JABALPUR SMART CITY LIMITED (JSCL)
MADHYA PRADESH

APPENDIX 2.10

TENDER DOCUMENT

For Percentage Rate only in work Departments and other Departments similar to Works Departments

(Effective from 1-1-2014)

Office of the **: - JABALPUR SMART CITY LIMITED**

NIT Number and Date **: - JSCL/2017/ 539 /ADM/34**

Dated of NIT **: - 26-08-2017**

Agreement Number and Date :-_____

Name of Work :-**CONSTRUCTION OF SMART ROADS & UNDER GROUND ELECTRIFICATION WORK UNDER PHASE 1**

Name of the Contractor :_____

Probable Amount of Contract

(Rs. In Figure) : **70.49 Crores**

(Rs. In Words) : **Seventy crores, nineteen lakhs, fourty seven thousand, five hundred and eighty one rupees only.**

Contract Amount
(Rs. In Figure) : 70,19,47,581/- (Rs. In Words) :

Stipulated Period of Completion: - **18 Months (including Rainy season)**

Appendix 2.10

Tender Document

Table of Contents

SECTION 1

JABALPUR SMART CITY LIMITED
CIN-U75100MP2016SGC035536

Office No JSCL/2017/539/ADM/34 Date : 26.08.2017

Notice Inviting Tender (2nd Call)

Jabalpur Smart City Limited invites online proposal for "Construction of Smart Road & Under Ground Electrification Work under Phase- 1" from eligible firms having experience of similar type of work. Interested bidders may obtain details RFP document from www.mpeproc.gov.in, www.jscljabalpur.org.

Estimated Cost of Project	70,19,47,581/-
Date of pre-bid	31.08.2017
Last date of Purchase the tender	06.09.2017
Last date of online submission	11.09.2017
Date of opening of online Technical Bid	12.09.2017
Last date of Physical Submission	13.09.2017 Before 5.30 PM
Date of opening of Financial Bid	15.09.2017
Tender Document Cost	Rs. 50000.00
Earnest Money Deposit	Rs. 35,10,000/-

Note :- Amendments to NIT, if any, would be published on website only, and not in newspaper.

Chief Executive Officer
Jabalpur Smart City Limited

Dainik Bhaskar - (1)

Jabalpur Smart city Limited
CIN-U75100MP2016SGC035536

Ref. No:- JSCL/2017/539/ADM /34 Date:-26/08/2017

Notice Inviting Tender (2nd Call)

Jabalpur Smart City Limited invites online proposal for **"Construction of Smart Road & Under Ground Electrification Work under Phase-1"** from eligible firms, having experience of similar type of work. Interested bidders may obtain details RFP document from www.mpeproc.gov.in, www.jscljabalpur.org.

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Last date of Online submission	11/09/2017
Date Of Opening of Online Technical Bid	12/09/2017
Last date of physical submission	13/09/2017 Before 05.30 PM
Date of opening of Financial Bid	15/09/2017
Tender Document Cost	50,000/-
Earnest Money Deposit	35,10,000/-

Note : Amendments to NIT, if any, would be published on website only and not in newspaper.

Cheif Executive Officer, Jabalpur Smart City Limited

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Jabalpur Smart City Limited हरिभूमि

Office No JSCL/2017/ 539/ADM/34 Date:-26/08/2017

C1N- U75100MP2016SGC035536

Notice Inviting Tender (rd Call)

Jabalpur Smart City Limited invites online proposal for "Construction of Smart Road & Under Ground Electrification Work under Phase — 1" from eligible firms, having experience of similar type of work. Interested bidders may obtain details RFP document from www.mpeproc.gov.in, www.jscljabalpur.org.

Estimated Cost of Project	70,19,47,581/-
Date Of Pre-bid	31/8/2017
Last date for Purchase the Tender	06/09/2017
Last date of online submission	11/09/2017
Date of opening of Online Technical Bid	12/09/2017
Last date of Physical Submission	13/09/2017 Before 05:30 PM
Date of opening of Financial Bid	15/09/2017
Tender Document Cost	50,000/-
Earnest Money Deposit	35,10,000/-

Note: -Amendments to NIT, if any, would be Published on website only, and not in newspaper.

Chief Executive officer
Jabalpur Smart City Limited

Hari Bhoomi

Jabalpur Smart City Limited

CIN- U75100MP2016SGC035536

SECTION 1

Notice Inviting e-Tenders

Jabalpur Smart City Limited

N.I.T.NO. JSCL/2017/ 539 /ADM/34 **Dated. 26.08.2017**

Online percentage rate bids for the following works are invited from registered contractors and firms of repute fulfilling registration criteria:

S.No.	Work	District(s)	Probable Amount (Rs. In lacs)	Completion Period (months)
1	**Construction of Smart Road & Under Ground Electrification Work under Phase – 1**	Jabalpur	7019.47	18 Months

1. Interested bidders can view the NIT on website ***http://www.mpeproc.gov.in***
2. The Bid Document can be purchased only online from ***28/08/2017 to 06/09/2017 23:59 PM***
3. ***Pre Bid Meeting*** is scheduled on *3:00 PM 31/08/2017* ***at JSCL office Manas Bhawan, Jabalpur.***
4. Amendments to NIT, if any, would be published on website only, and not in Newspaper.

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Chief Executive Officer
Jabalpur Smart City Limited

Notice Inviting Tenders
(2nd Call)
Jabalpur Smart City Limited

Office of the Executive Director, Jabalpur Smart City Limited

N.I.T.NO. JSCL/2017/ 539 /ADM/34 **Dated. 26.08.2017**

Online percentage rate bids for the following works are invited from registered contractors and firms of repute fulfilling registration criteria:

S. no.	Name of Work	District	Probable Amount of Contract (Rs. In lacs	Earnest Money Deposit (EMD) (in Rupees)	Cost of Bid Document (in Rupees)	Category of Contractor	Period of completion (in Months)
1	Construction of Smart Road & Under Ground Electrification Work under Phase – 1	Jabalpur	7019.47	35,10,000/-	50000.00	Appropriate class	18 Months

1. All details relating to the Bid Document(s) can be viewed and downloaded free of cost on the website.
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.***

Further, Details can be seen in the Bid Data Sheet.

4. Eligibility for bidders :

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 eligible for registration can also submit their bids after having applied for registration with appropriate authority. The bidder would be required to have valid registration at the time of signing of the Contract.

(a) 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, wherever applicable, are given in the Bid Data Sheet.
6. ***Special Eligibility***- Special Eligibility Conditions, if any, are given in the Bid data sheet.
7. The Bid Document can be purchased only online from ***28/08/2017 to 5:30 PM 06/09/2017.*** Other key dates may be seen in bid data sheet.
8. ***Pre Bid meeting*** is scheduled on ***3:00 PM 31/08/2017*** at ***JSCL Office Manas Bhawan, Jabalpur.***
9. ***SOR applied is UADD Schedule of Rates 2012*** *Volume I, II, & III* and amendments upto the date of submission of tender.
10. Amendments to NIT, if any, would be published on website only, and not in newspaper.

26.8.17

Chief Executive Officer
Jabalpur Smart City Limited

SECTION 2

INSTRUCTIONS TO BIDDERS (ITB)

A.GENERAL

PROJECT OBJECTIVE AND KEY COMPONENTS

Transforming roads into Smart Roads has been conceptualized by the under Smart City Mission and by JSCL, to create 21st century public realm infrastructure for all strata of the society. This entails comprehensive upgrading of the public Right of Way (ROW) of the streets which includes (but is not limited to) – refurbishment of existing carriageway, laying of new footpaths and cycle tracks, shifting of select utilities from its current location to new location (under footpaths) or construction of new utilities, external development works for landscape, hardscape, street furniture, lighting etc.

Smart Roads include **Four Broad Objectives,** namely:

- **ROAD DIET & SAFE STREETS:** Also known as lane-width reduction or road re-channelization is a technique in transportation planning whereby the effective width of the carriageway is reduced in order to achieve systemic improvements. Roads with clearly demarcated spaces for vehicles, pedestrians, cyclists and dedicated on-street parking to minimize conflicts between vehicular and pedestrian traffic. Safe streets with shaded walkways promoting walking as a daily activity – encouraging healthy lifestyles.

- **RESILIENT STREETS:** Streets with defined utility corridor including undergrounding & overhead utilities where upgraded utilities can withstand severe natural and man-made disasters. Streets that provide infrastructure allowing safe walking experience in night through pedestrian lighting and clean public space through dustbins at regular intervals.

- **INCLUSIVE STREETS:** Streets that allow and provide multiple mobility options to its citizens including walking, cycling, driving private vehicles and commuting through public transport. Universal accessible design that allow safe walking experience to all citizens especially elderly and people with special needs.

- **STREETS AS PUBLIC SPACES:** Streets that provide spaces outside our homes for social, cultural or intellectual interactions, to walk or to just breathe fresh air. Streets that reduces congestion through replacement of encroachments on streets to its designated areas and achieving low carbon emission.

1. SCOPE OF BID

The roads are to be constructed as per the street design attached in this document following the street design guidelines such as IRC , UTTIPEC street design guidelines, etc. issued by MoUD GoI. The attached road design considers the following three levels of transport (i) Pedestrian (ii) Cycle track (iii) Public transport users and lastly the motorized vehicles. It should include the necessary infrastructures/amenities like landscaping, water supply, storm water drainage, underground utility duct etc.

Dedicated corridors will be provided in traffic services like cycle track and pedestrian track. The scope of project is to re-construct the existing road 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 be considered for complete modification/up gradation of the roads with utility ducts to underground electrification work and OFCs 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.

18 M WIDE ROAD

(i) Existing Roads are either concrete or bituminous roads with lesser carriageway width. It is proposed to have (7) m wide carriageway of bituminous with provision of widening with overlay on existing surface without scarifying the existing bituminous surface. If the road is of concrete pavement then widening will be done with bituminous material.

(ii) Un-segregated Cycle track on both side of carriageway will be of bituminous material which is to be highlighted with road markings as per the street guidelines.

(iii) Pedestrian path on both side of cycle track which will be constructed with flag stone.

(iv) Landscaping with benches, tree guards, dustbins etc. is also proposed. There is also provision of Water ATMs along some roads.

(v) Underground utilities such as pipe line, sewer pipeline, OFC cables, Electrical cables, rainwater drain etc. The cost of sewer pipeline and water supply is not included in this project, as they are either being executed on other project or will be executed in different projects.

24 M WIDE ROAD

Existing roads are bituminous roads and it is proposed to have carriageway of bituminous with provision of widening with overlay on existing surface without scarifying the existing B.T. surface (as per attached road sections).

(i) Segregated cycle tracks on both side of carriageway will be of bituminous material which is to be highlighted with road markings as per the street guidelines.

(ii) Pedestrian path on both side of cycle track which will be constructed with flag stone.

