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for 3Nos. 3Phase Connections (Cable size Al arm. 4X6 to 4X25Sq. mm.)				
ii	Type B	Each	40	18200	728000
	Incomer- 63A TPN MCCB, 25KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing-** Bus Bar Suitable for 6 Nos. 3Phase Connections (Cable size Al arm. 4X6 to 4X25Sq. mm.)				
iii	Type C	Each	30	19300	579000
	Incomer- 100A TPN MCCB, 25KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for 10 Nos. 3Phase Connections (Cable size Al arm. 4X6 to 4X25Sq. mm.)				
iv	Type D	Each	25	24400	610000
	Incomer- 160A TPN MCCB, 35KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for 16 Nos. 3Phase Connections (Cable size Al arm. 4X6 to 4X35Sq. mm.)				
v	Type E	Each	15	35000	525000

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	Incomer- 200A TPN MCCB, 35KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for 24 Nos. 3Phase Connections (Cable size Al arm. 4X6 to 4X50Sq. mm.)				
vi	Type F	Each	25	16000	400000
	Incomer- 63A TPN MCCB, 25KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for connection of 1or 2 Nos. 4X25 Sq. mm. to 3.5X70 Sq. mm. Cables				
vii	Type G	Each	25	17000	425000
	Incomer- 100A TPN MCCB, 25KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for connection of 1or 2 Nos. 3.5X50 Sq. mm. to 3.5X95 Sq. mm. Cables				
viii	Type H	Each	15	19400	291000
	Incomer- 160A TPN MCCB, 35KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for connection of 1or 2 Nos. 3.5X70 Sq. mm. to 3.5X150 Sq. mm. Cables				
ix	Type I	Each	15	28000	420000
	Incomer- 200A TPN MCCB, 35KA, thermal magnetic trip, suitable for termination of 2 nos 150Sq.MM Al. arm. Cable. **Outgoing**- Bus Bar Suitable for connection of 1or 2 Nos. 3.5X95 Sq. mm. to 3.5X150 Sq. mm. Cables				
27	Supply and installation of MS Hot dip galvanised 14 swg thick perforated cable trays complete with jointing accessories and hardware in underground cable tranches of following sizes:				
i	width 600 mm x height 100 mm	Mtr	50	750	37500
ii	width 450 mm x height 100 mm	Mtr	50	600	30000
iii	width 300 mm x height 75 mm	Mtr	50	500	25000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
28	Supplying and installing double wall corrugated pipes (DWC) of HDPE (IS 14930 Part-I marked) for cable laid underground with necessary connecting sockets / couplings, test below road / ground surface, including excavation, back filling with excavated material with ramming and making the surface good.				
i	50 mm outside dia	Mtr	18000	207	3726000
ii	63 mm outside dia	Mtr	10000	210	2100000
iii	110 mm outside dia	Mtr	7000	309	2163000
29	Supply, installation, testing and commissioning of double pole structure comprising of 2 nos, 13 mtrs H-beam poles(37.1 kg/mtr) having 3-ph 11KV isolator , complete with 11KV pin / disc / post insulators, LA, 100x50 mm, MS cross channels, stay sets, coil earthing, ACSR O75 conductor etc, concreting etc complete in all respects suitable for terminating two nos 11KV, 3Cx240 sqmm XLPE insulated al. conductor arm. cables for tapping existing overhead line 11KV line feeder.	Each	20	150000	3000000
30	Dismantling of existing HT 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 MPPKVVCL / UMC stores. (Note associated LT line will have to be dismantled under this item, no separate cost will be paid for this)	Km	12	250000	3000000
31	Dismantling of existing LT overhead power system lines complete with all associated items like poles, conductors, insulators, overhead cables, wires, stay , studs, MS structure, LA, LT box, street lights, switching box etc and depositing the same in MPPKVVCL /UMC stores. (Note associated LT line will have to be dismantled under this item, no separate cost will be paid for this)	Km	20	150000	3000000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
32	Supply and installation of approved type precast RCC cable cover class HV / LV of size 300x180x40 mm	Each	5000	31	155000
33	MS fabrication work complete with primer and two coats of final paint in MS sheet, angle, channel, strip inclusive of supply of all material, hardware and installation at site.	Kg	40000	65	2600000
34	Soil excavation for laying of HT/LT cable at the depth of 0.9 to 1.2 mtrs and refilling the same after cable laying.	Mtrs	3000	100	300000
35	Supplying installation, testing and commissioning of outdoor type APFC panels automatic switching type capacitor bank suitable for 3 Phase 440 V, AC 50 HZ supply, fabricated with 16 gauge galvanised steel sheet duly pre-treated and pure polyester thick powder coated 80 micron thickness using siemens grey colour shade no. RAL-7032. The APFC panel shall be in cubical formation , compartmentalized in form with front openable doors. The door shall be provided with concealed hinges and with brazing wherever required to avoid deformation and shall be earthed. All the door shall have heavy duty door locks, and shall be sealed with neoprene gaskets. The APFC panel shall be IP 54, outdoor type weather, dust and vermin proof having canopy type tapperd roof self standing type as per approved GA diagram. The APFC panel shall be suitable for MCCB, MCB,APFC Relay, Capacitor Duty Contactor,HRC Fuse,Capacitor,CT & Terminals				
	(i) For 315KVA distribution transformer-Capacitor Bank 75KVAR (25 KVAR -2Nos., 15KVAR -1Nos. & 10 KVAR -1Nos.) APFC Relay 4-Stage	Each	39	130000	5070000
	(ii) For 500KVA distribution transformer-Capacitor Bank 100KVAR (50 KVAR -1Nos., 25KVAR -1Nos., 15 KVAR -1Nos. & 10 KVAR -1Nos.) APFC Relay 4-Stage	Each	14	160000	2240000
	(iii) For 630KVA distribution transformer-Capacitor Bank 125KVAR (50 KVAR -2Nos., 15KVAR -1Nos. & 10 KVAR -1Nos.) APFC Relay 4-Stage	Each	37	195000	7215000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
36	Supply, Installation, Testing and Commissioning of decorative pole with total height of 4 to 5 Mtrs as per road dimensions and as per directions of engineer in chrge.The Pole should be made out of M.S. grooved round tubular Pipe sections having steps. The minimum thickness of pole should be 3mm. The bottom part of the pole should be of 114 mm diameter and top part diameter 89 mm. Both the sections should be joined together by means of welded joints. A base plate of dimension diameter 430 mm x 15 mm thick should be joined with the pole at the bottom through welded joints. A cast iron pedestal to be fitted on the pole at bottom by grub screw fixing. Cast-iron embellishments should also be fitted between two sections of grooved tubular sections as shown in attached drawing. A service window to be provided in bottom section of pole to accommodate a 6 amp MCB & connector for mains connections . The Pole & the cast iron embellishments should be machined & polished properly to get the smooth finish. The pole should be duly pre-treated and painted in P.U. Paint in approved colour shade. The pole should be supplied & Erected with Bakelite sheet with 1 No. 6A SP B curve MCB & stud type terminal block suitable for terminating the respective cable. The fitting should be connected with Copper Flexible wire of 3CX2.5 Sq.mm. The item is inclusive of construction of M20 grade RCC foundation with bolts, plate and pipe. The Pole to be approved by Engineer in Charge & Architect. Product Reference Homedec Model No. HL-MSP-247 or Equivalent Bajaj or Schreder or Philips or Valmont or K-Lite makes	Each	1850	32000	59200000

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
37	Supply, installation testing & commissioning of Decorative heritage appearance Post top Luminaire made out of cast aluminium , the diffuser shall be translucent of poly carbonate material . The decorative luminaire shall be of wattage 30W to 35 LED with separate driver placed integrally in luminaire housing. Driver should be of THD <10% and power factor above 0.95 .external surge protection device of 10KV should be provided. Low power Led should be used of reputed make . Ingress protection of optical chamber shall be IP-65 . The Luminaire body shall be painted with exterior grade of Poly-urethane /Polyester coating in required colour shade. The fixture should be complete with suitable bracket, mounting accessories. Recommended Make : Wipro / Bajaj / Havells / Keselec Shreder / Philips /Crompton / Neri/ Disano or equivalent as approved by Engineer In charge.	Each	850	15000	12750000
38	Supply, installation testing & commissioning of Decorative heritage appearance Hanging / post top LED type luminaire made out of Spun aluminium , the diffuser shall be of PMMA / clear poly carbonate . The decorative luminaire shall be of wattage 35 TO 40 LED, 100 Lum/watt min., with separate driver placed integrally in street light housing Driver should be of THD <10% and power factor above 0.95 .High power Led of above 1watt should be used of make Cree/Nichia/Lumiled/Osram/Seoul. Lenses should be used to give required optics. Ingress protection of optical chamber shall be IP-65 . The Luminaire body shall be painted with exterior grade of Poly-urethane /Polyester coating in required colour shade. The fixture should be complete with suitable bracket, mounting accessories. Recomended Make : Wipro / Bajaj / Havells / Keselec Shreder /Crompton / Philips/ Neri /Disano or Equivalent as approved by Engineer In charge.	Each	1000	16500	16500000
39	Supply, laying, testing and commissioning following ISI marked XLPE insulated, Al conductor, armoured, 1.1kV grade cable underground / duct / surface as per site condition. The cable shall be laid in existing 50mm dia PVC pipe. The item includes termination of cable with suitable brass cable gland (at panel end) and aluminium lugs.				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	(A) 4Cx 25 Sq mm	Meters	500	180	90000
	(B) 4Cx 16 Sq mm	Meters	15000	135	2025000
	(c) 4Cx 10 Sq mm	Meters	20000	113	2260000
40	Supply, installation, testing and commissioning of outdoor weather proof type street lighting control feeder panel for smart controls, made from 14/16 SWG MS galvanised powder coated sheet or SMC material complete with mounting stand / clamps. The feeder pillar should provide following functionalities related to remote switching and monitoring of individual LED street lights: i) Should be capable of controlling of upto 15 KVA street lighting load distributed in three or single phase. The wattage of each street light will be 40 to 100 watts. ii) It should be complete with all required switching and protecting devices, contactors, timers, relays, sensors, controller, Gateway, remote wireless communication devices, wiring, pipe earthing, surge protection device, required software, web server, hosting, etc. iii) The feeder pillar should perform at least following tasks through remote PC/mobile based web application user friendly interface: Phase wise and individual remote ON/OFF switching of street lights. Monitoring of quantity and electrical parameters of individual street light fixtures full or partially /ON/OFF of street lights. iv) In addition to this panel should be able to generate wireless command to give dimming command to the street light fixtures so that light output can be dimmed.	Each	35	175000	6125000
41	Supply & installation of heavy duty HDPE pipe of 50MM dia for above size cable at min 600mm depth or suitable safe depth from ground level as per site condition complete with excavation and refilling of soil.	Meter	10000	125	1250000

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
42	Earthing with G.I. Earth plate 600mm X 600mm X 6mm thick including accessories and providing masonry encloser in cement mortar, cover plate having locking arrangement on the top and G.I. watering pipe 20mm dia 2.7 Metre long etc. (but without charcoal or coke and salt) complete as required.	Nos.	70	3054	213780
43	Supplying and laying 25mm X 5mm G.I. strip at 0.5 Metre below ground level as strip earth electrode including soldering etc. as required.	Meter	600	131	78600
44	Supply and laying of 6 SWG GI wire	Meter	40000	15	600000
45	Supply, installation testing & commissioning of LED street light Luminaires of Wattage range 120W to 130W, with IP 66 rating. The fixture should be made of pressure die cast Aluminium / Aluminium Extrusion and clear flat glass, integral control gear, IK 05 or above. The fixture should have lumen maintenance of at least 70% at 50000 burning hours at ambient temp of 35 degree C. The driving current for LED should be Max 1A ±10 %. The efficacy of fixture should be at least 100 lumens/watt. The power factor of driver should be > 0.9 and the THD < 20% & surge. Protection 10Kv. CRI > 70%. The Fixture should be complete with LED, Driver, and all other accessories. Vendor should provide LM 79 and LM 80 Test report. Luminaire. The fixture should be installed on existing poles. The street light fixture should have dimmability feature. For this suitable dimmable driver and wireless type luminaire controller as per specifications (signal transmitter cum receiver) shall be installed. The luminaire should be able to receive ON/OFF/ dimming etc. wireless signal commands and send status, fault diagnostic, electrical parameters signals to Control feeder pillar through wireless network. The job includes supply of all necessary hardware, clamps and mounting accessories. Item is inclusive of proper body earthing of lighting fixture.	Each	334	21500.00	7181000.00
46	Supply, installation testing & commissioning of LED street light Luminaires of Wattage range 90W to 100W, with IP 66 rating. The fixture should be made of pressure die cast Aluminium / Aluminium	Each	90	17000.00	1530000.00

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	Extrusion and clear flat glass, integral control gear, IK 05 or above. The fixture should have lumen maintenance of at least 70% at 50000 burning hours at ambient temp of 35 degree C. The driving current for LED should be Max 1A ±10 %. The efficacy of fixture should be at least 100 lumens/watt. The power factor of driver should be > 0.9 and the THD < 20% & surge. Protection 10Kv. CRI > 70%. The Fixture should be complete with LED, Driver, and all other accessories. Vendor should provide LM 79 and LM 80 Test report. Luminaire. The fixture should be installed on existing poles. The street light fixture should have dimmability feature. For this suitable dimmable driver and wireless type luminaire controller as per specifications (signal transmitter cum receiver) shall be installed. The luminaire should be able to receive ON/OFF/ dimming etc wireless signal commands and send status, fault diagnostic, electrical parameters signals to Control feeder pillar through wireless network. The job includes supply of all necessary hardware, clamps and mounting accessories. Item is inclusive of proper body earthing of lighting fixture.				
47	Supply, installation, testing and commissioning of Pole 9 Mtr. Ht. Poles shall be continuously tapered round conical cross section, 3 mm thick, MS Galvanised, T washed, primered and painted with PU base colour of choice. The column shall also be provided with flush door at the bottom with proper strengthening to the cut-out of the door opening. Bottom diameter of pole shale be 165 to 170 mm, top diameter 75 to 80 mm and base plate dim. 275X275X16 mm. The pole shall be provided with hinged flush door at the bottom with proper strengthening to the cut-out of door opening at height of 550mm with 300x100mm size for MCB positioning. A junction / looping box with Heavy duty 3 phase connector shall be built into the pole & its Decorative Arm should be painted with PU colour of the choice of engineer in-charge. Inclusive of supply and installation of Bakelite sheet with 6A SP C curve MCB & stud type terminal block suitable for terminating the respective cable. The fitting should be connected with Copper Flexible wire of 3CX2.5 Sq.mm. The pole as well as bracket shall be painted by polyurethane (PU) paint of approved colour shades. The colour of brackets and that of the pole				