(iii) Landscaping with 3 seat chairs, tree guards, dustbins etc. There is also provision of Water ATMs along some roads.

(iv) Median is proposed on the road.

(v) Underground utilities such as pipe line, sewer pipeline, OFC cables, Electrical cables, rainwater drain etc. The cost of sewer pipeline and water supply is not included in this project, as they are either being executed on other project or will be executed in different projects.

30 M WIDE ROAD

Existing roads are bituminous roads with lesser carriageway width. It is proposed to have carriageway of bituminous with provision of widening with overlay on existing surface without scarifying the existing B.T. Surface

(i) Segregated cycle tracks on both side of carriageway will be of bituminous material which is to be highlighted with road markings as per the street guidelines.

(ii) Pedestrian path on both side of cycle track which will be constructed with flag stone.

(iii) Landscaping strip with 3 seat chairs, tree guard, dustbin etc. There is provision of Water ATM in some Roads.

(iv) Median is proposed on the road.

(v) Underground utilities such as pipe line, sewer pipeline, OFC cables, Electrical cables, rainwater drain etc. The cost of sewer pipeline and water supply is not included in this project, as they are either being executed on other project or will be executed in different projects.

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 in scope of successful Bidder to undertake all Site surveys, Geotechnical investigations/Engineering Surveys, hydrological investigations Underground Utility Surveying of the roads for shifting and creating new, 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 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.

PRE-CONSTRUCTION PHASE (DESIGN & GOOD FOR CONSTRUCTION DRAWINGS)

This phase starts from the date of signing of the Agreement to the date of approval of GFC. The total timeline for this phase is 2 months w.e.f. from the date of signing of Agreement. Applying the design principles, objective and expected outcomes illustrated in the document as well as attached drawings/documents provided by the employer, the contractor must develop on the concept provided, to create a good for construction (GFC) drawings package, which on approval, shall be followed by on-site implementation. During this process, the contractor shall review the concepts design and planning for betterments or improvements which may be incorporated to better achieve the Employer's goals and objectives. These betterments, if any, shall be submitted by the contractor to the Client representative/PMC for review and for the approval before the closure of the Good for construction drawings stage.

KEY TASKS/ DELIVERABLES BY THE CONTRACTOR DURING GOOD FOR CONSTRUCTION STAGE WILL INCLUDE:

- This contract involves the design (wherever required, including submission and obtaining of all necessary approvals from the relevant authorities). The contractor shall prepare GFC for the works included in the RFP in accordance with the concept design developed by Employer.
  - The contractor should submit a complete timeline for scope of work to be carried out.
  - The Client Representative/PMC will supervise and monitor the progress of this phase and contractor shall provide necessary coordination.
  - Contractor shall conduct all investigations required for design and execution of project like traffic studies and road investigations , Inventory of roads, Geo-tech investigations minimum 3 m below the hard rock or as per the BIS standards and for its structural stability and propose any new pavement, junction improvements , if required.
  - Based on the revised cross section, traffic and other relevant parameters, contractor will have to design the geometry of road and pavement etc. and get it vetted and approved by 'Engineer in Charge'.
  - Preparation and Submission of Complete Bill of Materials (BoM) along with detailed technical specifications, manufacturer's details and delivery schedule at the sites. Shall also provide the codification for all the items delivered.

- Preparation and submission of the details of the man power deployment for the project.
- Dispatch of materials as per the implementation accepted timelines / implementation schedule and phasing of the project by the employer.
- Preparation and submission of periodical progress report for all the stages.
- Employer will provide all the available information pertaining to these roads to the successful bidder. However contractor has to validate the information provided by carrying of field/site surveys/other relevant surveys as deemed necessary independently. The contractor shall conduct site survey and investigation of the roads where design has to be implemented and prepare survey report highlighting the site feasibility, GFC drawings, and site specific requirements / dependencies for successful implementation.
- Contractor has to prepare the documentation for showcasing the daily and weekly progress and the quantification of work done, Its mandatory to submit the progress report with Photos and Video every month and also before and after present conditions. At the end of the project a movie with 15 minutes, showcasing the project at different stages shall be submitted by the contractor.

LANDSCAPE, HARDSCAPE AND CYCLE TRACK WORKS

a) The various components included (but not limited to) in this are – wide footpaths, cycle tracks, landscape corridor with trees, bus bays, on-street parking, road markings, median, hawker zone, improved junctions, table tops, universal accessible design by introduction of ramps, benches and planting beds, provision for future bus stops, etc.
b) Design and Construction of bus stops, public toilets and ATMs is not part of the contractor scope of work. Although the contractor is required to ensure site coordination and construction activity alignments when these works are being undertaken by other contractors.
c) General Arrangement Plans (Surface Finishes Layouts) including Materials, Site Furniture, cycle tracks etc.
d) Levels and Grading Layouts; Material/Lighting/Furniture Schedules; Hardscape Details (including ramps, cycle tracks, bus bays, on-street parking and benches); pedestrian lighting details; planting schedule; planting and soil details
e) Hard landscape specification including all details in employers bill of quantities (BoQ) and technical specs.
f) Softscape Specifications including all details in Employers BoQ and Technical Specs
g) Final Setting-Out Plan for hardscape, softscape; furniture, cycle tracks, footpaths, lighting etc.
h) All detail construction drawings suitable for construction works to be undertaken by competent contractor
i) All necessary coordinated services drawings (including but not limited to location of light fixtures, cycle tracks, footpaths, existing site services and any new added services etc.)

j) Shop drawings for all proprietary items/vendor items
k) The contractor must be aware of general and specific site conditions, topography and any existing landscape prior to commencement of any landscape works on site.

B) UTILITIES - SCOPE OF INFRASTRUCTURE FOR CONTRACTOR

a) Objectives for Infrastructure Layout: A sustainable approach to design and implementation of roads based on three basic principles outlined in the Tender i.e. Focus on pedestrians/cyclist movement for safety, Consistent traffic & travel lane widths and Intelligent relaying of all sub terrain utilities so that no more digging up of smart roads. Every effort to include parking spaces, street landscape, garbage pickup points, adequate lighting, clean signage's, ramped footpaths etc..in the smart streets.

b) The project of Smart Roads has been considered under smart city for showcasing the pilot development to the rest of the city, which makes the area liveable and better eco-friendly environment. The scope of work for infrastructure is explained in the following section.

1. Development and Strengthening of Carriage way with uniform lane widths. This would require removal of existing median and relocating it at a new defined road centre with street lighting and landscape elements as shown in concept drawings.
2. Development of footpath wider and pedestrian friendly ways.
3. Reserving the space for utilities in a specified corridor
4. Rehabilitation of tertiary storm water road side drain for easing out of rain water with proper shoulders etc. Development of junction across entire road.
5. Construction Bus bays, Auto bays wherever essential.
6. In this project, the above said points have been considered/ incorporated for the standard development of roads. The objective of these standards is to make road for longer duration usage and to be free from zig-zag movement of vehicles, to ease out the pedestrian movement and for the safety of school children and elderly. Further, this project should ensure to avoid un-necessary road cuttings by various utility agencies.

C) UNDERGROUND ELECTRIFICATION WORK - SCOPE OF WORK FOR CONTRACTOR

1. The entire electrical works should be carried out in accordance with the specifications without any extra cost. The work shall conform to latest edition of Indian Standard Specifications & Indian Electricity Rules.
2. The works shall be completed as per the requirement of ISO:9002 & all required documents for the same shall be made available.
3. The Technical specification of all the equipment and the quantities required of various accessories & auxiliaries. The contractor shall also ascertain the quantities of items such as HT/LT cables, earthing material, supporting steel pipes etc. and procure the material as per requirement. Excess material brought to site & not installed shall not be accepted by the Authority nor it will be paid for.

2. GENERAL QUALITY OF WORK:

The work shall have to be executed in accordance with the technical specifications specified in the Bid Data sheet/ Contract Data, and shall have to meet high standards of workmanship, safety and security of workmen and works.

3. PROCEDURE FOR PARTICIPATION IN E- TENDERING:

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

4. ONE BID PER BIDDER

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

1.2 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 Government/JMC/ JSCL or the Authority

6. SITE VISIT AND EXAMINATION OF WORKS:

The bidder is advised to visit and inspect 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 in this respect shall have to be borne by the bidder.

B.BID DOCUMENTS

7. CONTENT OF BID DOCUMENTS:

The Bid Document comprises of the following documents:

1. NIT with all amendments.
2. Instructions to Bidders, Bid Data Sheet with all Annexure
3. Conditions of Contract :
    I. Part I General Conditions of contract and the Contract Data with all Annexure, and
    II. Part II Special Condition 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 (WHERE APPLICABLE)

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 Documents, 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 document 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:

Part1- This shall be known as online Envelop A and would apply for all bids. Online envelop 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 the format given in the bid data sheet.
ii) Payment of the cost of Bid Document.
iii) Earnest Money : and
iv) An Affidavit Duly Notarized.

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

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

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 Proposal 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 is found false/fake/untrue before acceptance of bid. If it is found after acceptance of the bid, the bid 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, 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 is 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; and the Employer shall not be liable for the same.

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 the 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), in the amount specified in the Bid Data Sheet.

17.2 .The EMD shall be in the form of Fixed Deposit Receipt of a scheduled Nationalised/commercial bank, issued in favors 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 form(s) 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 after furnishing the required Performance security.

17.6 Failure to sign the contract by the selected bidder, within the specified period, for whatsoever reason, shall result in forfeiture of the earnest money.

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D. SUBMISSION OF BID

18. The bidder is required to submit online bid duly signed digitally, and envelop "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 non-responsive , and envelop 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 (Envelop 'B')*** shall not be opened.

19.3 Envelope 'C' (Financial Bid) shall be opened online at the time and 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 bidding 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 his 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 singing of the contract the bidder to whom LOA has been issued shall have to furnish performance security of the amount in the form and for the 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. similer 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 any other 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 fanatical or other benefit or to avoid an obligation:

c. ***'Coercive Practice'*** means impairing of harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party,

d. ***'Collusive practice'*** means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.

(END OF ITB)

BID DATA SHEET

GENERAL		
SR.NO.	**PARTICULARS**	**DATA**
1	Office inviting tender	***JABALPUR SMART CITY LIMITED***
2	NIT No.	**N.I.T.NO. JSCL/2017/ 539 /ADM/34**
3	Date of NIT	***26th of August 2017***
4	Bid document download available from date & time	***28th of August 2017***
5	Website link	***www.mpeproc.gov.in***
SECTION 1 – NIT		
CLAUSE REFERENCE	**PARTICULARS**	**DATA**
2	Portal fees	***As notified in e-tendering website***
3	Cost of bid document	***Rs.50,000.00***
	Cost of bid document payable at	***As notified in e-tendering website***
	Cost of bid document in favor of	***As notified in e-tendering website***
4	Affidavit format	***As per ANNEXURE B***
5	Pre-Qualifications required	***Yes*** | -
	If yes, details	***As per ANNEXURE C***
6	Special Eligibility	***Yes*** |
	If Yes, details	***As per ANNEXURE D***
7	Key dates	***As per ANNEXURE A***
SECTION 2 – IT B		
CLAUSE REFERENCE	**PARTICULARS**	***DATA***
1	Name of 'work'	***Construction of Smart Road & underground electrification work under phase- 1.***
2	Specifications	***As per ANNEXURE –E***
3	Procedure for participation in e-tendering	***As per ANNEXURE –F***
4	Whether joint venture is allowed	***Yes*** |
	If yes, requirement for joint venture	***As per ANNEXURE – G***
9	Pre bid meeting to be held	| ***Yes***
	If Yes, Date, Time & Place	***Date : 31/8/2017*** ***Time form: 15.00 hrs*** ***Place: JSCL Office Manas Bhawan Jabalpur M.P***

BID DATA SHEET		
CLAUSE REFERENCE	**PARTICULARS**	**DATA**
12	Envelopment A containing : i. Registration number or proof of application for registration and organizational details as per Annexure H ii. Cost of Bid Document iii. EMD iv. An affidavit duly notarized as per Annexure – B Should reach in physical form	***At the Office of the Jabalpur Smart city Limited, Manas Bhavan*** ***Rs. 50000.00*** ***Rs. 35,10,000/-*** ***Before***
14	Envelope-B Technical Proposal	***ANNEXURE – I and ANNEXURE –I (Format I-1 to I-5)***
15	Envelope-C Financial Bid	***Annexure – J (SHOULD BE SUBMITTED ONLINE)***
	Materials to be issued by the department	***ANNEXURE – K***
16	Period of Validity of Bid	***120 Days***
17	Earnest Money Deposit	***Rs 35,10,000/-***
	Forms of Earnest Money deposit	***i. FDR/e-FDR*** ***ii. Demand draft of scheduled commercial bank*** ***iii. Interest bearing securities of post office.***
	EMD valid for a period of	***365 Days***
	FDR must be drawn in favor of	***Executive Director, JSCL***
21	Letter of Acceptance (LoA)	***ANNEXURE L***
22	Amount of Performance Security	***5% of contract amount***
	Additional Performance Security, if any	***As per rule***
	Performance security in the format	***ANNEXURE M***
	Performance security in favour of	***Executive Director, JSCL***
	Performance security valid up to	***Valid contract period plus 3 (Three) months***

Annexure – A

(See clause 1, 7 of Section 1-NIT)

KEY DATES

S.No	WORKS DEPARTMENT STAGE	BIDDERS STAGE	START		EXPIRY		ENVELOPES
			Date	Time	Date	Time	
1		Purchase of Tender – Online	28/08/2017		06/09/2017		
2		Bid Submission – Online			11/09/2017		
3		Physical submission			13/09/2017		
4	Mandatory submission Open-online (Envelope-A)				12/09/2017		Envelope A
5	Technical Proposal open-online (PQ Envelope-B)				12/09/2017		Envelope B
6	Financial Bid open-online (Envelope-C)				15/09/2017		Envelope C

Original term deposit receipt of earnest money deposit, demand draft for the cost of bid document and affidavit shall be submitted by the bidder so as to reach the office as prescribed in bid data sheet, at least one calendar day before specified start time and date in key dates for 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 _____ (contractor) do solemnly affirm an oath and state that :

I/We am / 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 work) dated _____ issued by the _____ (name of the Department).

I/We am/ 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 :
    1. Term deposit receipt deposited as earnest money, demand draft for cost of bid document and other relevant documents provided by the Bank are authentic.
    2. Information regarding financial qualification and annual turnover is correct.
    3. Information regarding various technical 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 4 are correct to the best of my knowledge and belief.
Verified today _____ (dated) at _____ (place).

Signature with seal of the Deponent (bidder)

Note: Affidavit duly notarized in original shall reach at least one calendar day before opening of the bid.

Annexure—C

(Sec clause 5 of Section 1-NIT)

PRE- QUALIFICATIONS CRITERIA

The bidder should have:

A. Financial

i. Experience of having successfully executed: -
   a) ***Three similar works***, each costing not less than the ***amount equal to 20%*** of the probable amount of contract during the ***last 3 financial years***; or
   b) ***Two similar works***, each costing not less than the ***amount equal to 30%*** of the probable amount of contract during the ***last 3 financial years***; or
   c) ***One similar work*** of aggregate cost not less than the amount equal to ***50% of the probable amount*** of contract in any one financial year during ***the last 3 financial years;***

ii. ***Average Annual Construction Turnover*** on the construction works ***shall not be less than 30%*** of the probable amount of contract during ***the last 3 financial years.***

iii. Executed similar items of work in any one financial year during the last 3 financial years, which should not be less than the minimum, physical requirement, if any, fixed for the work.

iv. ***Bid Capacity —*** Bidder shall be allotted work up to his available Bid Capacity, which shall be worked out as given in ***Format 1-2 of Annexure I***. ***Bid Capacity shall be equal or higher than the bid amount.***

B. Physical

Physical qualifications for the work shall be as below

S.No.	Particulars	Quantity	Period
	Physical qualification required	Yes	
1	Execution of Urban Roads projects	Min. 2 projects of each min. 70% of 5.34 Kms	In Last 3 Financial Years
2	Bidder should have experience of successful completion of installation and commissioning of HT & LT	Min. 1 successful completion of installation and commissioning of HT (Minimum 0.5k m.) & LT (Minimum 4 Km) underground cabling works and 2(two) completed successfully installed plinth mounted/ Compact distribution substations of min. 500 KVA rating in urban area in government project or in project where system is handed over to state power distribution Company DISCOM);	In last 3 years

(The Employer shall specify all physical qualifications requited).

Note: Above criteria is indicative, subject to suitable stipulations by the Departments and specific Bid.

Annexure —D

(See clause 6 of Section 1-NIT)

SPECIAL ELIGIBILITY CRITERIA

For civil works following special eligibility criteria shall be fulfilled;

S. No.	Name of Equipment/ Machinery	Quantity Available with the bidder	Remarks
1.	Pneumatic tire Roller/Rubber wheeled roller of 12 to 15 tonne weight with tyre pressure of at least 0.56 Mpa	1 No.	
2.	Ready Mix Concrete batching mix plant with capacity 30 cum per hour	1 No.	
3.	Hydrostatic sensor paver finisher with dual application and electronic control for paving width of 7.00 Mtrs	1 No	

NOTE:- Intention to procure/lease the plants and machinery should be accompanied by documents to the effect. The nature of documents could be any one of the under:

i) Order to the manufacturer of the plant and equipment's.
ii) Confirmation from the manufacturer.
iii) Proof of payments in full or part.
iv) Agreement to lease the equipment.

For underground electrification works following special eligibility criteria shall be fulfilled;

Bidder must submit valid labour License with clearance certificate along with Provident Fund (PF) Registration Certificate & Bank challan/Online Payment receipt;

Note: Above criteria are indicative, subject to suitable stipulations by the departments and specific bid.

Annexure- E

(See clause 2 of Section 2 —ITB & clause 10 of GCC)

SPECIFICATIONS

For civil works following SPECIFICATIONS shall be referred;

1. MP UADD Specification
2. MP PWD Department Specifications,
3. IRC Specifications
4. UTIPEC Road Design Specifications
5. CPWD Specifications

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.

For underground electrification works following SPECIFICATIONS shall be referred;

Technical Specification for Compact / Package Secondary Substation

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

1.2.0 The 12KV Package Substation Design must be as per IEC 61330/62271-202.

1.3.0 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:61330/ 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

2.0.0 **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.

2.1.0 GENERAL DESIGN CRITERIA FOR PACKAGE SUB-STATION

2.1.1 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

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 equipment mentioned above can be accessed after opening the enclosure lockable doors

2.2 The prefabricated-package substation shall be designed for

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

2.3 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.

2.4 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.

3.0.0 TENDER SPECIFIC REQUIRED

3.1.0 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 standards.

3.1.1 **Ratings**:

Description	Unit	Value
Rated Voltage / Operating Voltage	kV rms	11
Rated frequency & Number of phases	Hz & nos.	50 & 3
Rated maximum power of substation	kVA	**630 KVA 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 (RMU) &Busbar		
Rated current on CB & Bus	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 requirement in specs

SPECIFICATIONS FOR ENCLOSURE OF PACKAGE SUB-STATION

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

3.2.2 The enclosure shall be of partially modular design made of GI sheets fastened by riveting or bolting from the inside of the enclosure. The fastening shall not be visible on the outer surface of enclosure.

3.2.3 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.

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

3.2.5 The enclosure shall be powder coated or Wet Polyurethane paint as per manufactures standards.

3.2.6 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

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

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

3.2.9 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.

3.2.10 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.**

3.2.11 **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.

3.2.12 **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). The manufacturer has to submit the internal arc 20KA / 1 sec type test report for customer verification, in event of order.**

3.2.13 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. Option shall be kept for the roof of the transformer compartment which shall be detachable type to access the transformer for maintenance purpose. Use of Al-drop for door locking is not accepted.**

3.2.14 The locks employed for door locking or latch handle used for door locking should have an arrangement to cover them with metallic cover –to ensure that locks/latches do not rust due to exposed environment.

3.2.15 **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 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

The earthing of the enclosure shall be done with copper of suitable thickness.

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

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

3.2.18 **Cleaning &Painting :** 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 wet polyurethane paint or Powder coated.**

TECHNICAL SPECIFICATION OF 11KV SF6 METAL ENCLOSED, INDOOR RING MAIN UNIT (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.

4.0 STANDARDS AND REFERENCE DOCUMENTS

4.1 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 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, as offered RMU shall be fixed and Non extensible type hence not applicable.

4.2 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 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/motorized 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
- Space heater with thermostat.

IO list details required for F-RTU communication -

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

a) List of potential free contacts for Isolator (Terminals shall be provided):

Digital Indications

1. Isolator ON --02 No. & 2 NC
2. Isolator OFF --02 No. & 2 NC
3. Isolator Earth switch Status (ON/OFF)
4. FPI Operated
5. LOCAL/REMOTE switch position

List of commands

1. Isolator Close
2. Isolator Open
3. FPI reset

b) List of potential free Contacts for Circuit Breakers / Bus Coupler (Terminals shall l provided)

Digital Indications

1. Circuit Breaker ON
2. Circuit Breaker OFF
3. Auto Trip
4. LOCAL/REMOTE switch position

List of commands

1. Circuit Breaker Close
2. Circuit Breaker Open

TECHNICAL REQUIREMENTS OF FRTU

2.0 General

The Feeder Remote Terminal Unit (FRTU) shall be installed for Ring Main Units (RMUs). FRTU shall be used for control of switching devices such as breaker, isolator inside RMU. FRTU & RMU should be of same make to have better integration.