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SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	may be same or may be different. These shall be decided by Engineer In charge, USCL. The PU colour of the pole as well as bracket shall be guaranteed for at least 3 years from date of handing over the installation. This guarantee shall be given by the manufacture of pole in writing and shall be counter by the contractor. The contractor has to submit a certification to USCL from the manufacture of pole that the pole and its bracket will not bend, break, buckle or fall due to wind pressure in the Ujjain city area and due to weight of the fitting with control gear boxes etc.(The item is inclusive of construction of suitable M20 grade RCC foundation as per the attached specifications).				
a	With Single arm decorative bracket bracket.	Each	U/R	30478.00	
b	With Twin arm decorative bracket.	Each	145	33928.00	4919560.00
c	With Triple arm decorative bracket.	Each	15	37377.00	560655.00
48	Supply, installation, testing and commissioning of Pole 7.5 Mtr. Ht. Poles shall be continuously tapered round conical cross section,3 mm thick, MS Galvanised, T washed, primered and painted with PU base colour of choice. The column shall also be provided with flush door at the bottom with proper strengthening to the cut-out of the door opening. Bottom diameter of pole shale be 155 to 160 mm, top diameter 70 to 75 mm and base plate dim. 275X275X16 mm. The pole shall be provided with hinged flush door at the bottom with proper strengthening to the cut-out of door opening at height of 500mm with 300x100mm size for MCB positioning. A junction / looping box with Heavy duty 3 phase connector shall be built into the pole & its Decorative Arm should be painted with PU colour of the choice of engineer in-charge. Inclusive of supply and installation of Bakelite sheet with 6A SP C curve MCB & stud type terminal block suitable for terminating the respective cable. The fitting should be connected with Copper Flexible wire of 3CX2.5 Sq.mm.The pole as well as bracket shall be painted by polyurethane (PU) paint of approved colour shades. The colour of brackets and that of the pole may be same or may be different. These shall be decided by Engineer In charge, USCL. The PU colour of the pole as well as bracket shall be guaranteed for at least 3 years from date of handing over the installation. This guarantee shall				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	be given by the manufacture of pole in writing and shall be counter by the contractor. The contractor has to submit a certification to USCL from the manufacture of pole that the pole and its bracket will not bend, break, buckle or fall due to wind pressure in the Ujjain city area and due to weight of the fitting with control gear boxes etc.(The item is inclusive of construction of suitable M20 grade RCC foundation as per the attached specifications).				
a	With Single arm decorative bracket bracket.	Each	U/R	27000.00	
b	With Twin arm decorative bracket.	Each	39	29500.00	1150500.00
c	With Triple arm decorative bracket.	Each	4	30000.00	120000.00
49	Supply, laying, testing and commissioning following ISI marked XLPE insulated, Al conductor, armoured, 1.1kV grade cable underground at 600 mm depth or at safe depth as per site condition. The cable shall be laid in existing 50mm dia PVC pipe. The item includes termination of cable with suitable brass cable gland (at panel end) and aluminium lugs.				
	(B) 4Cx 25 Sq mm	Meters	400	180.00	72000.00
	(C) 4Cx 16 Sq mm	Meters	6200	135.00	837000.00
50	Supply, installation, testing and commissioning of outdoor weather proof type street lighting control feeder panel for smart controls, made from 14/16 SWG MS galvanised powder coated sheet or SMC material complete with mounting stand / clamps. The feeder pillar should provide following functionalities related to remote switching and monitoring of individual LED street lights: i) Should be capable of controlling of upto 15 KVA street lighting load distributed in three or single phase. The wattage of each street light will be 40 to 150 watts. ii) It should be complete with all required switching and protecting devices, contactors, timers, relays, sensors, controller, Gateway, remote wireless communication devices, wiring, pipe earthing, surge protection device, required software, web server, hosting, etc. iii) The feeder pillar should perform at least following	Each	10	175000.00	1750000.00

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
	tasks through remote PC/mobile based web application user friendly interface: Phase wise and individual remote ON/OFF switching of street lights. Monitoring of quantity and electrical parameters of individual street light fixtures full or partially /ON/OFF of street lights. iv) In addition to this panel should be able to generate wireless command to give dimming command to the street light fixtures so that light out put can be dimmed.				
51	Supply & installation of heavy duty HDPE pipe of 50MM dia for above size cable at min 600mm depth or suitable safe depth from ground level as per site condition complete with excavation and refilling of soil.	Meter	5500	125.00	687500.00
52	Earthing with G.I. Earth plate 600mm X 600mm X 6mm thick including accessories and providing masonry encloser in cement mortar, cover plate having locking arrangement on the top and G.I. watering pipe 20mm dia 2.7 Metre long etc. (but without charcoal or coke and salt) complete as required.	Nos.	20	3054.00	61080.00
53	Supplying and laying 25mm X 5mm G.I. strip at 0.5 Metre below ground level as strip earth electrode including soldering etc. as required.	Meter	240	131.00	31440.00
54	Supply and laying of 6 SWG GI wire	Meter	7000	15.00	105000.00

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
55	Supply of Digital Under Ground cable fault Location detector for suitable for LT and MV cables. The specifications for the cable fault detector are as follows: It should be a microprocessor based fault locator with a user friendly menu. It should be easy to operate. It should test almost all power cables, telecom & signal cables. It should have English menu which is easy to understand & use. With Megameter & Ohmmeter it enables to test insulation resistance & loop resistance. It has USB Port for uploading test data to computer. FEATURES : Small size, light weight and ABS plastic housing which should be ergonomically designed for easy use by user. Menu driven simple operation. Measurement maximum 8 km in selectable ranges. Tests any type of HT, LT Range, VOP and Gain are selected automatically. Rechargeable lithium battery with intelligent charger Continued 8 hours operating time on internal battery. Rugged construction and easy to carry on site.	Each	2	250000	500000
	Color LCD Display (480 x 280 dots or more). Automatic testing mode. Both pulse reflection (TDR) and intelligent bridge (Bridge) testing for open, short, or low insulation cable faults. With mega meter it enables to test insulation resistance and loop resistance. Six function keys and simple operation. Manual testing function is also available. With 4 GB USB Pen drive, it is easy to upload memory data to computer.				
56	Supply, Installation, Testing and commissioning of IP55 type, Mini Pillar Link Connection System as per IEC 60439-5: 2006, IEC 60439-1 : 2004, made of High density injection moulded polyethylene, having connectors made from tin plated brass material. The voltage rating shall be 415V and short ckt rating should be 28KA rms. The overall dimensions should not exceed width: 550mm and height: 900 mm. The Pillars shall be of following types:				

ESTIMATE FOR 11KV AND LT UNDERGROUND CABLING SYSTEM WITH COMPACT / PACKAGED SUBSTATIONS AND DRY TYPE TRANSFORMER FOR POWER DISTRIBUTION & STREET LIGHTING IN ABD AREA UNDER SMART CITY UJJAIN.

SN	Description	Unit	Qty	Rate (Rs.)	Amount (Rs.)
i	2Way On Load Connect-Disconnect link of 800A Capacity suitable for connecting 2 nos, 3.5/4 Cx 120 to 300 sqmm Al Arm. Cables as Incomer and 6 nos, 3.5/4 Cx 25 to 50 sqmm Al Arm. Cables as Outgoings.	Each	40	₹75000	₹3000000
ii	3Way On Load Connect-Disconnect link of 800A Capacity suitable for connecting 3 nos, 3.5/4 Cx 120 to 300 sqmm Al Arm. Cables as Incomer and 5 nos, 3.5/4 Cx 25 to 50 sqmm Al Arm. Cables as Outgoings.	Each	40	₹89000	₹3560000
	Total				**₹ 599,043,615**

RUPEES FIFTY NINE CRORES NINTY LAKHS FOURTY THREE THOUSAND SIX HUNDRAD AND FIFTEEN ONLY

LIST OF DRAWINGS FOR ROAD RECONSTRUCTION AND INFRASTRUCTURE DEVELOPMENT IN ABD AREA UNDER UJJAIN SMART CITY, UJJAIN

SL.NO	SUBJECT	TITLE	DRAWING NO	SHEET SIZE	NO. OF SHEET
1	Infra-structure Development (ABD)	Layout Plan of Project Roads	PDMC/ABD/INFRA/LayOut/ 01	A3	1
2		Smart Road Planning & Section for 18m wide roads	PDMC/ABD/INFRA/P&S-18m/02		1
3		Smart Road Planning & Section for 15m wide roads	PDMC/ABD/INFRA/P&S-15m/03		1
4		Smart Road Planning & Section for 12m wide roads	PDMC/ABD/INFRA/P&S-12m/04		1
5		Smart Road Planning & Section for 10m wide roads	PDMC/ABD/INFRA/P&S-10m/05		1
6		Smart Road Planning & Section for 8m wide roads	PDMC/ABD/INFRA/P&S-8m/06		1
7		Smart Road Planning & Section for 6m wide roads	PDMC/ABD/INFRA/P&S-6m/07		1
8		Typical Cross Section of Infra details with HDPE duct provisions for 18m wide road	PDMC/ABD/INFRA/TYP-CS/8		1
9		Typical Cross Section of Infra details with HDPE duct provisions for 15m to 12m wide road	PDMC/ABD/INFRA/TYP-CS/9		1
10		Typical Cross Section of Infra details with HDPE duct provisions for 10 wide road	PDMC/ABD/INFRA/TYP-CS/10		1
11		Typical Cross Section of Infra details with HDPE duct provisions for 8m wide road.	PDMC/ABD/INFRA/TYP-CS/11		1
12		Typical Cross Section of Infra details with HDPE duct provisions for 6m wide road.	PDMC/ABD/INFRA/TYP-CS/12		1
13		Typical section for Rigid Pavement	PDMC/ABD/INFRA/STD/13		1

LIST OF DRAWINGS FOR ROAD RECONSTRUCTION AND INFRASTRUCTURE DEVELOPMENT IN ABD AREA UNDER UJJAIN SMART CITY, UJJAIN

SL.NO	SUBJECT	TITLE	DRAWING NO	SHEET SIZE	NO. OF SHEET
14		Standard Bedding details of RCC NP3 Storm Water Pipe	PDMC/ABD/INFRA/STD/14		1
15		Typical GA of RCC Storm Water Manhole Chamber	PDMC/ABD/INFRA/TYP-GA/15A & 15B		2
16		Standard details of 1m wide Central Median	PDMC/ABD/INFRA/STD/16		1
17		Typical GA of RCC Chambers for Feeder Pillar & Electrical Service Connection.	PDMC/ABD/INFRA/TYP-GA/17		1
18		Typical GA of RCC Chambers for OFC and HT, LT & Service Lines for Power Supply	PDMC/ABD/INFRA/TYP-GA/18		1
19		Typical CS of RCC Box culvert	PDMC/ABD/INFRA/TYP-GA/19		1
20		Typical CS of RCC Pipe culvert	PDMC/ABD/INFRA/TYP-GA/20		1

NB:

GA= GENERAL ARRANGEMENT

OFC= OPTICAL FIBER CABLE

RCC = REINFORCEMENT CEMENT CONCT=RETE

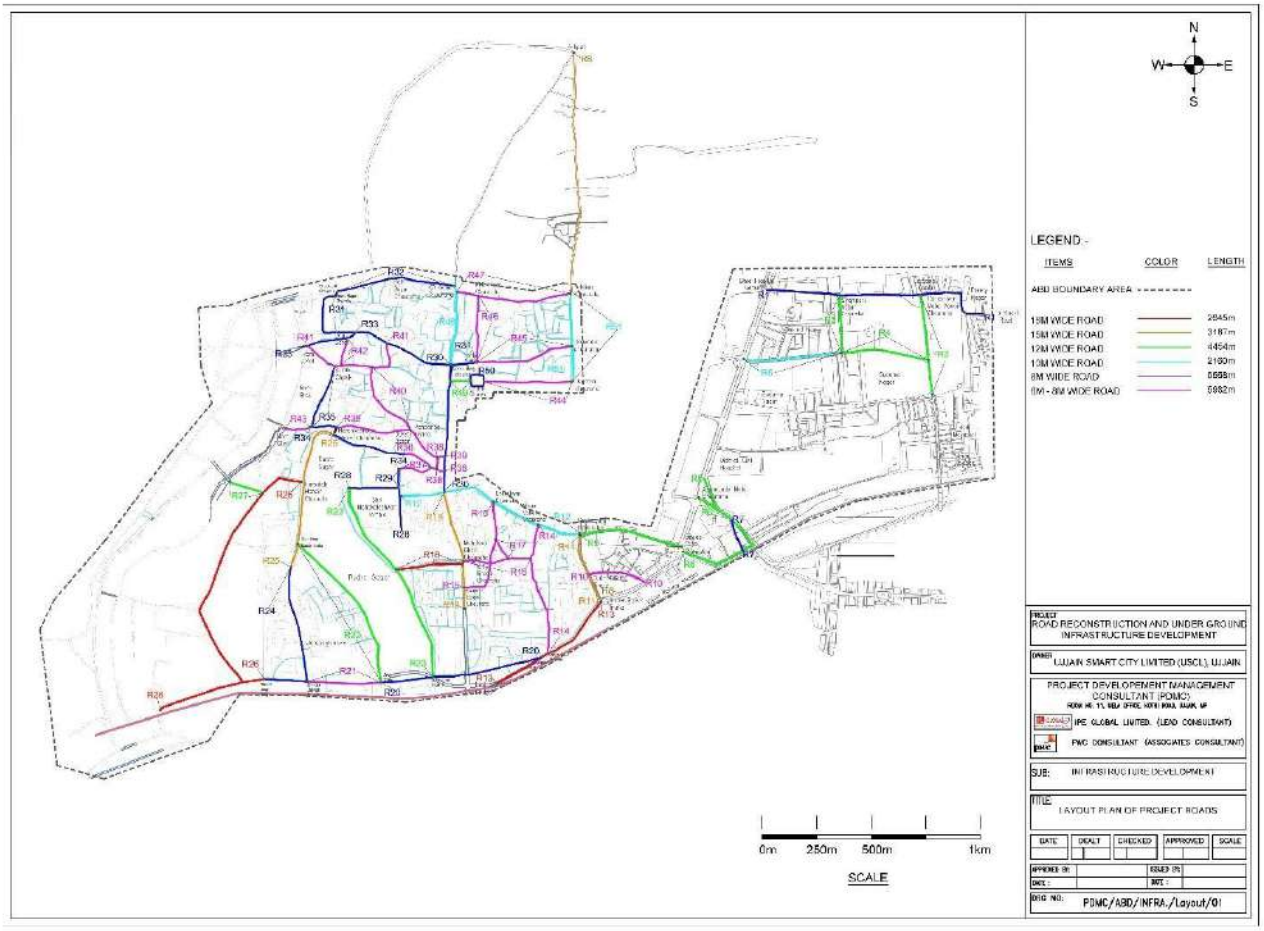

FIG 1: LAYOUT OF ABD ROADS

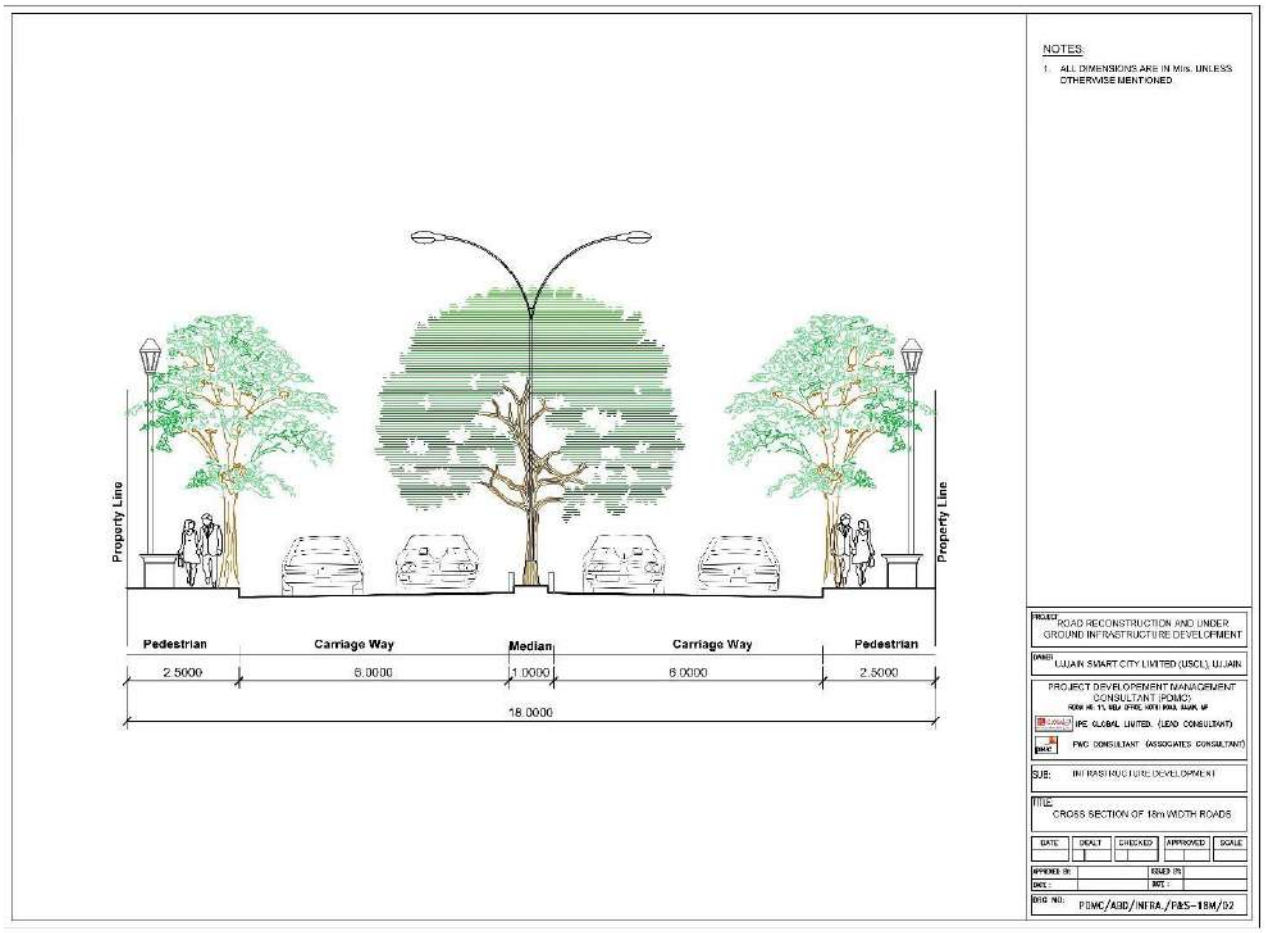

FIG 2: PLANNING AND CROSS SECTION OF 18M WIDE ROAD

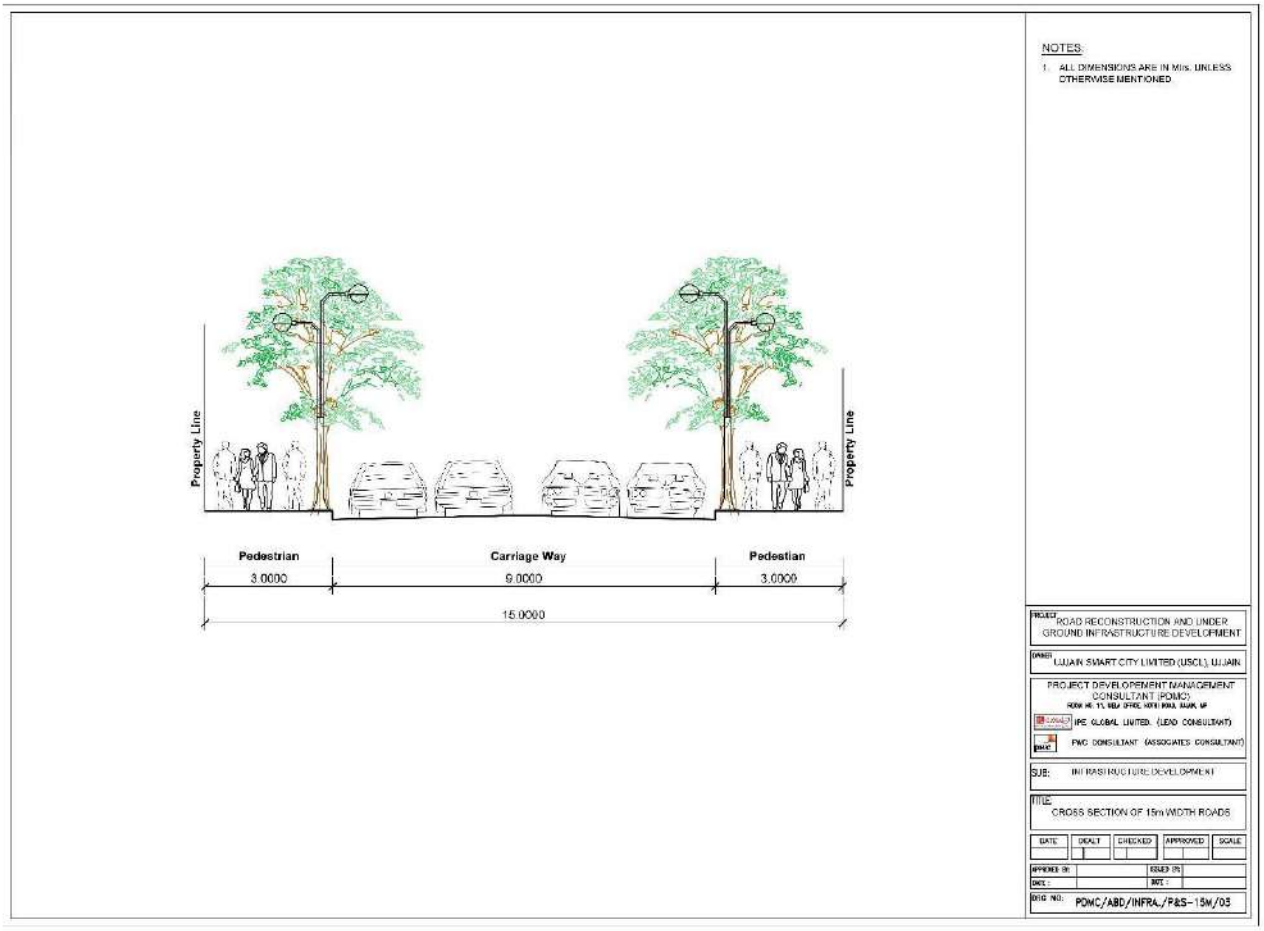

FIG 3: PLANNING AND CROSS SECTION OF 15M WIDE ROAD

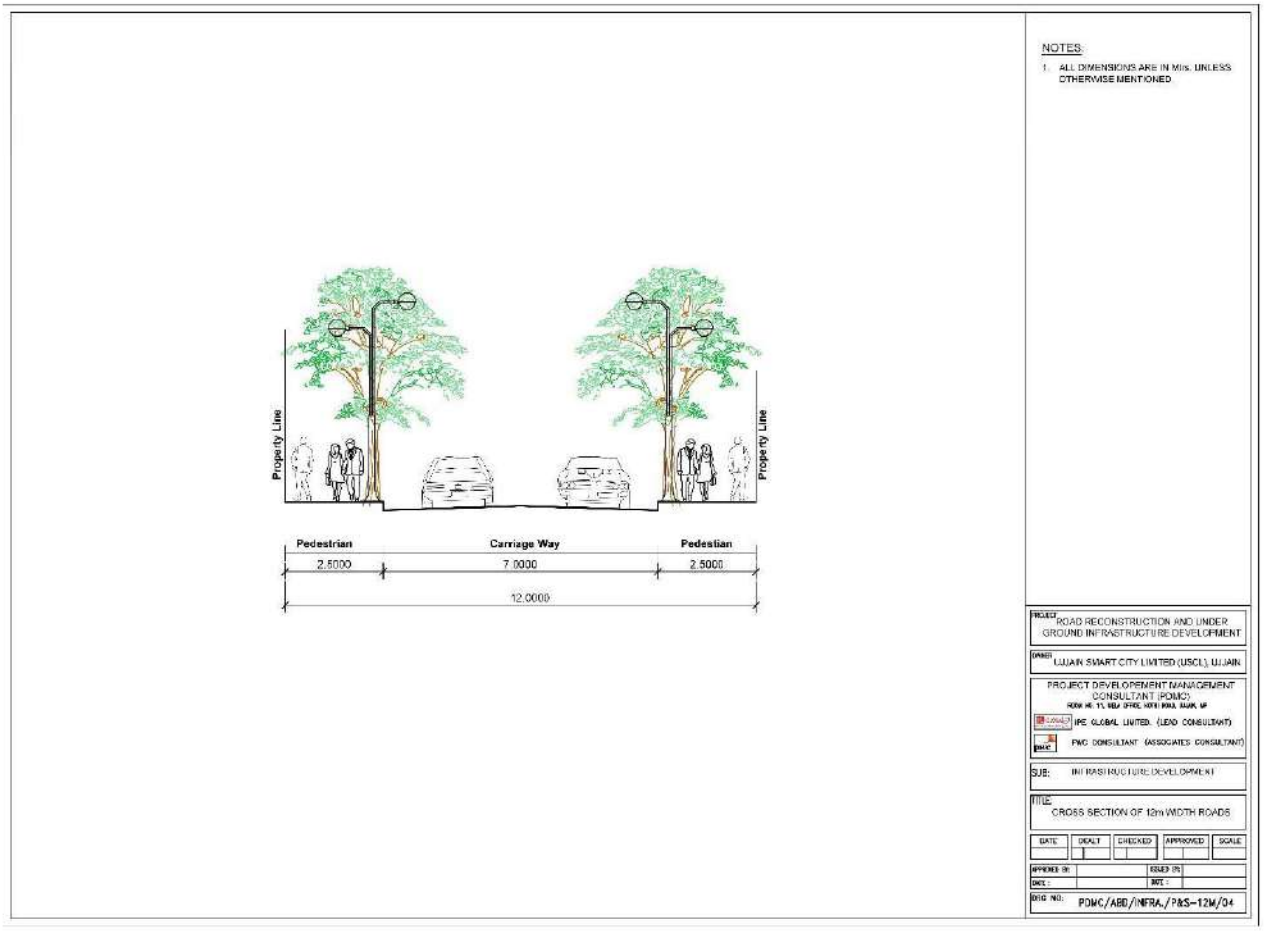