2.1 Design Standards

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

2.2 FRTU Functions

As a minimum, the FRTU shall be capable of performing the following functions:

(a) FRTU should be modular and DIN rail mountable with separate head unit and IO module.Head unit shall communicate upstream with control centre and downstream to IO modules. (IO module shall acquirehardwireddigital input, digital output andanalog Input).
(b) Receiving and processing digital commands from the master station(s)
(c) Data transmission rates 300 to 19200 bps for Serial ports for MODBUS. and 10/100 mbps for TCP/IP Ethernet ports
(d) Use of IEC 60870-5-101/104 protocol to communicate with the Master station(s)
(e) Use of MODBUS protocol over RS485 interface to communicate with MFTs.
(f) Have required number of communication ports for simultaneous communication with Master station(s), MFTs and FRTU configuration & maintenance tool.
(g) FRTU shall have the capability of automatic start-up and initialisation following restoration of power after an outage without need of manual intervention. All restarts shall be reported to the connected master stations.
(h) Remote database downloading of FRTU from master station from SCADA/DMS control centre.
(i) As the SCADA/DMS system will use public domain such GPRS/CDMA etc, therefore it mandatory to guard FRTU data/ equipment from intrusion/damage/breach of security &hence FRTU shall have adequate cyber security features as per IEEE P1686, IEC62351.
j) The FRTU shall support IEC 61131-3 PLC programming for incorporation of peer to peer communication & achieve Self Healing Grid (SHG) automation logic.
k) The FRTU head unit shall have in-built webserver facility for commissioning and maintenance with local and remote access compatibility with PC.
l) One PT100 sensor input shall be taken in FRTU to measure temperatures, such as (ambient air or transformer oil).
m) FRTU should be fitted in the factory & RMU/PSS operations shall be demonstrated during FAT.
n) RTU shall support archiving

2.3 Communication ports

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

- The FRTU shall have one Ethernet port for upstream communication and shall be able to communicate with two SCADA simultaneously.
- FRTU shall have one Serial port for communication with MFT's to be connected in daisy chain using MODBUS protocol.

- FRTU shall have one port (Ethernet/USB) for connecting the portable configuration and maintenance tool for FRTU.

2.3.1 Master Station Communication Protocol

FRTU shall use IEC 60870-5-104/101, DNP3 as a communication protocol for communicating to master station.

2.3.2 Communication Protocol between FRTU & MFTs

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

2.4 Cyber Security

In order to secure all controls and data acquisition, the FRTU shall be designed to be compliant with NERC and IEC62351 requirements. The FRTU shall support secure access based on RBAC, with the possibility to configure the roles.
Remote access connection shall be secured for maintenance shall be on web browser through HTTPS. The local access shall be through the USB port.

The FRTU should allow to manage user authentication through a Radius server or LDAP server or through HTTPS access to webserver. Shall be possible to configure RTU integrated firewall policies like Define via configuration that web server is only accessible via dedicated Ethernet interface.

2.4.1 Future proof design

Remote firmware update
- The FRTU shall support remote firmware updates

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

2.4.2 Hardening

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

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

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

2.4.3 Communication

Compliance to security standards
The FRTU shall follow the IEC 62351 standards and at least:
- IEC 62351-5: 2013
- IEC 62351-3

The data should be wrapped in a IPsec tunnel for end to end security.
Communication security

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

2.4.4 Configuration

- Remote access connection shall be secured for maintenance shall be on web browser through HTTPS. The local access shall be through the USB port.

2.4.5 Access control

RBAC

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

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

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

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

Management of Security passwords

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

User Authentication

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

Central management of user account

- The FRTU should allow to manage user authentication through a Radius server or LDAP server or through HTTPS access to webserver.

2.4.6 Security Log

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

2.4.8 Documentation

Secured Versioning

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

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

These documents are not required if the RTU uses IPsec method for End to End encryption.

IO Acquisition module details:

2.5 Status input (32 or 16 DI capability in IO module)

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

2.6 Sequence of Events (SOE) feature

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

2.7 Control Outputs (16 or 8 DO capabilities in IO module)

The FRTU shall provide the capability for a master station to select and change the state of digital output points. These control outputs shall be used to control power system devices such as Circuit breakers, isolator, reset, relay disable/enable and other two-state devices, which shall be supported by the FRTU. A set of control outputs shall be provided for each controllable device. On receipt of command from a master station using the select check-before-execute operate (SCBO) sequence, the appropriate control output shall be operated for a preset time period which is adjustable for each point from 0.1 to 2 seconds. Each control output shall consist of one set of potential free

NO contact. The output contacts shall be rated for atleast 0.2 Amp. at 24Vdc / 48 Vdc. These output contact shall be used to drive heavy duty relays. In case Control output module of FRTU does not provide potential free control output contact of this rating, then separate control output relays shall be provided by the contractor. These relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils & shall conform to the relevant IEC requirements.

2.7.1 Heavy duty control output relays

The control output contact from the FRTU shall be used for initiating heavy duty relays for trip/close of switching devices. The contractor shall provide heavy duty relays. Each control output relays shall consist of atleast 2 NO contacts. The output contacts shall be rated for at least 5 Amps Continuous at 220Vdc and shall provide arc suppression to permit interruptions of an inductive load. Relay coils shall be shunted with diodes to suppress inductive transients associated with energizing and de-energizing of the relay coils. The relays shall conform to the IEC255-1-00 and IEC 255-5 requirements.

2.7.2 Control Security and Safety Requirements

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

(a) Select- check-before-operate operate (SCBO) sequence for control output.
(b) No more than one control point shall be selected/executed at any given time.
(c) The control selection shall be automatically cancelled if after receiving the "control selection" message, the "control execute" command is not received within the set time period.
(d) No control command shall be generated during power up or power down of FRTU.

2.7.3 Dummy breaker latching relay

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

2.8 Analog Inputs (4AI capability in IO module)

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

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

2.9 Contact Multiplying Relays (CMRs)

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

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

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

2.10 Time facility

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

2.11 Diagnostic Software

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

2.12 Power Supply

The FRTU /RMU shall include a power supply which integrates a 12Vdc battery charger
The battery charger shall be compensated in temperature and protected against deep discharge and overvoltage. A single 12Vdc battery is mandatory in order to limit the maintenance constraints.
In case of absence of the battery, the power supply shall be able to supply at least the FRTU.
The power supply, from the battery voltage, provides the following:

- 24Vdc 48Vdc± 10% for the motorisation. This voltage shall be connected only in execute phase.
- 12Vdc for thetransmission devices.

- 12Vdc for the FRTU modules.

2.12.1 Power supply input

Input voltage: 110Vac 230Vac ± 10%

The power supply shall be insulated to 10kV and surge protected up to 20kV , in compliance with IEC60255-5.

2.12.2 Battery (if not a part of RMU)

The battery capacity shall maintain a backup time of 10 hours for all the voltage outputs and shall permit 10 Open/Close cycles of the switchgear. The single 12Vdc battery shall be periodically checked, and a battery fault shall be transmitted to the SCADA.The maximum battery charging time shall be 24hours

2.12.3 Monitoring

The power supply shall deliver the following status to the SCADA

- End of life detection
- Battery disconnected
- Absence of power input
- Voltage output faults
- Battery fault

Any other data should be available through a serial link communication.

2.13 Environmental Requirements

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

2.14 FRTU Size and Expandability

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

2.15 Archives

FRTU Events shall be archived in logs.

FRTU Events shall be stored in the archive logs with a time resolution of 1ms, and a discrimination of 10ms.

The capacity of the logs shall be up to 100,000 events and measurement

All the logs shall be available from a maintenance tool connected to the FRTU or sent on request to the SCADA. The contain of the logs shall be configurable and the name of the logs sent to the SCADA shall be configurable. It shall be formatted as a .csv file.

2.16 RTU IO Simulation

It shall be possible to simulate RTU IOs – Digital Indications, Digital Output Commands and Analog signals for the purpose of testing the RTUs. Separate test equipment shall not be required for this simulation. It shall also be possible to simulate RTU system and security events.

There must be an option to select RTU in Test Mode before starting the IO simulation.

Indoor RMU

- Modular design, panel type with front cable access
- RMU must be made of robotically welded Non Ferrite, Non magnetic stainless steel of grade 304 with thickness of minimum 2.5 mm with all live parts inside stainless steel tank
- The RMU should have provision of Gas refilling at site, in case there is some leakage of the gas.
- Maximum Modules can be accommodated in a single robotically welded Stainless steel Tank so as to make it more compact and reliable.
- Cable covers must be interlocked with Earth switch to have complete safety of operating person. The cable bushings shall be bolted type design
- 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.

4.3 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.

4.4 GENERAL TECHNICAL REQUIREMENTS

4.4.1 **Fixed type Vacuum breakers insulated in SF6 gas**. It should be maintenance free, Having stainless steel robotically welded enclosure for INDOOR RMU application.

4.4.2 **Low gas pressure devices- 1.4 Bar pressure**. RMU should have full rating with Bar gas pressure.

4.4.3 Live cable indicators- High operator safety.

4.4.4 Fully Rated integral earthing switch for Switches and Breakers.

4.4.5 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.

4.4.6 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.

4.4.7 Cable boxes should be front access and interlocked with earth switch. No rear access required.

4.4.8 Cable testing possible without disconnection of cables.

4.4.9 Compact in dimension / Dimension to be submitted with offer

4.4.10 Low pressure, sealed for life equipment,

4.4.11 Cable earthing switch on all switching device-standard, for operator safety.

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

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

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)
- Equipment healthiness :Gas pressure ,Trip Ckt healthy ,Number of operations

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

4.5 TECHNICAL AND GUARANTEED PARTICULARS.

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

5.0 DESIGN CRITERIA

5.1 ***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 +40 deg C

Relative humidity up to 95%

Altitude of installation up to 1000m, IEC 60120

5.2 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 in manufacturers works & material of tanks should be NonFerrite ,Non Magnetic grade stainless steel of grade 304 of minimum 2.5mm thickness to ensure very high degree of precision in sealing of SF6 tank.

The manufacturer should submit the certificate of grade of stainless steel used during stage inspection / engineering

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 &relevant type test reports should be submitted by the manufacturer.

6.0 TECHNICAL DATA

6.1 *Ring Main Unit, Electrical data*

Electrical data and service conditions

No	***Rated voltage***	KV	***12KV***
1	Power frequency withstand voltage	KV	28
2	Impuls 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 (cable Switch)	A	10
10	earth fault (cable switch)	A	200
11	earth fault cable charging (cable switch)	A	115
12	Short circuit breaking current (T-off circuit breaker)	kA	21
13	Rated making capacity	kA	50
14	Rated short time current 3 sec.	kA	21

Ambient temperature:

15	Maximum value	°C + 40
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%

6.2 Ring Main Unit Technical data(11KV) INDOOR

General data, enclosure and dimensions

1	Standard to which Switchgear complies	IEC
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	3position 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	RAL 7035
15 cable cover	RAL 7035

7.0 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

8.0 OTHER MAIN FEATURES

8.1 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.