FIG 4: PLANNING AND CROSS SECTION OF 12M WIDE ROAD

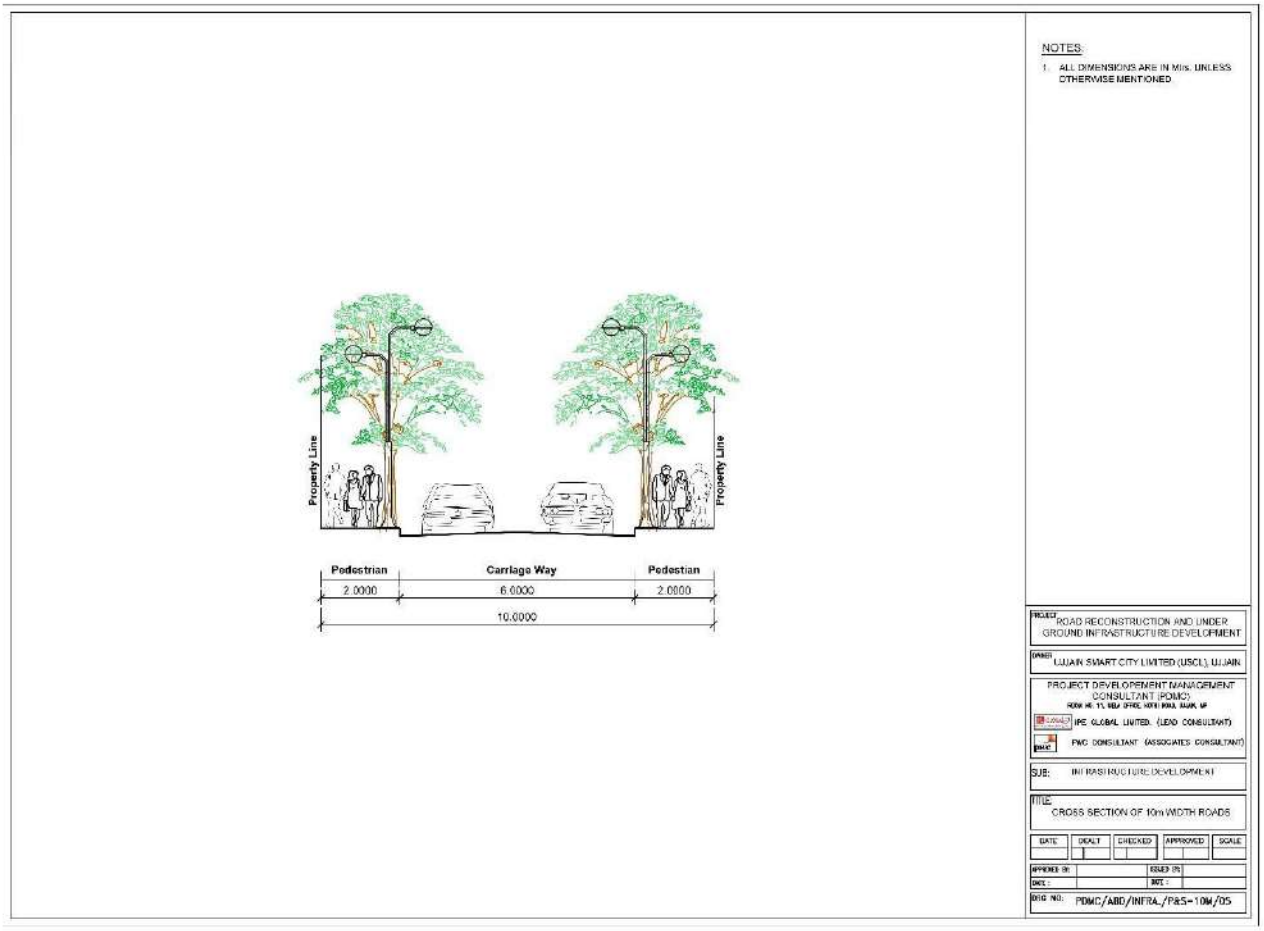

FIG 5: PLANNING AND CROSS SECTION OF 10M WIDE ROAD

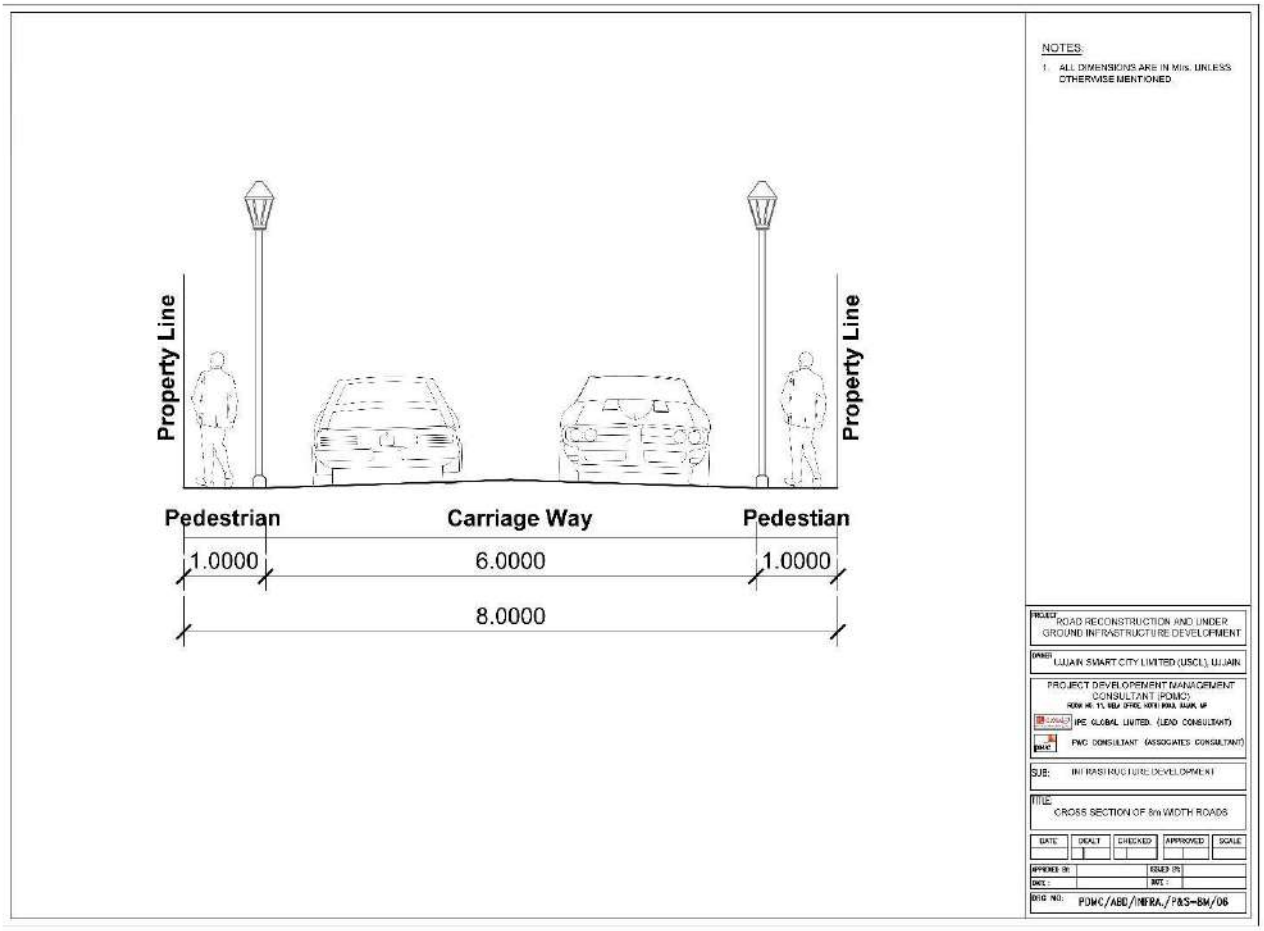

FIG 6: PLANNING AND CROSS SECTION OF 8M WIDE ROAD

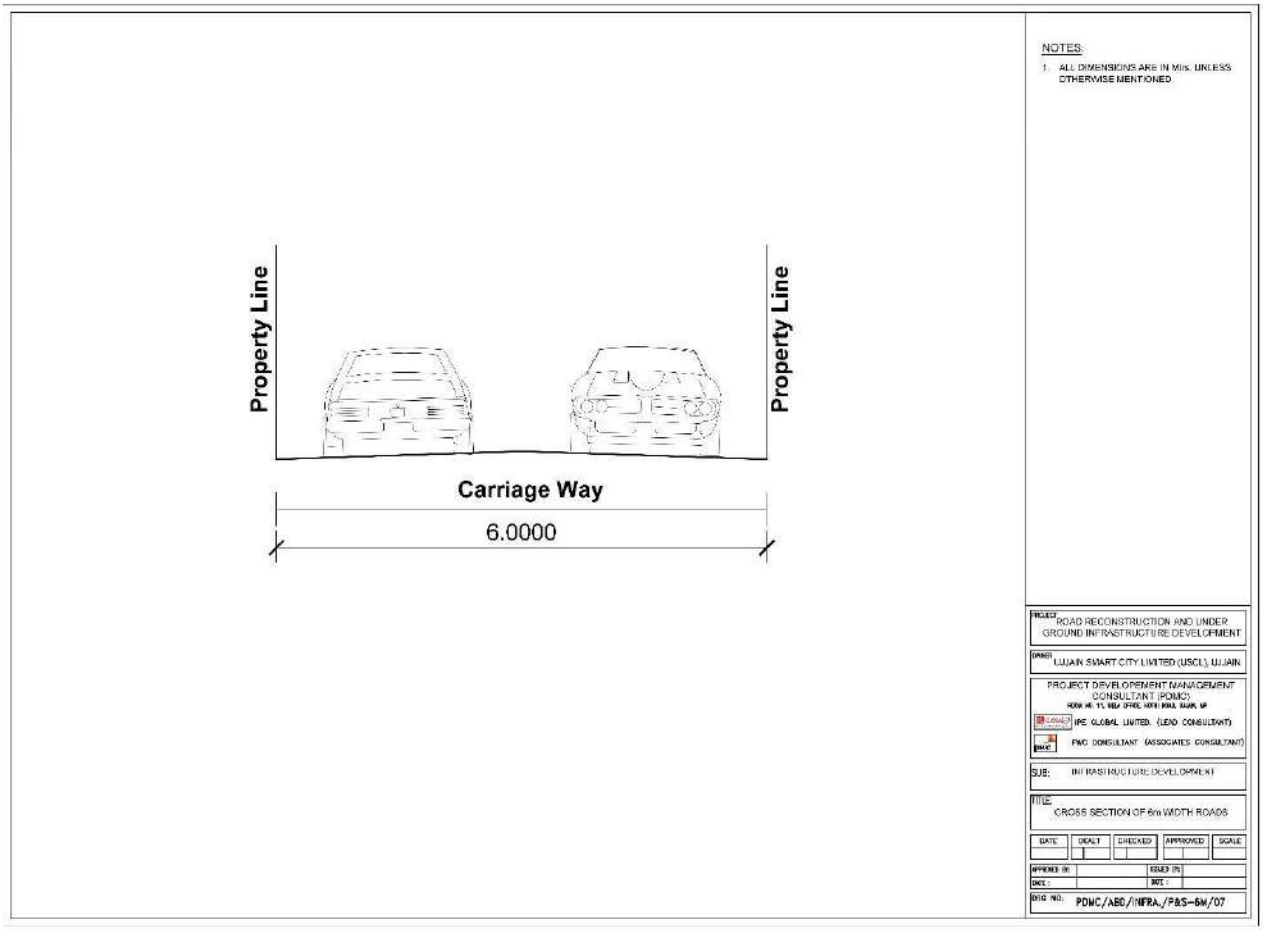

FIG 7: PLANNING AND CROSS SECTION OF 6-8M WIDE ROAD

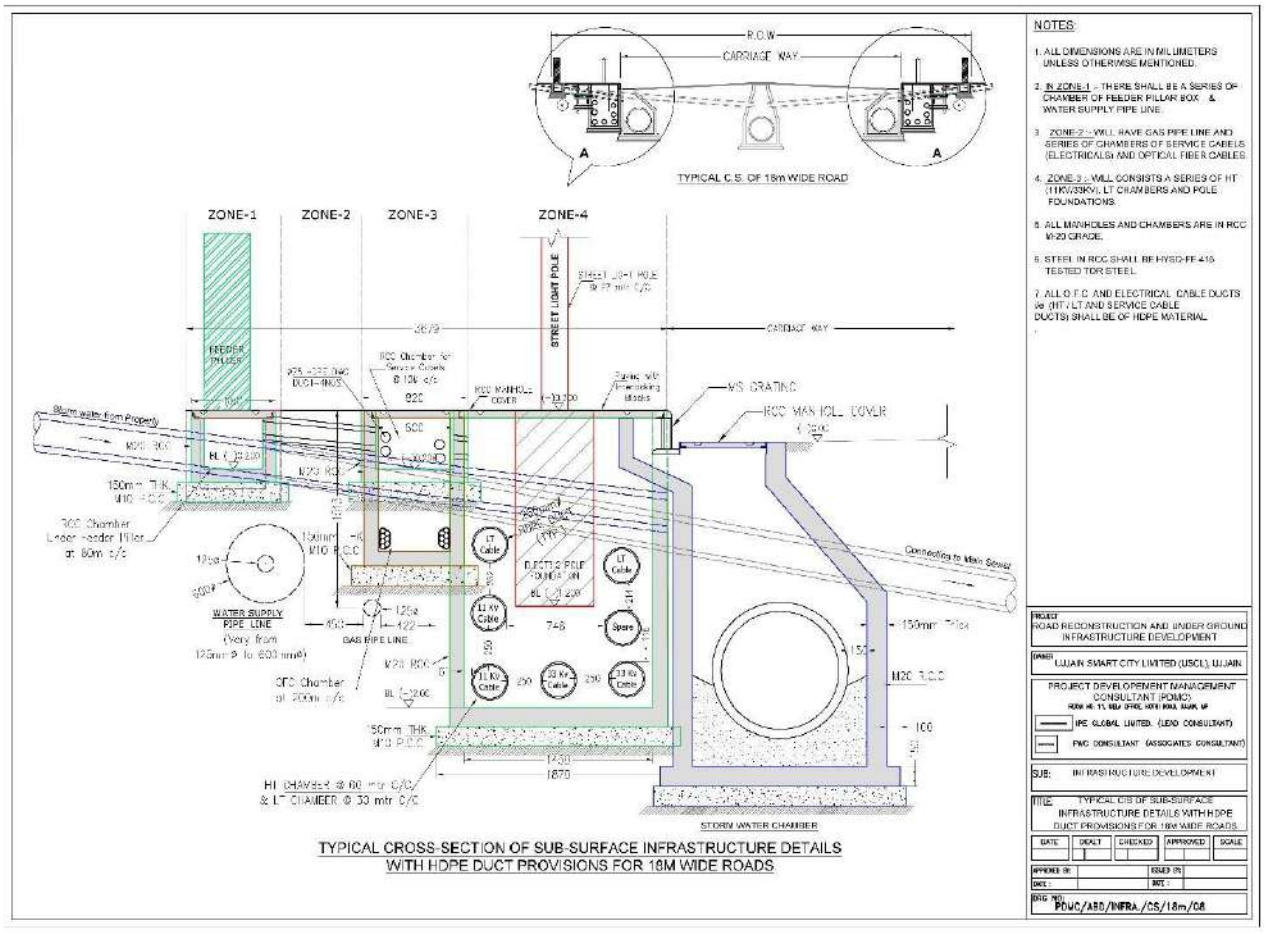