8.2 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.

8.3 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 provide 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.

8.4 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.

8.5 Position indicators

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

8.6 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.

8.7 Cable compartment

The Cables access in the RMU shall be from the front.

The cable bushings shall be either bolted type or plug-in type or any other manufacturer design that can enable facility for site removal of bushings. The bushings shall be standardized type C interface for 630A current carrying suitability.

The detailed drawing of type C 630A rated bushing should be submitted during detailed engineering for verification, in event of order.

8.8. 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.

8.9 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 has 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.

8.10 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.

8.11 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.

9 TESTING AND CERTIFICATION.

9.1 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.

9.2 ROUTINE TESTS.

Routine tests should be carried out in accordance with IEC 60298 standards. These tests should be ensure 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 asses the quality of RMU.

10.0 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

10.1 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

10.3 GENERAL DESIGN FEATURES

Dry Type Cast resin Transformer (630KVA)

The distribution transformer shall be designed to comply with following features

10.3.	Major Design criteria	
10.3.1	Voltage variation on supply side	+ / - 10 %
10.3.2	Frequency variation on supply	+/ - 5 %

	side	
10.3.3	Transient condition	- 20 % or + 10 % combined variation of voltage and frequency
10.3.4	Service Condition	The transformer enclosue 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
10.3.5	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
10.3.6	Short Circuit withstand Capacity of the transformer	
10.3.6.1	Three phase dead short circuit at secondary terminal with rated voltage maintained on the other side	For2 secs.
10.3.6.2	Single phase short circuit at secondary with rated voltage maintaine on other side	For2 secs.
10.4	Overload capability	As per IEC 60076 part 12
10.5	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
10.6	Radio Influence Voltage	Maximum 250 Microvolt
10.7	Harmonic currents	Transformer to be designed for suppression of 3^{rd}, 5^{th}, 7^{th} harmonic voltages and high frequency disturbances.
10.8	Partial Discharges	As per IEC 60076-11
		Routine test on all Units and value to be less than 10PC as per IEC

10.09	Parallel operation	Shall be designed to operate in parallel With existing Transformer. Details of existing transformers shall be forwarded to the bidder on Request			
10.10	Major Parameters				
10.10.1	Rating		630 KVA		
10.10.2	Voltage Ratio	11kv / 433 volts			
10.10.3	Vector Group	Dyn11			
10.10.4	Percentage Impedance @120°C	5%, tolerance as per IS			
10.10.5	Losses at 120°C	Losses indicative Capitalization will be done based on lowest losses Received			
10.10.5.1	No load Loss –IS tol in KW (630KVA /500KVA/315KVA)		1.3		
10.10.5.2	Load losses at principal tap- IS Tol in KW (630KVA /500KVA/315KVA)		6.1		
10.10.6	Temperature rise winding: outside PSS without enclosure / inside PSS max.	80/90 ^{0}C			
10.10.7	Flux density	Maximum flux density at 10 % over excitation/overfluxing-1.9 Tesla Maximum			
10.10.8	Tapping on HV winding	Off Circuit taps on HV winding , + / - 5 % in steps of 2.5 % , change of taps by link			
10.10.9	Design Clearances	Phase - phase	Phase – earth		
	11KV system	180mm	120mm		
	415V system	25mm	25mm		
10.10	Construction & Design				
10.11.1	Core				
10.11.1.1	Material	High grade , non ageing, low loss, high permeability, grain oriented,			

		cold rolled silicon steel lamination
10.11.1.2	Grade	Premium grade minimum M4 or Better
10.11.1.3	Lamination thickness	0.27mm (Min)
10.11.1.4	Design Flux Density at rated conditions at principal tap	1.73 Tesla
10.11.1.4	Maximum Flux Density at 10 % over excitation / over fluxing	1.9 Tesla maximum allowed
10.11.1.5	Core Design Features	i) All steel sections used for supporting the core thoroughly sand cutting , drilling, ii) Provision of lifting coil assembly
10.11.2	Winding	Cooper winding shall be preferred
10.11.2.1	Material	Electrolytic Copper/ Aluminum Foil/Wire for CRT
10.11.2.2	Maximum Current Density allowed	Al -1.5 Amps / Sq.mm.
10.11.2.3	Winding Insulating material	CRT -Class F minimum, free from compounds liable to ooze out, shrink or collapse. Uniform insulation shall be applied to the windings and overall winding shall be epoxy cast resin
10.11.2.4	Tapping	Off Circuit taps on HV winding , + / - 5 % in steps of 2.5 % , change of taps by link
10.11.2.5	Essential provision for tap links	Shall be shrouded with cover made from insulating material. To prevent deposit of dust.
10.11.2.6	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 a intervals. vii) Threaded con locking facility. viii) Winding leads supported , usi Practicable ix) Provision of taps as indicated in the technical
10.11.2.7	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.
10.11.3	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.
10.11.4	Support Insulator/ terminations	
10.11.4.1	Type of HV and LV support insulators	Epoxy Resin Cast
10.11.4.2	Minimum Creepage of bushings and support Insulators	31 mm / kV
10.11.4.3	Arcing horns	Not required
10.11.4.4	Termination on HV side	By cable within main enclosure
10.11.4.5	HV side cable size	11 kV (E) grade , A2XCEWY 3C x 150 sqmm / 1C X 95 Sq.mm
10.11.4.6	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
10.11.4.7	HV side cable terminating	Tinned copper of size 50 x 6
	busbar	
10.11.4.7	Termination on LV side	Suitable bus bar as per PSS spec
10.11.5		
	Current Transformers	
10.11.5.1	Mounting	On LV side terminal bus bars on
		all three phases
10.11.5.2	Maintenance requirements	Replacement should be possible
		without dismantling LV side
		support insulators
10.11.5.3	Accuracy Class	0.5
10.11.5.4	Burden	15 VA
10.11.5.5	Type	Suitable for CSS use
10.11.5.6	CT ratio	
		630kVA -1200/5 Amps
10.11.6	Hardware	
10.11.6.1	External	Stainless Steel only
10.11.6.2	Internal	Cadmium plated except special
		hardware for frame parts and core
		assembly as per manufacturer's
		Design
10.12	Gasket	Neoprene rubber based gasket
		across all doors & covers
10.13	Control cable specification (to	PVC insulated, extruded PVC
	be used by the vendor)	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
10.14	Terminal Blocks to be used by	Nylon 66 material, minimum 4 sq
	the vendor	mm, screw type for control wiring
		and potential circuit.
10.14.1	Essential provision for CT	Sliding link type disconnecting
	terminals	terminal block screwdriver operated
		stud type with facility for CT
		terminal shorting material of

		housing melamine/ Nylon66
10.15.	Painting of WTI box	
10.15.1	Surface preparation	By 7 tank pretreatment process or shot blasting method
10.15.2	Finish on internal / external surfaces	Polyurethene based painting, min. Dry film thickness 80 microns
10.15.3	Insulating support material for base plate for mounting components	Bakelite shall not be used as a base plate for mounting any components, insulating material non hygroscopic insulating material like FRP shall be used.
10.16	Minimum Protective devices on Transformer	
10.16.1	Surge Arrestor (Applicable for Cast Resin Transformers)	Required, Connected on Transformer Primary side on top of core coil assembly on all three Phases
10.16.1.1	Type	Metal oxide
10.16.1.2	Housing	Polymeric preferable
10.16.1.3	Rating	9 KV.
10.16.1.4	Continuous operating voltage , kV rms	6.35
10.16.1.5	Maximum Continuous operating voltage, kV rms	7.65
10.16.1.6	Nominal Discharge Current, kA Peak	5
10.16.1.7	Energy Absorption Capability, kJ/kV	Greater than 2.5
10.16.1.8	Creepage factor	31 mm /kV
10.16.1.9	Reference std	IS 3070 part 3 and IEC 99-4
10.16.2	Winding Temperature scanner	Required
10.16.2.1	No of RTD inputs	Four (Three for windings, One shall be spare)
10.16.2.1.1	Location of winding RTD	At location of winding where maximum temperature is expected.
10.16.2.2	No of potential free trip contacts	Two , 1 Trip contact to be wired to SCADA by PSS vendor

10.16.2.3		No of potential free Alarm		Two, 1 Trip contact to be wired to
		contacts		SCADA by PSS vendor

10.16.2.4	Output Port for data transfer	4-20mA output's
10.16.2.5	Auxiliary supply	240 V AC, 1 phase, 50 Hz. Tapped from LV side busbar through a MCB located inside box
10.16.2.6	Winding Temperature Scanner terminal Box	Required with RS485 Port for integrating with FRTU
10.16.2.6.1	Size	As per Manufacturer's Standard , to be mounted on HV compartment.
10.16.2.6.2	Fixing of instrument within box	On base plate
10.16.2.6.3	Fixing of terminals within the Box	On C channel available with the terminals
10.17	**Fitting and accessories**	
10.17.1	Rating & Diagram plate	Required
10.17.1.1	Material	Anodized aluminum 16SWG
10.17.1.2	Background	SATIN SILVER
10.17.1.3	Letters, diagram & border	Black
10.17.1.4	Process	Etching

10.17.1.5 Name plate details

Following details shall be provided on rating and diagram plate as a minimum

i) type of transformer i.e Cast Resin transformer etc. with winding material
ii) standard to which it is manufactured
iii) manufacturer's name;
iv) transformer serial number;
v) month and year of manufacture
vi) rated frequency in Hz
vii) rated voltages in kV
vii) number of phases
viii) rated power in kVA
ix) type of cooling
x) rated currents in A
xi) vector group symbol
xii) ***1.2/50μ***s wave impulse voltage withstand level in kV
xiii) power frequency withstand voltage in kV
xiv) impedance voltage at rated current and frequency inpercentage at principal, minimum and maximum tap at highest temperature
xv) load loss at rated current at highest temperature
xvi) no-load loss at rated voltage and frequency
xvii) auxiliary loss
xviii) continuous ambient temperature at which ratings apply in °C
xix) winding connection diagram with taps and table of tapping voltage, current and power
xx) transport weight of transformer

	xxi) weight of core and windings xxii) weight of enclosure and fittings xxiii) total weight xxiv) tapping details xxv) phase CT details xxvi) Class of insulation xxvii) IP protection rating of the enclosure xxviii) name of the purchaser xxix) PO no and date xxx) Guarantee period	
10.17.2	Detachable Bi-directional flat Roller Assembly	Required
10.17.2.1	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).
10.17.2.2	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.
10.17.3	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.
10.17.4	Core, Frame to tank Earthing	NA
10.17.5	Off Circuit tapping link	Required
10.17.6	Tap link position plate	NA
10.17.7	Danger plate made of Anodized aluminum with white letters on red background on HV and LV side	
10.17.8	Skid with Haulage lugs	Required
10.17.9	Lifting lugs for complete transformer as well as Enclosure	Required
10.17.9.1	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.