FIG 8: TYPICAL CROSS SECTION OF INFRA DETAILS WITH HDPE DUCT PROVISIONS FOR 18M WIDE ROAD

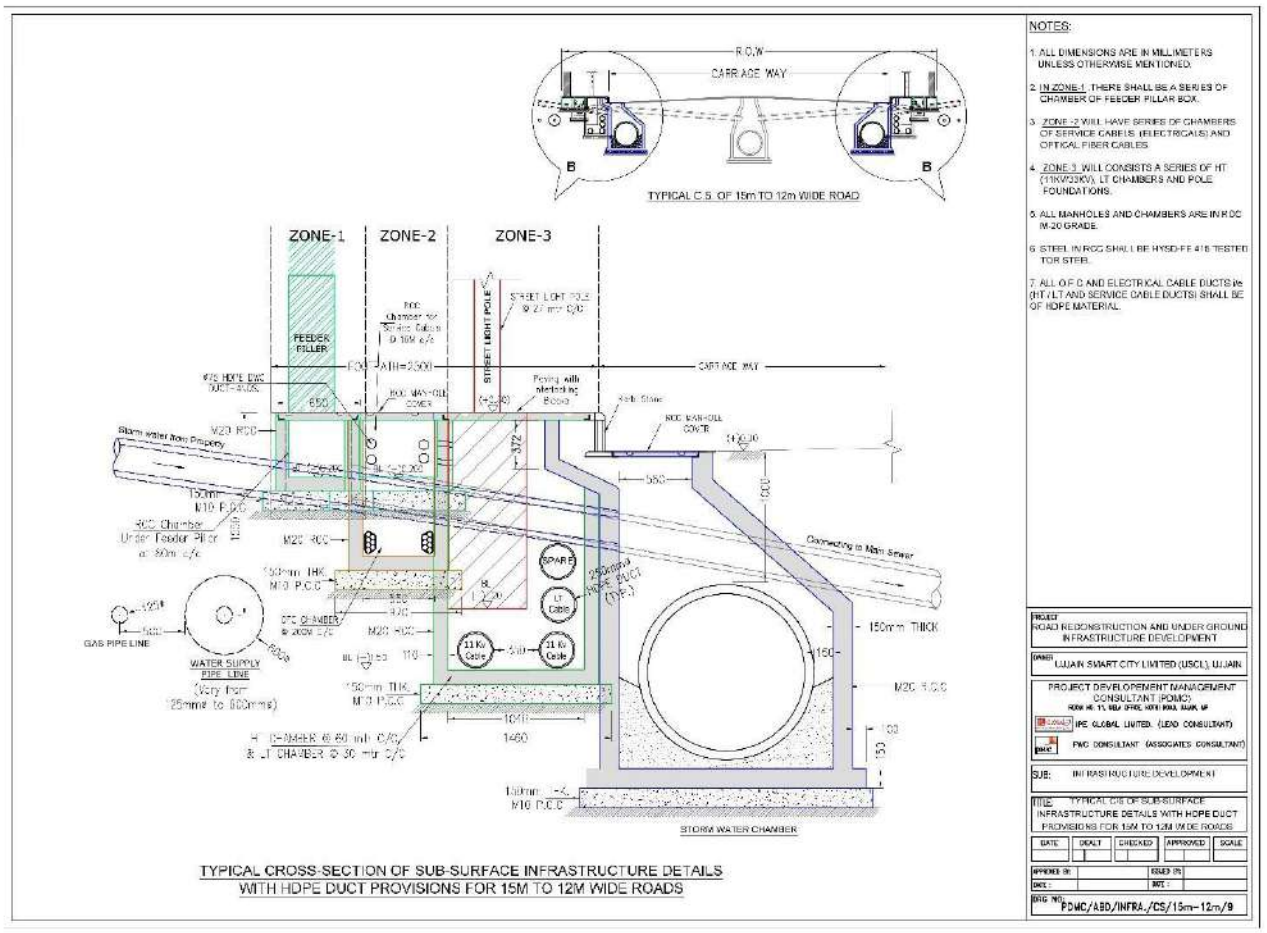

FIG 9: TYPICAL CROSS SECTION OF INFRA DETAILS WITH HDPE DUCT PROVISIONS FOR 15-12M WIDE ROAD

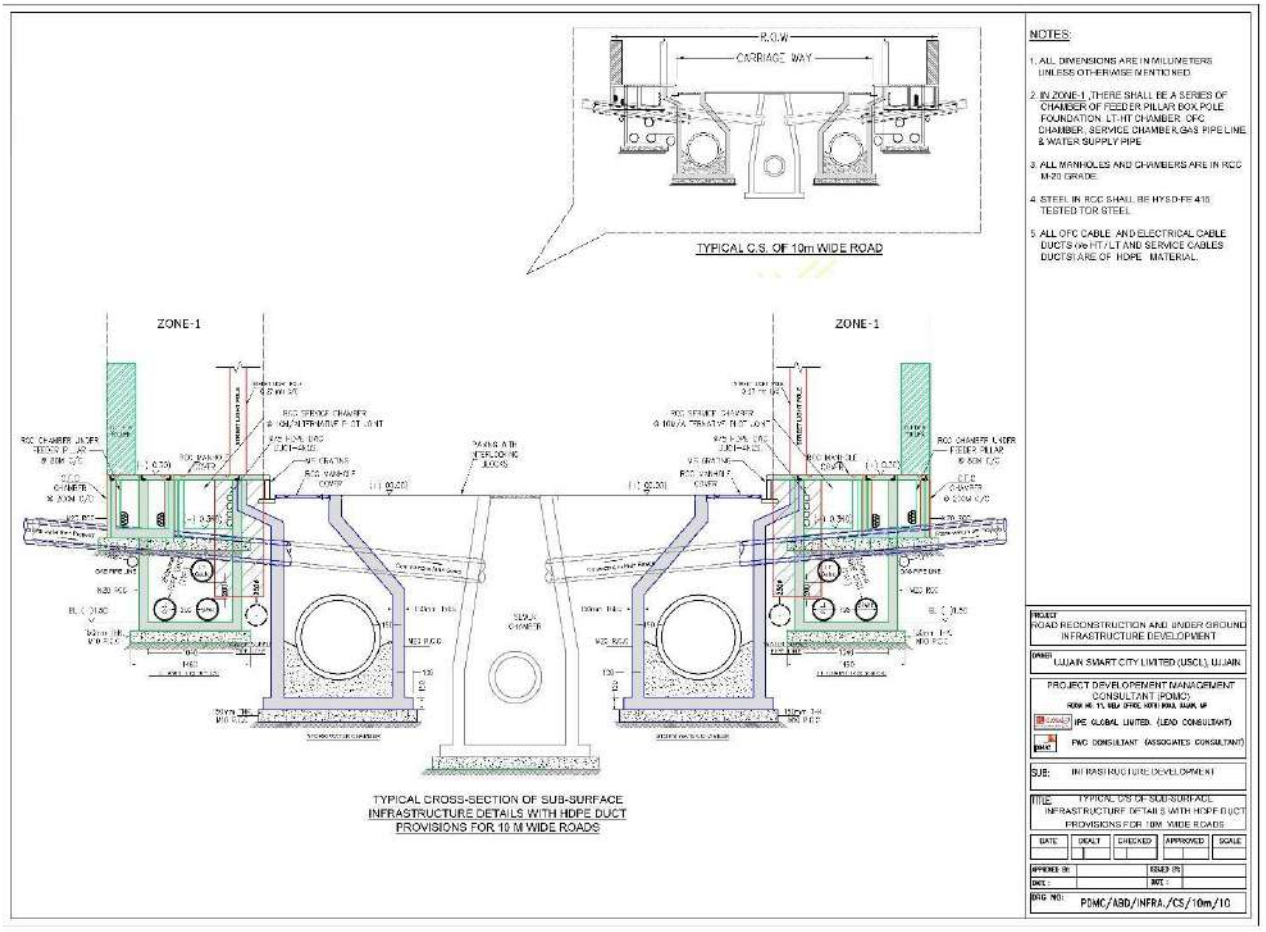

FIG 10: TYPICAL CROSS SECTION OF INFRA DETAILS WITH HDPE DUCT PROVISIONS FOR 10M WIDE ROAD

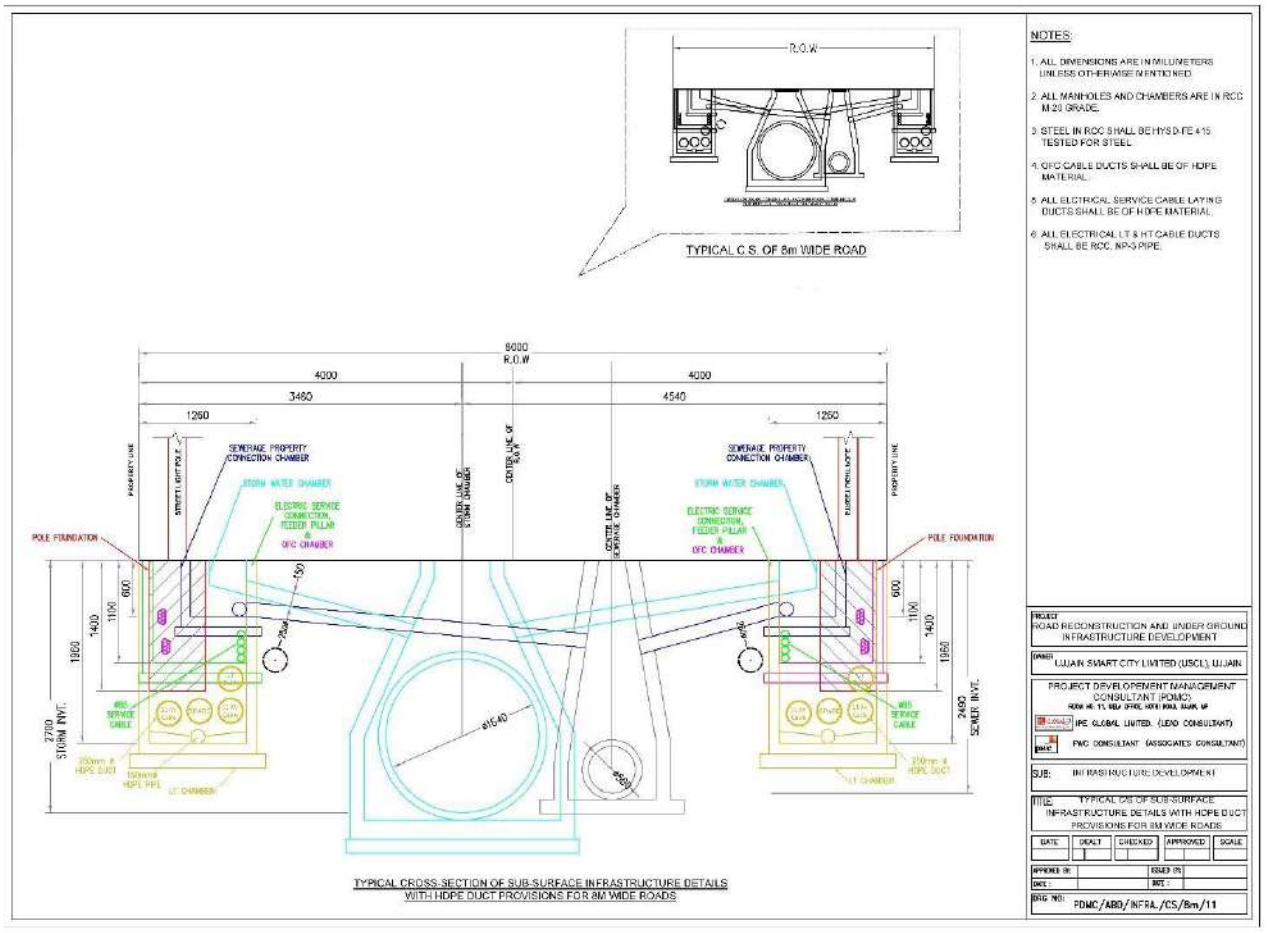

FIG 11: TYPICAL CROSS SECTION OF INFRA DETAILS WITH HDPE DUCT PROVISIONS FOR 8M WIDE ROAD

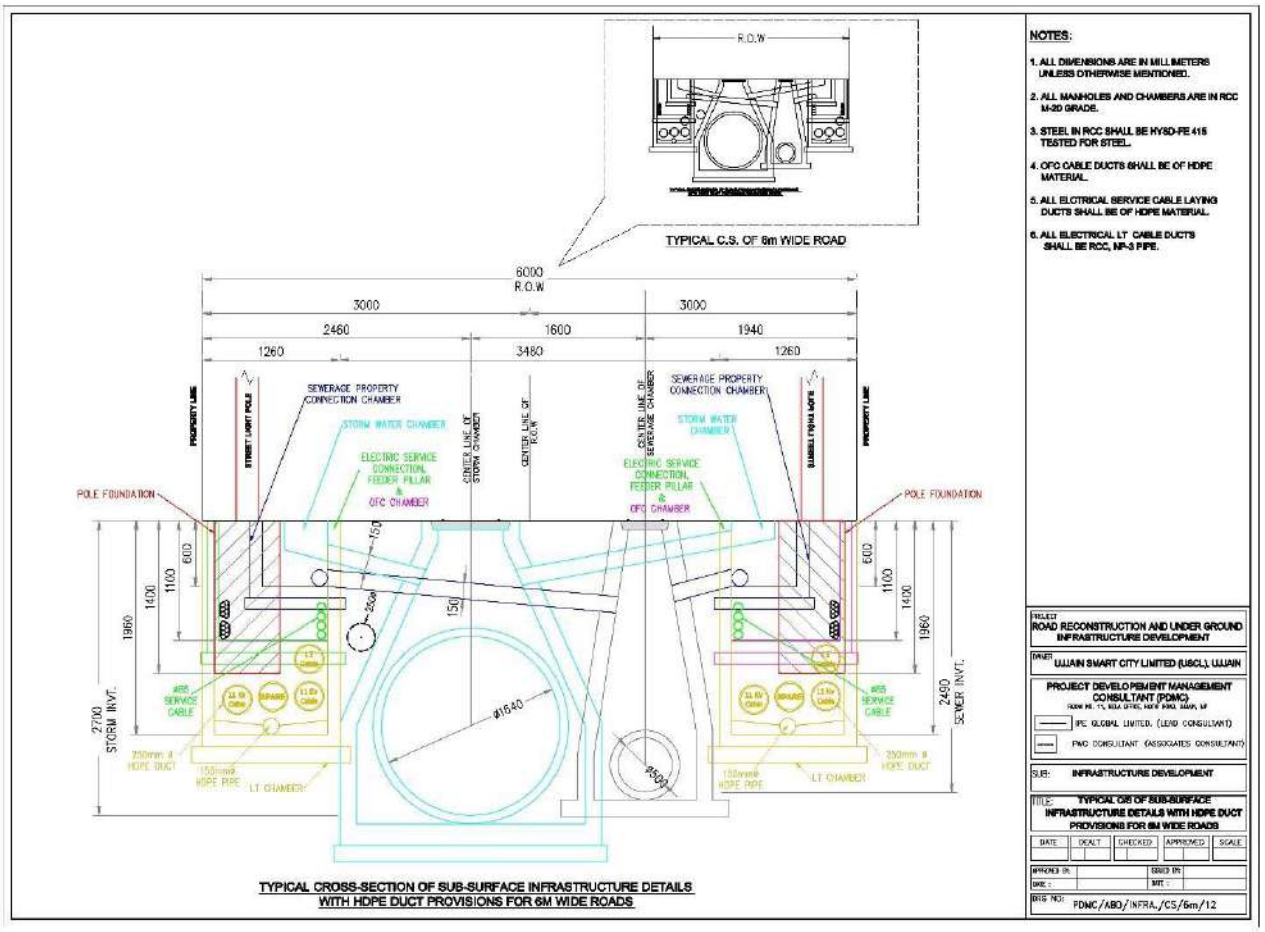

FIG 12: TYPICAL CROSS SECTION OF INFRA DETAILS WITH HDPE DUCT PROVISIONS FOR 6-8M WIDE ROAD

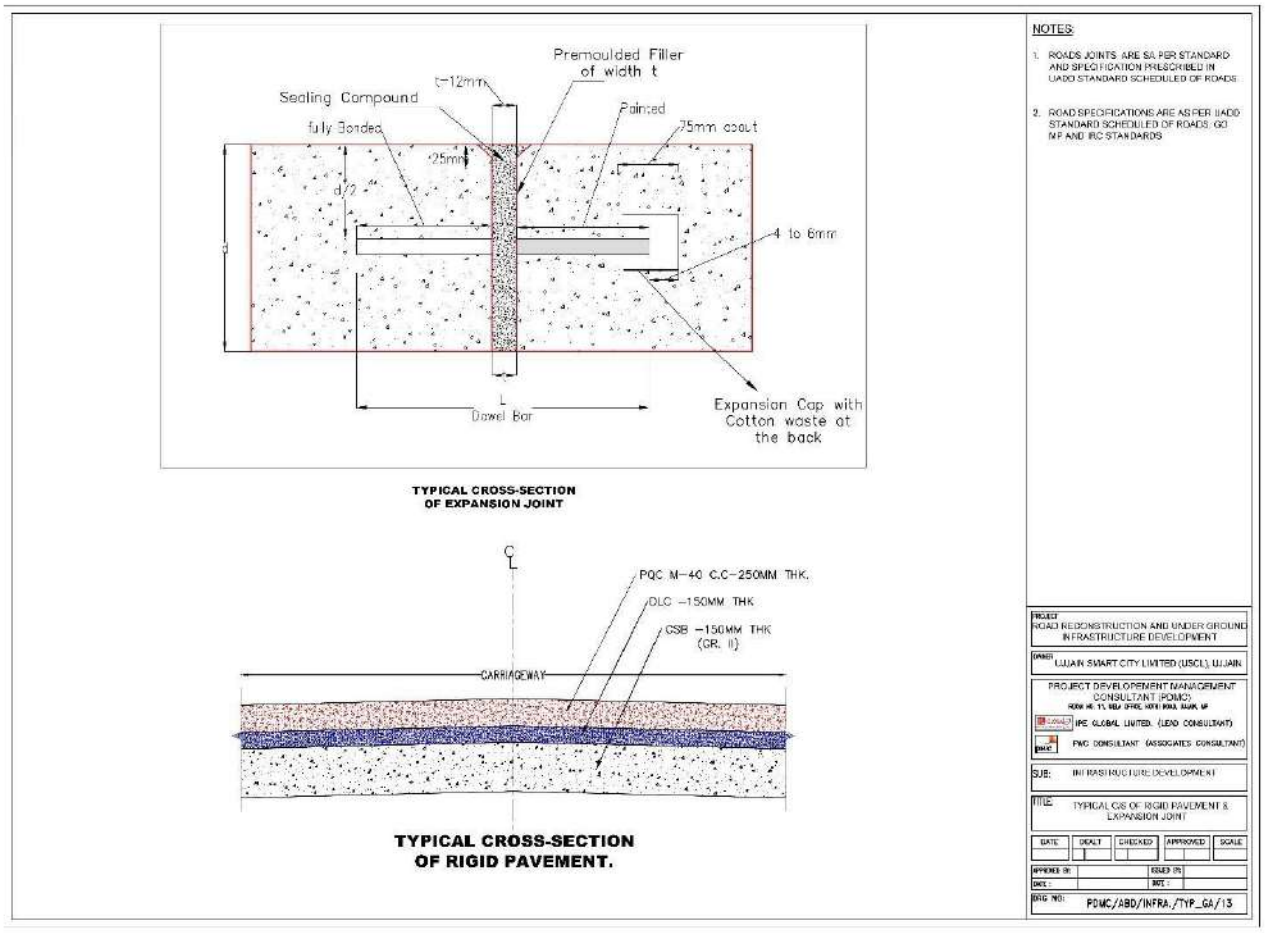

FIG 13: TYPICAL SECTION FOR RIGID PAVEMENT

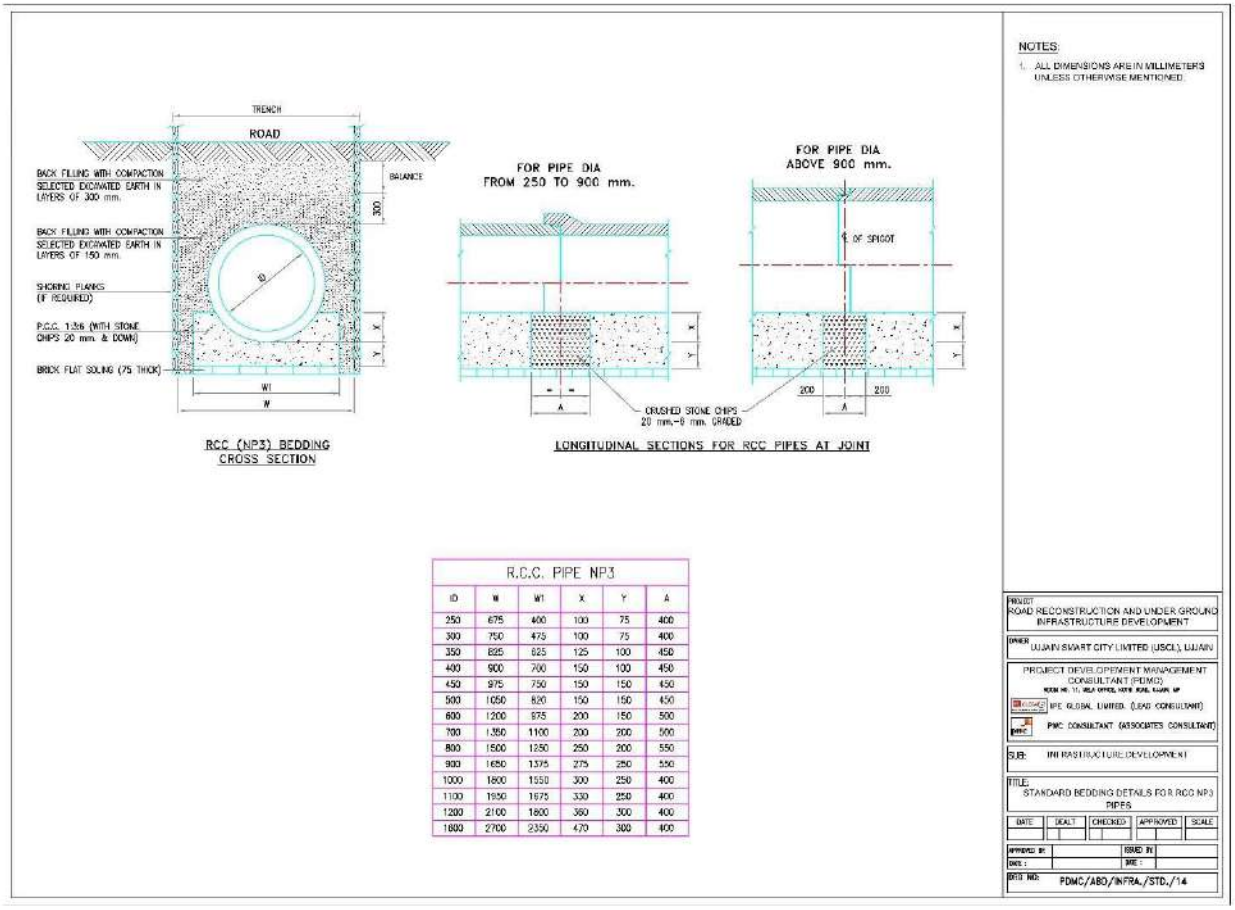

FIG 14: STANDARD BEDDING DETAILS OF RCC NP3 STORM WATER PIPE