10.17.10	Caution Plate for tap links	Required
10.17.11	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.
10.17.12	Surge Arrestor & its Grounding Bushing	Required
10.17.12.1	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.
10.17.13	LV additional neutral earthing Bushing	Required
10.17.13.1	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.
10.17.14	Winding temperature scanner	Required
10.17.15	RTD in Winding and near top of enclosure.	Required
10.17.16	Space heater inside enclosure	Thermostatically controlled space heater inside enclosure required, supply of space hater from feeder pillar through MCB fixed properly

		inside enclosure.
10.17.1	Mounting of space heater	By suitable spacers so that heater does not come in contact with panel wall directly.
10.17.17	Earthing link	Across all gasketted joints in the

		enclosure body.
10.18.1	Loss capitalization formulae for Oil / VPI/ Cast Resin	As per CBIP manual (see note 1)
10.18.1.1	No load Loss capitalization Figure	Rs 4,09,980 per kw
10.18.1.2	Load loss capitalization figure	Rs 2,26,720 per kw
10.18.2.	Limiting Dimensions of Cast Resin Transformers	Dimensions indicated are maximum. Manufacturer shall try the best design for optimizing the dimensions further.

Note 1: The transformers will be evaluated against no load and load losses guaranteed by the bidders with capitalization of losses as per CBIP guidelines for loss capitalization. The corresponding capitalization figures for no load and load losses shall be as per cl. 7.20.1.1 and 7.20.1.2 above. However, the maximum loss figures acceptable are as per indicated in the relevant specifications. In the event of measured loss figures during testing / challenge testing exceeding the guaranteed loss figures of the successful bidder, penalty shall be applied at a rate of 1.5 times the figures mentioned above for both no load and load losses for all the units purchased from the successful vendor.

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

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

12. L.V Switchgear Panels

12.1 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

12.1 System:-

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

12.2General finish:- Tropical, totally enclosed, metal-clad, weather-proof, vermin and dust proof.

12.3Construction :

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

12.4Circuit Ways:

INCOMER – 1000 A ACB EDO type 50KA
O/G – 4 No 250 A MCCB 35 KA with LSIG protection
O/G – 2 Nos 160 A MCCB 25 KA with TMA protection

13.5 GENERAL CHARACTERISTICS OF ACB

13.5.1) 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

13.5.2) 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 12 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 with stand

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.

13.5.3) Environmental characteristics

– Operating temperature: -25 °C...+70 °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 tropicalisation 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.

13.5.4) 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 ofstandardising 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 andthe condition of springs charged/discharged on the front, by means of certain andreliable signals.

– The operating mechanism must be of the stored energy type with operation bymeans of precharged springs fitted with antipumping device. The springs arecharged 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 protectionreleases. It must be allowed the interchangeability of protection releases fromskilled personnel.

- ACBs shall have minimum watt losses in order to restrict temperature rise insidethe breaker.

13.5.5) 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.

13.6 General aspects of MCCB with Thermal Base release

Standards conformity

Molded case circuit-breakers (MCCB) installed in the low voltage plant must bedesigned, 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 harmonizednational standards, the CE "Low Voltage Directives" (LVD) n° 73/23 EEC and"ElectromagneticCompatibility Directive" (EMC) n° 89/336 EEC.

13.6.1 Molded case circuit breakers functional features

– Rated insulation voltage (Ui) for MCCB shall be 800 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 as690V, however performance on short circuit level shall be consider based on systemoperating voltage.

– Rated uninterrupted current between varying from 160 and 800 A with trip unitssettings starting from 1 A

– Rated short circuit breaking capacity shall be considered as per bill of material andthe rated service short circuit breaking capacity (Ics) shall be in 50-100% of ratedultimate 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 between16kA and 200kA @ 380/415 V AC.

– Both line up and line down supplying must be possible without decreasing MCCBsperformances or functionality

– MCCB shall confirm to current limiting type and this feature shall ensure less amountof let through energy at the time of opening on fault. The mccb shall have openingtime less then 10msec for current rating upto 800A

– A test bottom for the correct functionality checking (moving contacts opening) mustbe place

in front of the breaker.

13.6.2 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 tripunit: +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.

13.6.3 Construction characteristics

– The range of moulded case circuit-breakers must cover a range of rateduninterrupted currents from 160 to 800 A.

– By means of the double insulation technique, moulded case circuit-breakers mustguarantee complete separation between the power circuits and the auxiliary circuits.
–Moulded case circuit-breakers must have an operating lever which always indicatesthe exact position of the circuit-breaker contacts (positive operation), by means ofsafe 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 indeliblymarked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in aposition where it is visible with the circuit-breaker installed.

–Moulded case circuit-breakers with rated uninterrupted current up to 250 A shallhave a 45 mm high face which makes them suitable for installation on modularpanels.

– For the front parts of the circuit-breakers the degree of protection of at least IP20(excluding the terminals) must be guaranteed.

13.6.4 Protection trip units

13.6.4.1 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 thresholdagainst 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 unitis 40°C. The temperature performance of the trip unit must be indicated as thetemperature varies.

– The protection threshold against short-circuit can be either the fixed or adjustabletype with continuity from 5 and up to 10 times the rated current of the trip unit. Forcurrent rating upto 250Amps, magnetic threshold be minimum of 10 times of ratedcurrent.

13.6.4.2 Magnetic only overcurrent trip units

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

– The adjustable magnetic only trip units (suitable for motor protection) shall only beavailable in the three-pole version, whereas those with fixed threshold shall also beavailable in the four-pole version.

– The adjustable magnetic only trip units must be available for circuit-breakers up to250 A with an upper magnetic threshold equal to Im =3200

OR

13.6 General aspects of MCCB with microprocessor based release

Standards conformity

Molded case circuit-breakers (MCCB) installed in the low voltage plant must bedesigned,manufactured and tested according with the international standards IEC 60947-1, IEC60947-2,IEC 60947-3, IEC 60947-4-1, IEC 61000 or with the corresponding harmonized nationalstandards, the CE “Low Voltage Directives” (LVD) n° 73/23 EEC and “ElectromagneticCompatibility Directive” (EMC) n° 89/336 EEC.

13.6.1 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 as690V, however performance on short circuit level shall be consider based on systemoperating voltage.

– Rated uninterrupted current between varying from 160 and 3200 A with trip unitssettings starting from 10A

– Rated short circuit breaking capacity shall be considered as per bill of material andthe rated service short circuit breaking capacity (Ics) shall be in 100% of ratedultimate short circuit breaking capacity (Icu). (Ics=Icu)

– According to IEC 60947-2 (§ 4.4) starting from 400 A the circuit breakers must becategory B, however other small rating category A shall be confirmed.

– MCCBs must be available with different ultimate short breaking capacities between16kA and 200kA @ 380/415 V AC.

– Both line up and line down supplying must be possible without decreasing MCCBsperformances or functionality

– MCCB shall confirms to current limiting type and this feature shall ensure less amountof let through energy at the time of opening on fault. The mccb shall have openingtime less then 10msec for current rating upto 630A, and less them 15msec for currentrating upto 1600Amps.

– A test bottom for the correct functionality checking (moving contacts opening) mustbe place in front of the breaker.

13.6.2 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.

13.6.3 Construction characteristics

– The range of moulded case circuit-breakers must cover a range of rateduninterrupted currents from 160 to 3200 A.

– By means of the double insulation technique, moulded case circuit-breakers mustguarantee complete separation between the power circuits and the auxiliary circuits.

–Moulded case circuit-breakers must have an operating lever which always indicatesthe exact position of the circuit-breaker contacts (positive operation), by means ofsafe 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 indeliblymarked on the circuit-breaker (in accordance with § 5.2 of IEC 60947-2) and in aposition where it is visible with the circuit-breaker installed.

–Moulded case circuit-breakers with rated uninterrupted current up to 250 A shallhave a 45 mm high face which makes them suitable for installation on modularpanels.

– The same depth must be guaranteed from 320 A up to 1000 A, in order to standardizeboth switchboards and their supports.

– All the installation positions must be possible without jeopardizing the function of theapparatus. Starting from 630 A up to 1600 A the withdrawable version shall bemounted 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.

13.6.4 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 toguarantee correct operation of the protection functions even in the presence of asingle phase supplied with a current value equal to 20% of the phase current.

– They must be unaffected by electromagnetic interference in compliance with theEMC directive on the matter.

– The basic version shall be fitted with protection functions against overload (functionL) and against short-circuit. The latter function can either be of the instantaneoustype (function I) or, alternatively, with intentional delay (function S). The function ofprotection against short circuit must be excludable. A basic version shall also beprovided with only the protection threshold against instantaneous short-circuit whichcannot be excluded.

– The minimum performances of the protection functions of the electronic protectiontrip unit for distribution, where present, must be:

1. Function **L**:adjustable trip threshold I1= (0.4...1) x In, trip curves for the basicversion with times from 3 to 12 seconds – 2 different trip curves - (at 6 timesthe set threshold). Cannot be excluded.

2. Function **S**: adjustable trip threshold I2= (1...10) x In, trip curves for the basicversion with times from 0.1 to 0.25 seconds – 2 different trip curves – (at 8times 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 tolerancesaccording to the International Standards.

– The size of the current sensors must be a minimum of 10 A to a maximum of 3200 Aso 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

14.0. TYPE TESTS FOR THE PACKAGE SUBSTATION:

14.1 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. The CSS shall be of original equipment manufacturer

14.2 **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.

14.3 **Test Witness:** Routine test shall be performed in presence of Owner's representative if so desired by the Owner. The Contractor shall give at least fifteen (15) days advance notice of the date when the tests are to be carried out.

14.4 **Test Certificates:**

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

14.6 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.

Makes of Equipment

It shall be preferred that the make of the RMU, Transformer & LT panel shall be same as that of CSS manufacturer

Compact Substation [OEM Make Only]	ABB / SIEMENS / SCHNEIDER
RMU	ABB / SIEMENS /SCHNEIDER
Transformer Dry Type	ABB / SIEMENS / SCHNEIDER/Voltamp/Raychem
LV inside the CSS	ABB /SIEMENS / SCHNEIDER as per the model of LV switchgear mentioned
Numerical Relays	ABB /ASHIDA/SCHNEIDER /SIEMENS

TECHNICAL SPECIFICATION for Outdoor Type Non Extensible 12 KV SF6 INSULATED VCB Ring Main Unit

1.00.0 INTENT OF SPECIFICATION:-

This specification covers design, engineering, manufacture, shop testing, inspection, Painting, packing, supply, forwarding, delivery to site, erection, testing and commissioning of 12KV Compact SF6 Insulated VCB RMU Switchgear complete with all accessories.

It is not the intent to specify completely herein all details of the equipment; nevertheless, the equipment shall be complete and operative in all respects and shall conform to the highest standard of engineering, design and workmanship.