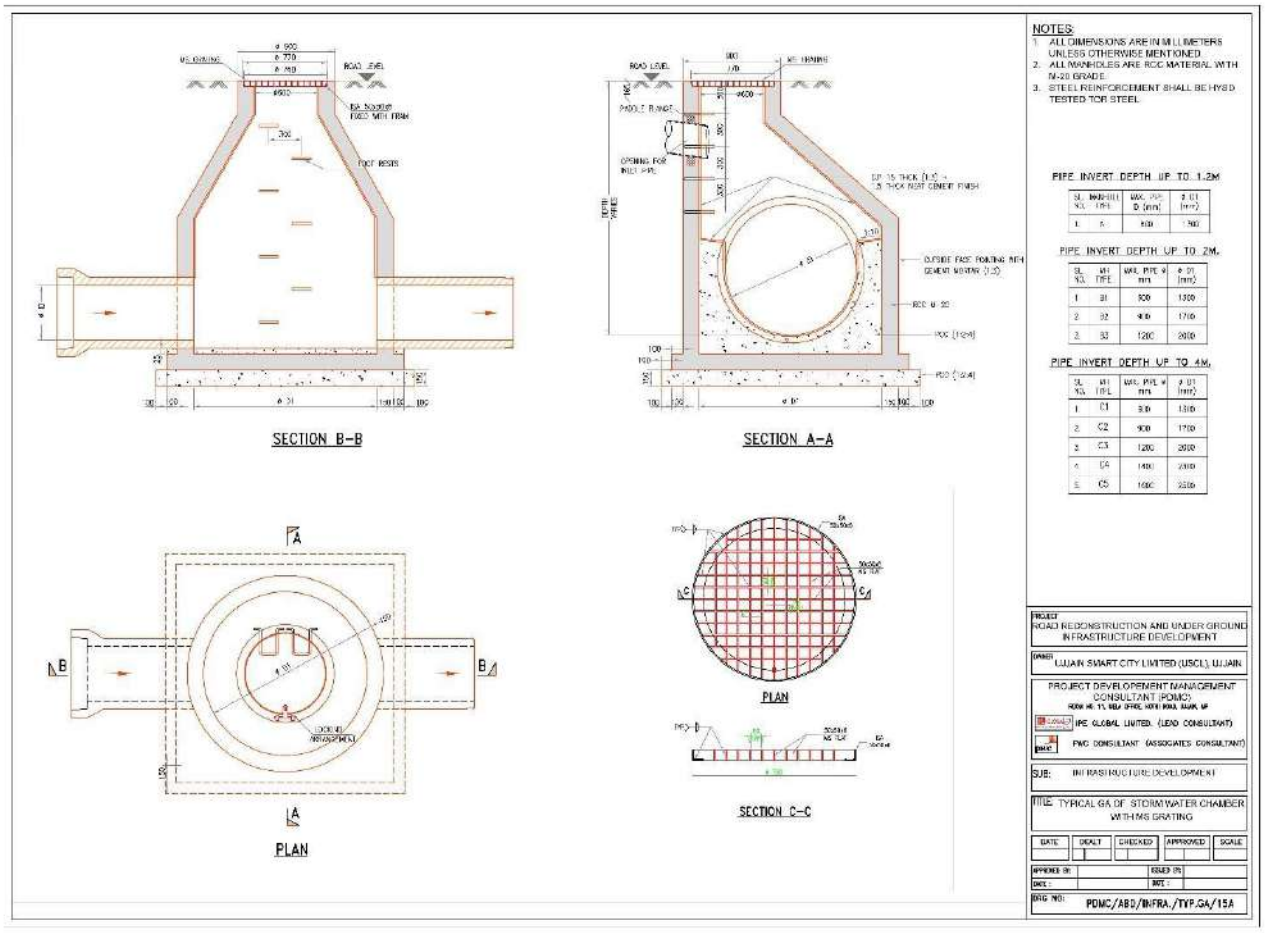

FIG 15 A: TYPICAL GA OF RCC STORM WATER MANHOLE CHAMBER

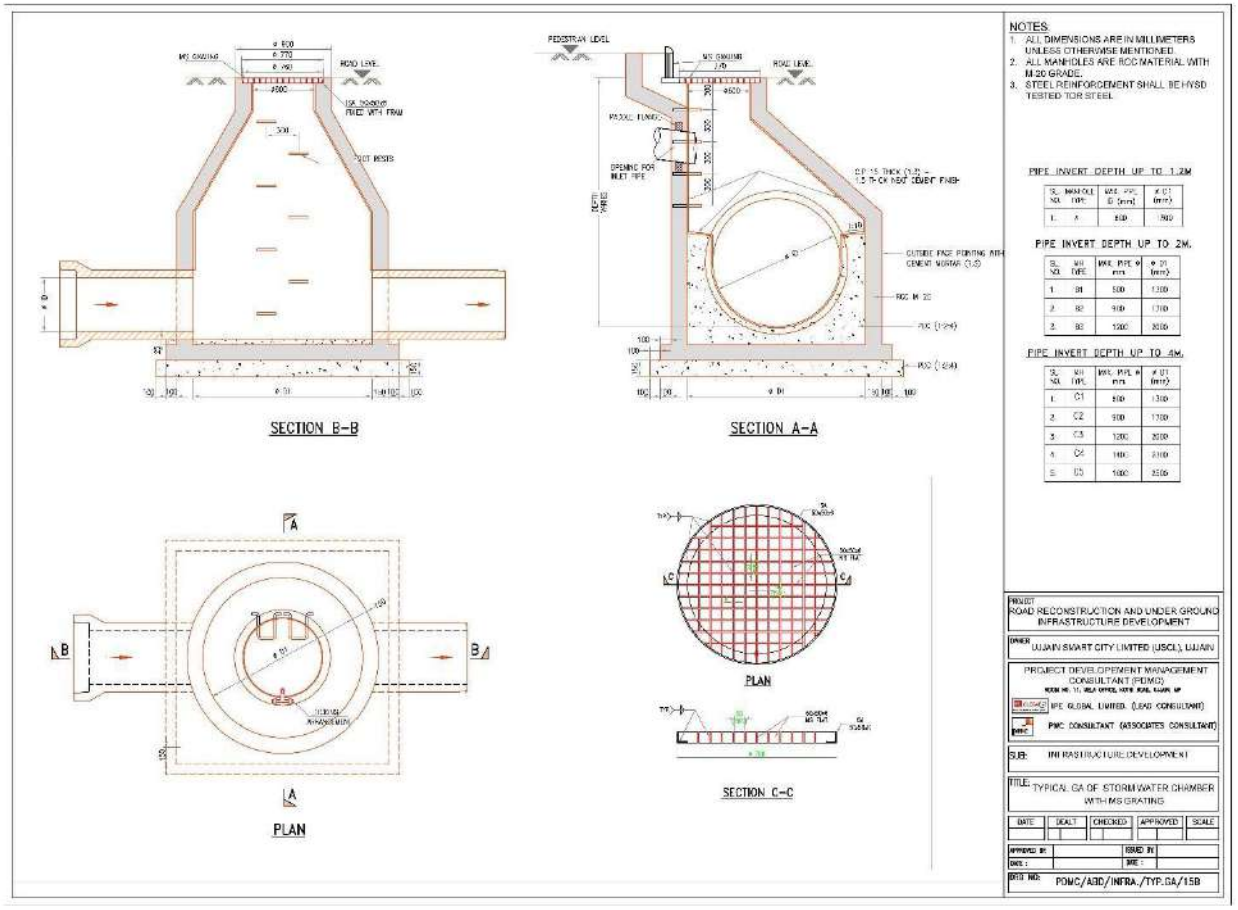

FIG 15 B: TYPICAL GA OF RCC STORM WATER MANHOLE CHAMBER

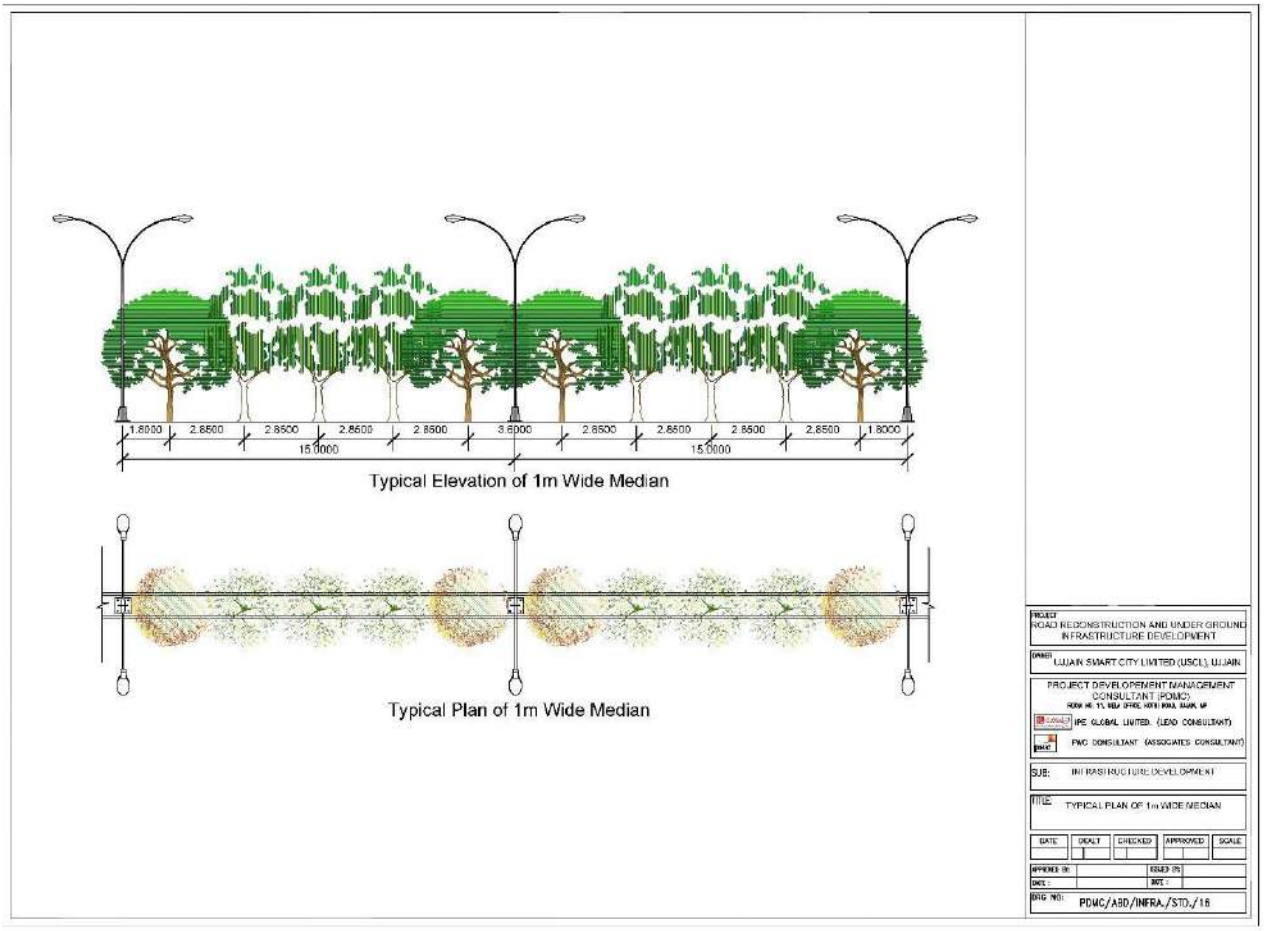

FIG 16: STANDARD DETAILS OF 1M WIDE CENTRAL MEDIAN

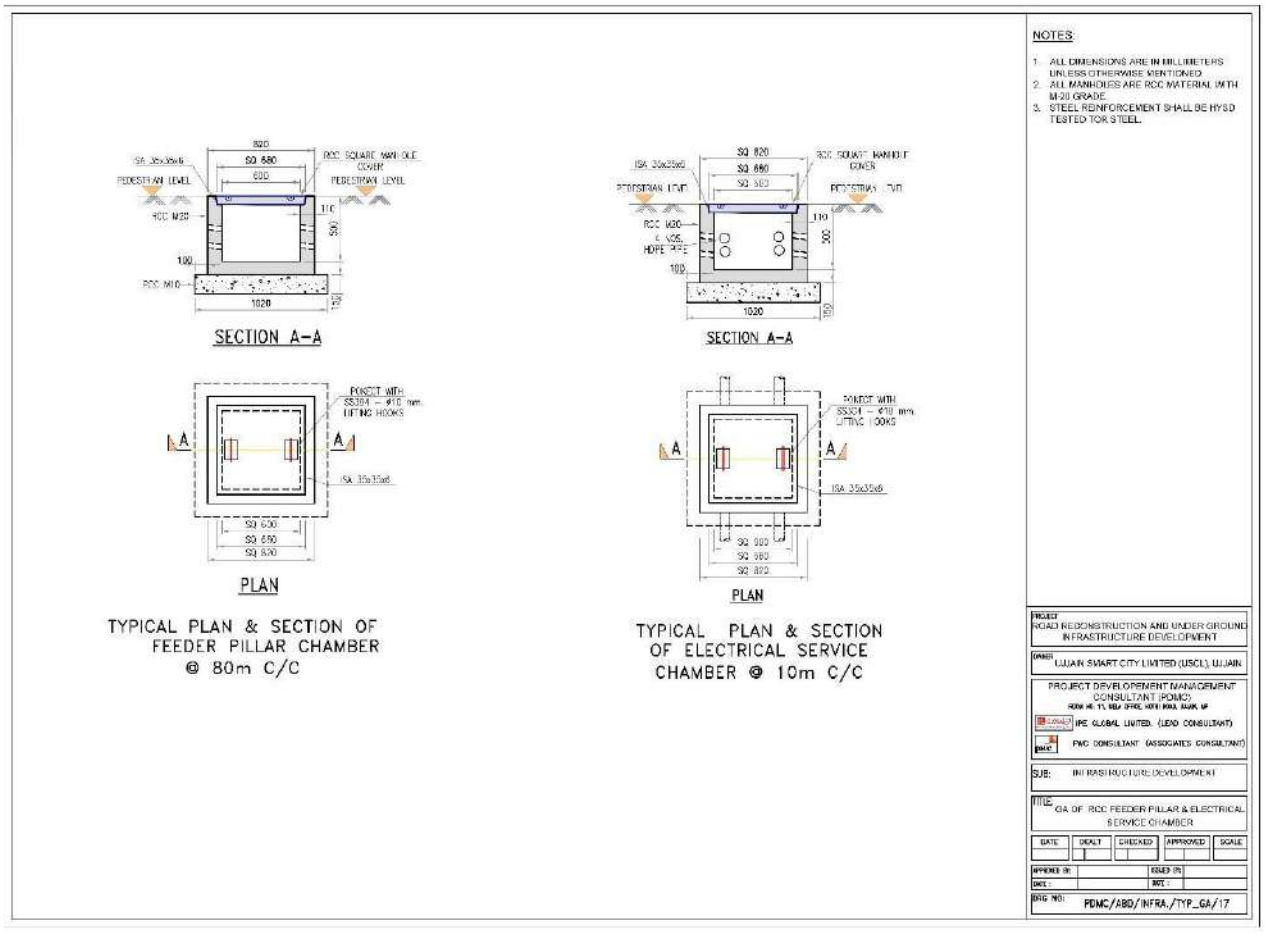

FIG 17: TYPICAL GA OF RCC CHAMBERS FOR FEEDER PILLAR & ELECTRICAL SERVICE CONNECTION.