Should the bidder wish to deviate from this specification in any way, he shall draw specific attention to such deviation by listing the deviations in the deviation

schedule without which his offer will be considered in conformity with the specification in all respects.

2.00.00 CODES AND STANDARDS:-

In order to be accepted, the switchgear shall comply with the requirements stated in the latest

editions of the following recommendations, standard and specifications

Metal Enclosed switchgear:	IEC 62271-200
General Purpose switches:	IEC 60265-1
Disconnectors and E/S	IEC 62271-102
Switch Fuse Combination:	IEC 62271-105
Circuit Breakers:	IEC 62271-100
Common clauses:	IEC60694

3.00.0 SCOPE OF WORK:

The scope of supply shall include design, manufacture, testing and supply of the following 12KV SF6 Insulated Compact Switchgear with Vacuum Circuit Breakers along with Cable termination Kits / Gland plates & Foundation Frames

The configurations required are mentioned as follows [all RMUs are NON Extensible Type]

a) **3 Isolator + 1 VCB [Motorized]**
b) **2 Isolator + 2 VCB [Motorized]**
c) **3 Isolators [Manual]**

4.00.0 Special Maintenance Tools & Tackles:-

The Bidder shall provide a list of recommended spare parts with their individual prices for equipment to be supplied against this specification. This list shall identify all essential spares items for any recommended maintenance for a period of five years after commissioning.

The Bidder shall give an assurance that spare parts and consumable items will continue to be available through the life of the equipment, which shall be 25 years minimum.

Spare parts shall be delivered suitably packed and treated for long periods in storage. Each pack shall be clearly and indelibly marked with its contents, including a designation number corresponding to the spare parts list in the operation and maintenance instructions,

Any special devices, slings or shackles necessary for the maintenance shall be handed over to the Purchaser in working order on completion of the installation and commissioning of the equipment.

5.00.00 General Technical Requirements:

- The COMPACT SWITCHGEAR shall be suitable for operations at a height of 1000 meters or below above sea level.
- The HT RMU shall be Outdoor type with at least 1.5 mm thick Powder coated enclosure with IP54 protection
- The Front Facia of the RMU & Cable doors shall be enclosed inside the enclosure & cable doors can be only accessed after opening of the enclosure lockable doors

- The COMPACT SWITCHGEAR shall be capable of operating normally within the following temperature range :

    - Maximum air temperature: + 40 ° C
    - Minimum air temperature: - 25 ° C

- The COMPACT SWITCHGEAR shall be capable of being operated in electrically exposed locations.
- The COMPACT SWITCHGEAR shall be capable of being exposed to high relative humidity and ambient air pollution.

System Parameters:

General Technical Requirements	
Network	Three phases - Three wires
Rated Voltage	12kV
Service Voltage	11KV
System Frequency – Hz	50 Hz
Bus bar Rating- A	630 Copper
Min Gas pressure – BarG	0.05
Filling pressure- BarG	0.3
IP Rating	IP 3X / IP 67 for gas tank

Internal Arc test	IEC 62271-200
Lightning Impulse withstand Voltage	95 kV
Power Frequency withstand voltage	28 kV rms - 1 min
Rated Normal Current Incomer Circuit breaker Feeder Circuit-breaker Isolator Feeder Bus bar current	 630 A 630 A 630 A 630 A
Rated Short time current withstand with time duration	21 kA for 3 sec
Rated Short circuit making capacity of line switches and earthing switches	52.5 kA peak at Rated Voltage
Type of Switchgear	Manual Operation Non Extensible Type
Internal Arc test	A-FL 20KA for 1 sec duration for gas tank

Construction (Outdoor Ring Main Units)

The SF6 Insulated VCB Ring Main Unit shall be suitable for Out-door applications.

For out-door applications, the switchgear shall be housed in a powder coated/equivalent painted enclosure of IP 54

protection.

It should be noted that the cable doors shall be enclosed inside the main IP 54 enclosure. Cable compartment access shall be only possible after opening the main enclosure lockable door.

The enclosure door shall be locked with cylindrical shoot bolt shaft that enclosure completely closure of doors without can gaps. The locks or the latch door

The switchgear and busbar shall all be contained in a stainless steel enclosure filled with SF6gas. The enclosure should meet the "sealed pressure system" criterion in accordance with the IEC 62271-200 standard (i.e a system for which no handling of gas is required throughout the 30 years of service life) & minimum IP67 degree of protection .

The SF6 gas tank shall be made of at least 2.5 mm grade- 304 unpainted stainless steel .The stainless steel tank shall have non-ferrite & non-magnetic properties.
The stainless steel tank should be welded robotically to ensure highest precision in welding.
Manufacturer should submit the certificate of stainless steel grade 304 during stage inspection
Manual welding shall not be acceptable.

The switch-boards shall be suitable for mounting on a trench, utilities space or base.

Each switchboard shall be identified by an appropriately sized label which clearly indicates the functional units and their electrical characteristics.

The switchgear and switchboards shall be designed so that the position of the different devices is visible to the operator on the front of the switchboard and operations are visible as well.

In accordance with the standards in effect, the switchboards shall be designed so as to prevent access to all live parts during operation without the use of tools.

Dielectric medium

SF6 gas will be used as dielectric medium for MV COMPACT SWITCHGEARs. SF6 gas used for the filling of the COMPACT SWITCHGEAR shall be in accordance with IEC 376. Gas will only be used for insulation and arc interruption will take place inside in Vacuum.

Earthing of metallic parts

There shall be continuity between the metallic parts of the switchboard and cables so that there is no electric field pattern in the surrounding air, thereby ensuring the safety of people.

The substation frames shall be connected to the main earth busbar without dismantling any busbars.

Earthing of the main circuit

The cables shall be earthed by an earthing switch with short-circuit making capacity, in compliance with IEC 129 standard. The earthing switch can only be operated when the **main Isolator & Circuit Breaker** are open.

The earthing switch shall be fitted with its own operating mechanism and manual closing shall be driven by a fast-acting mechanism, independent of operator action.

Mechanical interlocking systems shall prevent access to the operating shaft to avoid all operator errors such as closing the earthing switch when the switch is closed.

Modules of RMUs -

ISOLATOR MODULE

It shall consist of an SF6 cubicle housing a ON LOAD switch dis-connector and an earthing switch. Busbars and all electrical connections are located inside the tank. The operating shafts for the switches shall have rotary seals where they enter the SF6 cubicle. The operating mechanisms shall be located outside on the front of the SF6 tank. Cable bushings shall be located on the front of the SF6 cubicle in a separate cable compartment.

VACUUM CIRCUIT BREAKER MODULE

The circuit breakers shall be of the maintenance-free, Vacuum Circuit Breakers type. The position of the power and earthing contacts shall be clearly visible on the front of the switchboard..

The circuit breakers shall have at least 2 positions: open-disconnected & closed and shall be constructed in such a way that natural interlocks prevent all unauthorized operations. The earthing of the feeder shall be by a Fault Making Earth Switch that shall be in series with VCB The earth switch shall be mechanically interlocked with the isolators / breaker to prevent any un-authorized operation.

It shall be fitted with a local system for manual tripping by an integrated push button. There willbe no automaticreclosing.

The circuit breaker shall be associated with an integrated protection unit that will operate without any auxiliary power supply and shall include

- Three toroid transformers
- Microprocessor based Over Current and Earth Fault relay with high set (Self Powered Type)
- A low energy release

The protection shall be provided by Self powered numerical relay : basic OC + EF Protection

The necessary transformer protection required like alarms WTI / OTI / buckholz/Pressure relief shall be provided in a separate relay

METERING MODULE

The metering module shall be AIS compartment having PT with HT fuses for protection & necessary energy meters that shall have basic functions – V / I / KW /KVAR / KWH

The metering module shall be made of powder coated enclosure/ equivalent painted with IP 54 protection.

COMPACT SWITCHGEAR - bushings and Cable terminations

Bushings

The bushing should be conveniently located for working with cables specified and allow for the termination of these cables in accordance with the instructions supplied. The cable bushings shall have either plug-in type or bolted type or a design that shall enable the user to remove cable bushings at site- to ensure faster maintenance & reduce downtime of switchgear.

The bushings should be of Type "C" rated for 630A

Detailed drawings of the type of bushings shall be submitted during detail engineering.

Cable clamps

A non ferro-magnetic cable clamp arrangement & gland plates must be provided for all network cables terminated on the COMPACT SWITCHGEAR

Voltage indicator Systems [VPIS]

Each function shall be equipped with a voltage indicator box on the front of the device to indicate whether or not there is voltage in the cables. The capacitive dividers will supply low voltage power to the lamps.

Safety of people

Any accidental overpressure inside the sealed chamber will be limited by the opening of a pressure limiting device in the rear part of the enclosure. Gas will be released to the rear of the switchboard away from the operator. The switchgear shall be tested with Internal arc test A-FL 20KA for 1 sec duration for tank. The manufacturer has to submit the type test report of internal arc during bidding stage & drawing approval for the purpose of the verification.

Operating lever

An anti-reflex mechanism on the operating lever shall prevent any attempts to reopen immediately after closing of the switch or earthing switch.

All manual operations will be carried out on the front of the switchboard.

The effort exerted on the lever by the operator should not be more than 250 N for the switch and 250 N for the circuit breaker.

Front plate

The front plate shall have an IP2XC degree of protection. The front shall include a clear mimic diagram which indicates the different functions.
The position indicators shall give a true reflection of the position of the main contacts. They shall be clearly visible to the operator.
The lever operating direction shall be clearly indicated in the mimic diagram.

The manufacturer's plate shall include the switchboard's main electrical characteristics.

Aprroved Makes –

RMU – ABB / SIEMENS / SCHNEIDER
Numerical Relays – ABB / SIEMENS / SCHNEIDER / C&S / ASHIDA

TESTS:-

Routine Tests shall be conducted on the Compact Switchgear in accordance with the latest versions of IEC. Type Test certificates for tests conducted earlier on similar equipment shall be furnished.

Tests shall be performed in the presence of Purchaser's representatives. The Contractor shall give at least fifteen (15) days advance notice for witnessing the tests. Copies of certified reports of all tests carried out at works shall be furnished. The equipment shall be dispatched from works, only after receipt of Purchaser's written approval of the test reports.

Each completely wired Compact Switchgear Unit shall be tested to ensure that all of its protective, control and interlock systems are satisfactorily functioning in the manner as required.

The Bidder shall indicate tests recommended to be carried out at site during installation and commissioning to ensure satisfactory performance of all the equipment supplied.

TECHNICAL SPECIFICATIONS FOR 11 KV XLPE INSULATED UNDERGROUND

CABLES

1.0 SCOPE:

1.1 The scope of this specification covers the design, manufacture, stage inspection atworks, inspection and testing the finished ISI marked 11KV 300 Sq.mm power cablesstranded compact circular aluminium conductor, conductor screened with extrudedsemiconducting compound, Extruded XLPE insulated, insulation screened withextruded semi conducting compound in combination with copper tape, cores laid upinner sheath must be extruded type of PVC ST2, galavnized steel flat strip armouredand overall PVC sheathed cable confirming to IS 7098/P2/2011.