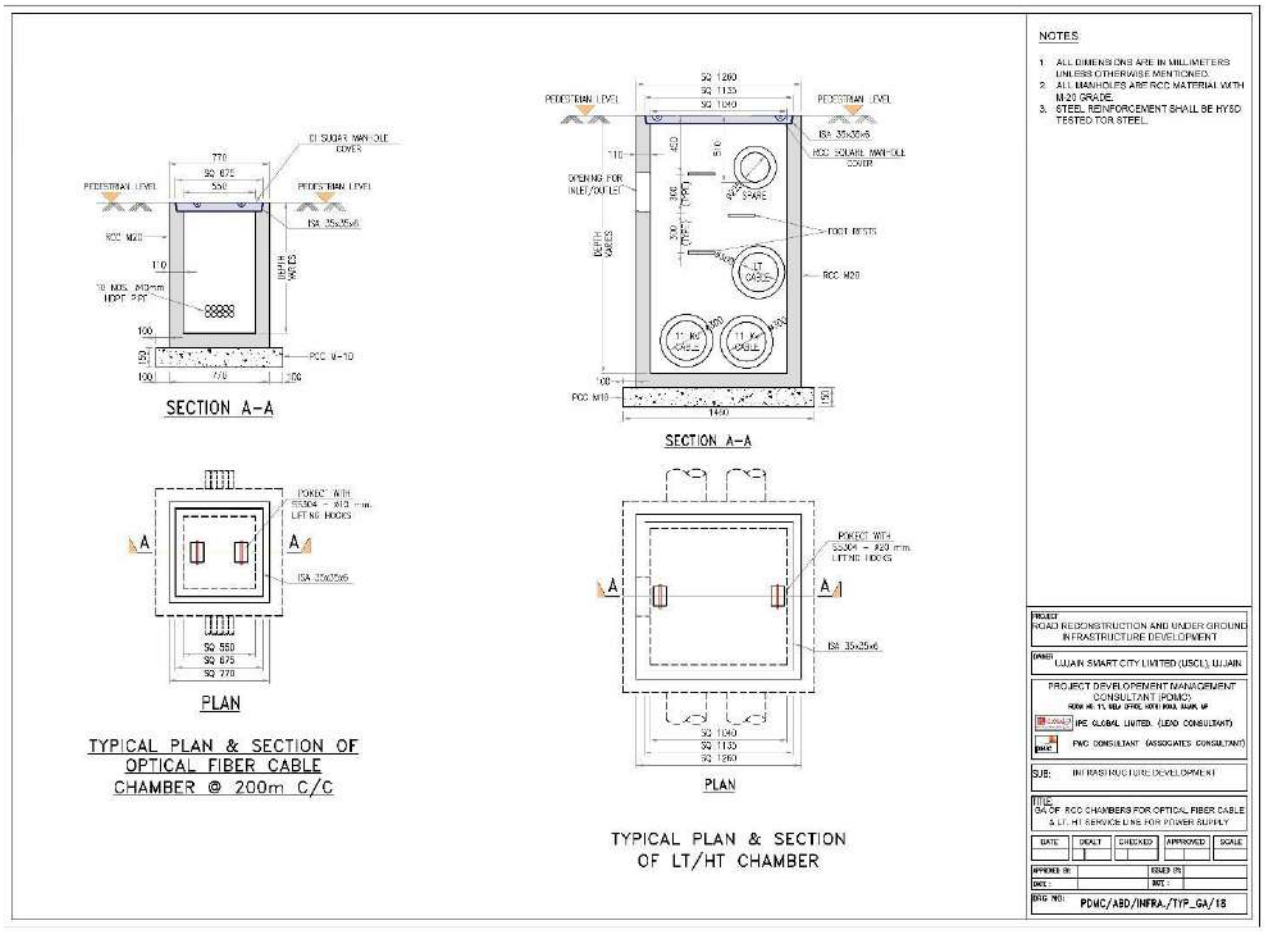

FIG 18: TYPICAL GA OF RCC CHAMBERS FOR OFC AND HT, LT & SERVICE LINES FOR POWER SUPPLY

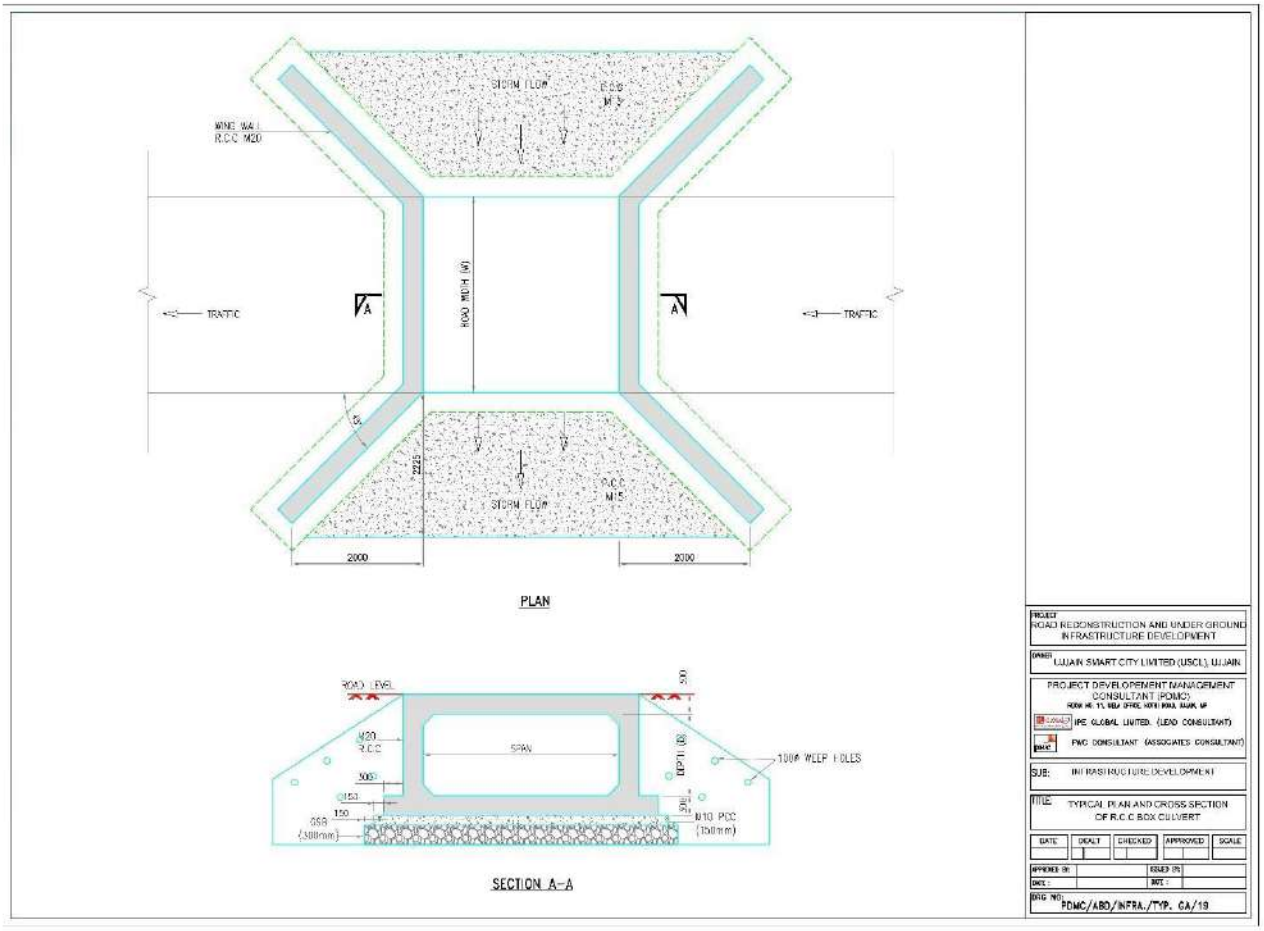

FIG 19: TYPICAL CS OF RCC BOX CULVERT

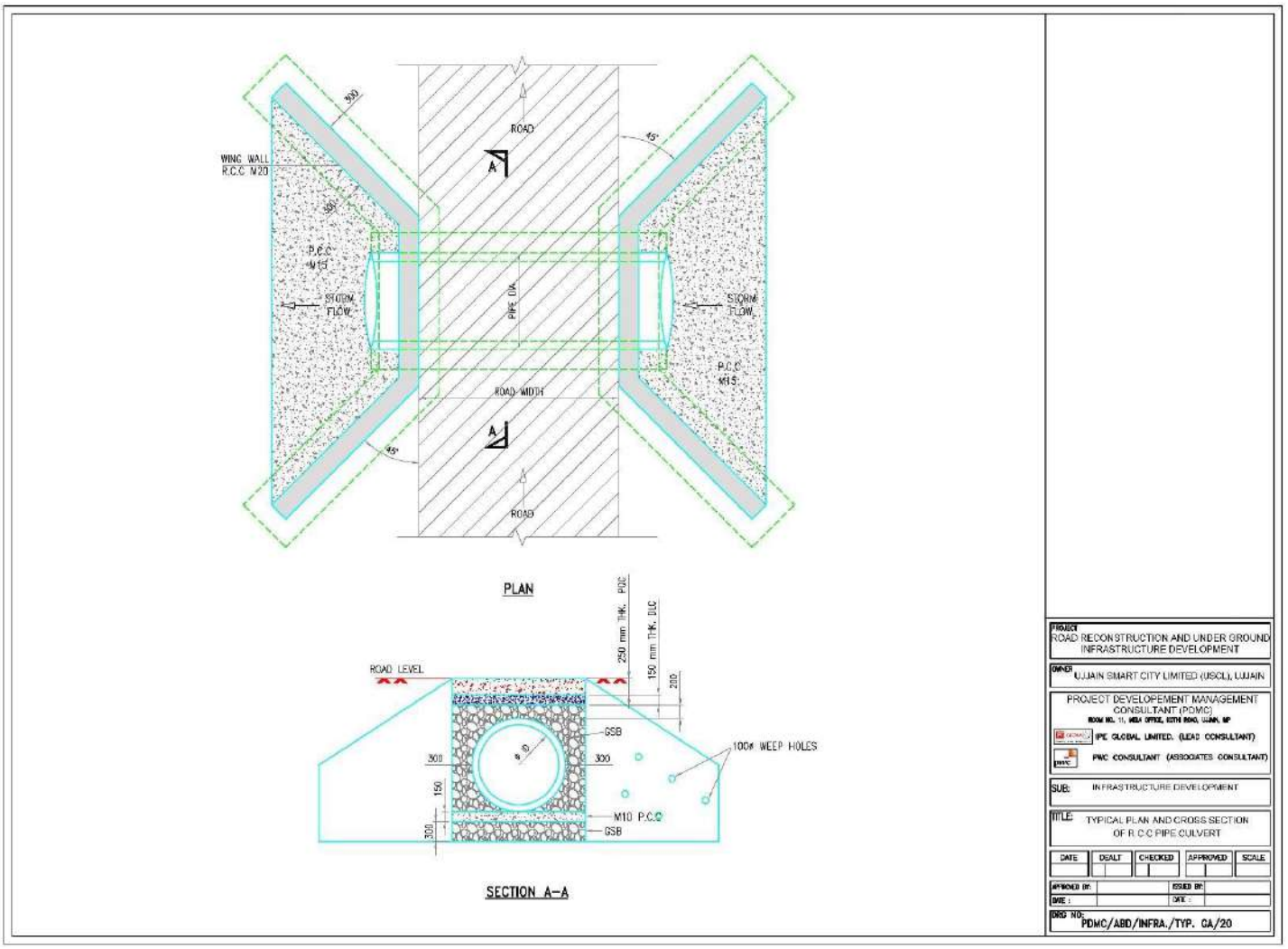

FIG 20: TYPICAL CS OF RCC PIPE CULVERT

Section 5

FORM OF AGREEMENT

This agreement, made on the day of_____between (name and address of Employer) (hereinafter called "the Employer) and_____(name and address of contractor) hereinafter called "the 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 ready 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
viii. Employer's requirements and
ix. 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 ……

Section 6

LIST OF SUGGESTED BRANDS

The following are the recommended for manufacturing of the major items given below. Where more than one manufacture is listed, the contractor is free to choose between them subject to meeting the prescribed specifications. For additional items the contractor is free to submit proposals for other manufactures from time to time and the same shall be effective after approval by the employer. The contactor may substitute alternate brand names for the major items given below provide that it demonstrates to the employer satisfaction that substitute is inevitable in the interest of the project and the alternative makes proposed by the contractor are substantially equivalent or superior to the one recommended here under:

Item / Component	Recommended makes
VT and Centrifugal Pumps	Kirloskar / Jyoti / Mather+Platt /WPIL/Becon Weir/ *Flowmore Ltd, Gurgaon*
Pump motors	Kirloskar / Jyoti / Crompton Grieves / ABB / Alsthom /BHEL/Siemens/ Bharat Bijlee
Power Transformers	ABB / Crompton Grieves/ Emco / Siemens
DI Pipes	Electrosteel / Jindal / Tata / Electrotherm
HDPE Pipes & specials	Reliance / Duraline / Jain Irrigation/ Godavari/ Sangir/
Sluice Valves / Scour Valves	Kirloskar / IVC / VAG /IVI/ Fouress
Butterfly Valve	Kirloskar / IVC / VAG /IVI/ Fouress
Non-return Valves	Kirloskar / IVC / VAG /IVI/ Fouress
Kinetic Air Valve	Kirloskar / IVC / VAG /IVI/ Fouress
Valve Actuators	Auma / Rotork / Limitork
Hydraulically operated Flow cum Pressure control valves	VAG / Darling-Muesco / Singer
Zero Velocity Valve	Vardhman Electromech/ Flownix valves
Single faced Sluice Gates	JASH / VAG / Kirloskar
Water Hammer Control Devices	Sureseal or equivalent

Electro-magnetic Flow meters	Emerson / Krohne Marshall / Yokogawa/ Siemens/ Endress +Hauser (India)/ITRON India/ Nivo Controls
Electromaganatic Flow Metter, Water Meter, Items For Instrumentation /Automation	Endress +Hauser (India)/ITRON India/ Nivo Controls
Woltman type Bulk water meters	Zenner / Itron / Elster / Minol
WTP equipement : *Flash mixers, Clariflocculator, Flocculators, Rotating bridge, Blowers etc.*	Triveni / Shivpad / Dorr-Oliver / Voltas
Single Faced Sluice Gate/WTP equipement (Flash mixers, Clariflocculator, Rotating bridge & Chlorination Equipement)	GEO Miller/Kay International.
Chlorination equipment : Chlorinator, Chlorine leak detector, Residual Chlorine analyzer, Scrubber etc.	Pennwalt / W&T / Alldos
DI / CI Fittings & specials	Kiswok / Electrosteel/ Kejriwal.
Dismantling / Expansion joints	Anup Engg. / LoneStar / Vedanta / Precise
Compression fittings, Tapping Saddles, Electrofusion Couplers	Kimplas /, George ficher / Glynwed / Frialen / Trustlene / GPS / Durafuse

Item / Component	Recommended makes
Programmable Logic Controllers (PLC)	Rockwell *(Allen Bradly)* / Siemens / Honeywell
Molded Case Circuit Breaker (MCCB)	Siemens / Schneider M.G. / Jyoti / L&T
Relay and Contactors	Siemens / Alstom / Jyoti / ABB / L&T
Cables	Tropodur / Finolex / Asian / Gloster / Incab / Universal / Polycab
Panel Enclosures and Consoles	Rittal / President / Cutler Hammer
Switch fuse Disconnector	L & T, FN Type, Siemens 3 KL Type, GEPC
Multi-Function Energy Meters	Enercon, L & T, SOCOMEC
Capacitor bank	Crompton Greaves, Khatau Junker, Malde, L
Cable Termination kit	Raychem, Denson, M-Seal
Battery	HBL NIFE, Exide, Amco
Battery Charger	Chaabi Electrical, Masstech
Ultrasonic Type Level Measurement Device	Endress+Hauser / Krohne Marshall / Hycontrol UK, Electronet
Pressure switch	Indfoss, Switzer, Tag Process Instruments
Pressure gauge	WAREE, WIKA, AN Instruments, Guru, Hitek, Electronet
Flow switch	Switzer, General Instrument, Forbes Marshall
Pressure Transmitter	Emerson, Foxbro, Druck, Endress – Hauser, ABB, Honeywell Automation,
Engineering cum Operator work Station	IBM, Compaq, Dell
Local Supervisory Station	IBM, Compaq, Dell
HMI Software	Wincc, Rs View, Monitorpro, Intellution,
Alarm Annunciator	Minilec, Peacon, ICA, APLAB, Electronet
Uninterruptible Power Supply	HI-Real, Pulse, Tata Libert, APC, APLAB
Lightening Protection Unit	MH Inst, Crompton Greaves, MTL, Pepper & fuchs, Rittmever, Cirprotec
Instruments & Control Cables	Delton, Asian, Servel, TCL, Thermopad
Receiver Indicator/Digital panel meter	Masibus, Yokogawa, Lectrotek, NISHKO, SaiTech, MTL INSTS, Electronet
Conductivity level switch	Pune techtrol, SBEM, Krohne Marshall, Endress+Hauser India NIVO, Electronet

Computer (Servers & Workstation)	HP-Compaq / IBM / Dell
Laptop	HP / Dell / Sony / Toshiba
Printer	Samsung, HP, CANNON
Multifunction power monitor	MASIBUS, L&T, ENERCON, SOCOMECH, SECURE, DAE
Temperature Scanner	SaiTech, Masibus, Nishko, Lectrotek
Analog Signal Multiplier	MASIBUS, Sai Tech, MTL INSTS, NISHKO
Items for Instrumentation / Automation	Endress+Hauser India/ ITRON India pvt Ltd/ Nivo controls/
Air conditioning	Voltas, Samsung, Carrier, Hitachi
Furniture	Godrej, Ergo, Featherlite