2.0 RATED VOLTAGE:

2.1 The rated voltage of the cable shall be 11000 Volts AC with the highest systemvoltage of 28**000** Volts between phases of the effectively earthed three-phasetransmission system.
2.2 . The cables shall be capable of operating continuously under the system frequencyvariation of ± 3 Hz, voltage variation of ± 1 0% and a combined frequency– voltage variation of ± 10%.

3.0 APPLICABLE STANDARDS:

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

a. IS 7098 (Part 2)-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 armoring of cables.

f. IS 5831-Specification for PVC insulation sheath for electric cables.

g. IS 10462-Fictitious calculation method for determination of dimensions ofprotective coverings of cables Part 1 - Elastomeric and thermoplastic insulatedcables.

4.0 CONSTRUCTION:

Conductor: - The cable conductor shall be made from stranded aluminum to form compactshaped conductor having resistance within the limits specified in IS:8130/1984 and anyamendment thereof. The wires shall be laid up together with a suitable right hand lay.Stranded Class 2 – Annealed as per the IS:8130 / IEC 60228/ BS 6360 standards.

4.2 CONDUCTOR SHIELD: The conductor having a non-magnetic semi-conducting screenshall ensure perfectly smooth profile and avoid stress concentration. This conductorscreen shall be extruded in the same operation as the insulation, the semi-conductingpolymer shall be cross linked and shall be as per the IS:7098 Part 2, IEC:60502 Part –2, BS:6622, BS:7835.

4.3 Insulation: - The insulation shall be water tree retardant (TR) cross linkedpolyethylene insulation applied by extrusion and shall conform to the followingrequirements:

Sl.No.	Properties	Requirements
1.	Tensile Strength	12.5N/mm², Min
2.	Elongation to break	200 percent, Min
3.	Aging in air oven: a) Treatment: Temperature: Duration: b) Tensile Strength variation: c) Elongation variation:	 135±3°C 7 days ±25 percent, Max ±25 percent, Max
4.	Hot set:	
	a) Treatment: Temperature: Time under load Mechanical stress b) Elongation under load c) Permanent elongation (set) after cooling	200±3°C 15 min 20N/cm² 175 percent, Max 15 percent, Max
5.	Shrinkage: a) Treatment: Temperature Duration b) Shrinkage	130±3°C 1 hour 4 percent, Max

6.	Water absorption (Gravimetric): a) Treatment: Temperature: Duration b) Water absorbed	85±2°C 14 days
		1 mg/cm², Max
7.	Volume Resistivity a) at 27°C b) at 70°C	$1x10^{14}$ ohm-cm, Min $1x10^{13}$ ohm-cm, Min

4.3.1 The XLPE insulation should be suitable for specified 11 KV system voltage.

4.3.2 The curing process of XLPE insulation should be dry cured with nitrogen

4.3.3 The manufacturing process shall ensure that insulations shall be free from

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

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

4.3.6 The insulation of the cable shall be high standard quality, specified in IS:7098 (Part-II/1985). Withstand continuous conductor temperature of 90 deg C, which means higher continuous rated current carrying

4.3.7 The cables can operate even at conductor temperature of 130 deg C during a short time emergency and can withstand conductor temperature up to 250 deg C during a Short Circuit condition

4.3.8 The average thickness of the insulation shall not be less than 8.8-mm. The insulation shall be so applied that it fits closely on the conductor (or conductor screening or barrier if any) and

it shall be possible to remove it without damaging the conductor.

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

4.4 INSULATION SHIELD :

To confine electrical field to the insulation, non-magnetic semi-conducting 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 through single head process and shall be as IS:7098 Part 2, IEC:60502 Part – 2, BS:6622, BS:7835.

4.5 SHEATH :

The sheath shall be suitable to withstand the site conditions and the desired temperature. It should be of adequate thickness, consistent quality and free from all defects. The PVC sheath shall be extruded as per IS:7098 Part-II/1985. IEC:60502 Part –2,BS:6622, LSOH to BS:7835.

4.6 ARMOUR :

Armoring shall be applied over the inner sheath with single galvanized steel strip complying with the requirements of IS:3975/1979. The dimensions of the galvanized strip shall be as specified in table 4 of the IS:7098/Part-II/1985. The armour strip shall be applied as closely as practicable. The direction of the lay of the armour shall be left hand. The joints in armour strip shall be made by brazing or welding and the surface irregularities shall be removed. A joint in any strip shall be at least 300mm from the nearest joint in any other armour strip in the complete cable and shall be as per IS:7098 Part 2, IS: 3975, IEC:60502 Part – 2, BS:6622, BS:7835.

4.7 **OUTER SHEATH :**

Extruded PVC ST2, outer sheath as per IS:5831/1984, IS:7098 Part 2, IEC:60502 Part – 2, BS:6622, LSOH to BS:7835. 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 PVC sheathing material used.

4.8 The screening shall consist of nonmetallic semi-conducting compound, shielded cores laid up with solid Non-hygroscopic fillers, inner sheath of extruded PVC, Galvanized round wire armour and PVC overall sheath**.**

4.9 The cables should be suitable for use in solidly earthed system.

4.10 The 11 kV underground cables shall be manufactured to the highest quality, best workmanship with scientific material management and quality control. The bidder shall furnish the quality plan, giving in detail the quality control procedure / management system.

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

5 SYSTEM DETAILS:

General Technical particulars

Nominal system voltage (rms) (U)	11KV
Voltage variation	+/- 10%
Highest system voltage (rms) (U_m)	28 KV
Phase to Earth voltage (rms) (U_o)	6.35 KV
Number of Phase	3
Frequency	50Hz
Variation in Frequency	+/- 3 Hz
Type of Earthing	Solidly Earthed
Basic impulse insulation level (1.2/50 □S wave)	75 kV
Total relay & circuit breaker Operating time	15 – 20 cycles

4.12 The parameters of the LT power cables to be supplied shall be as specified below

Nom.	Nom.	Armoured	Max.DC	AC current rating

Nom. cross sectional area (Sq.mm)	Nom. Thickness of XLPE insulation mm main core	Nom. Steel Armour Size (mm)	Approx. Overall dia. (mm)	Approx, weight (kg/km)	Max.DC conductor resistance at 20°C (ohm/km)	In air (amps)	In ground (amps)
25	0.90	4 X 0.8	22.8	821.0	1.200	95	97
35	0.90	4 X 0.8	24.9	961.0	0.868	117	116
50	1.00	4 X 0.8	28.1	1195.0	0.641	140	134
70	1.10	4 X 0.8	33.0	1569.0	0.443	176	167
95	1.10	4 X 0.8	35.8	1903.0	0.320	221	199
120	1.20	4 X 0.8	39.0	2303.0	0.253	258	227
150	1.40	4 X 0.8	42.9	2720.0	0.206	294	255
185	1.60	4 X 0.8	47.5	3276.0	0.164	339	287
240	1.70	4 X 0.8	52.7	4048.0	0.125	402	333
300	1.80	4 X 0.8	58.4	4872.0	0.100	461	375
400	2.00	4 X 0.8	65.6	6101.0	.0778	542	426

4.13 The short circuit current of the LT cable to be as specified below

Sq.mm of LT Cable	Short Circuit Current(KA)
25	2.420
35	3.370
50	4.790
70	6.680
95	9.030
120	11.400
150	14.200
185	17.500
240	22.600

300	28.200
400	37.600

5 SYSTEM DETAILS:

General Technical particulars

Nominal system voltage (rms) (U)	0.44KV
Highest system voltage (rms) (U_m)	1.1 KV
Number of Phase	3
Frequency	50Hz
Variation in Frequency	+/- 3%
Type of Earthing	Solidly Earthed
Total relay & circuit breaker Operating time	15 – 20 cycles

6 CLIMATIC CONDITIONS:

(a) Maximum ambient air temperature (in shade)	45^0 C
(b) Maximum ambient air temperature (under sun)	50^0 C
(c) Maximum daily average ambient air temperature	35^0 C
(d) Maximum yearlyaverage ambient air temperature	30^0 C
(e) Maximum humidity	100%
(f) Altitude above M.S.L.	up to 1000M
(g) Average No. of thunder storm days per annum	50
(h) Average No. of dust storm days per annum	Occasional
(i) Average No. of rainy days / annum	90
(j) Average Annual Rain fall	925
(k) Normal tropical monsoon period	04 Months
(l) Maximum wind pressure	150 kg/Sq.M

7.0 DESIGN CRITERIA :

i. 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.

ii. 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.

iii. For continuous operation of the cables, at specified rating, the maximumconductor temperature shall be limited to the permissible value as perthe relevant standard, generally not exceeding 90°C under normaloperation and 250°C under short – circuit conditions.

iv. The cables in service will be subject to daily load cycles, of two peaksduring a day; morning peak and evening peak, with around 25% to 50%loading during the nights.

v. The materials used for outer sheaths shall be resistant to oils, acids andalkalis.

vi. The cables shall have the mechanical strength required, during handlingand laying.

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

viii. The cables shall be designed to have a minimum useful life span of Thirty-five years.

b. The detailed design drawings shall be submitted along with the bid documents.

7.1 MANUFACTURE PROCESS:

Cross-linking of the insulation materials (pre compounded polyethylene) shall beconforming to IS: 7098 (Part – II) and the proof of purchase of the above insulating materialshall be submitted and is to be offered for stage inspection.

8 MATERIALS:

8.1 **Conductor** **:** -The conductor shall be of stranded construction. The material for conductor shall consist of the plain aluminum of H2 or H4 grade as per clause – 3 of IS 8130/ 1984.

8.2 The minimum number of wires shall be 53 for circular compacted 400 sq.mmaluminum conductor as per table – 2 of IS 8130/ 1984.

9 CORE IDENTIFICATION:

9.1 The core identification for 31/2 core cables shall be provided, by suitable means, like, by application of individual colour or colored stripes, or by numerals or by printing on the cores as per clause 13 of IS: 7098 - Part 2

9.2 For identification of different coloring of XLPE Insulation, or by using colored strips, red, yellow and blue colors respectively shall be used to identify the phase conductors.

10 LAYING UP OF CORES:

The cores shall be laid together with a suitable right hand lay. The interstices at the center shall be filled with a non- hygroscopic material.

10.1 **INNER SHEATH (COMMON COVERING):**

10.2 The laid up cores shall be provided with inner sheath applied either 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.

10.3 The thickness of the inner sheath (common covering) shall be given as follows**:**

10.2 The laid up cores shall be provided with inner sheath applied either 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.

10.3 The thickness of the inner sheath (common covering) shall be given as follows**:**

CALCULATED DIAMETER IN MM OVER LAID UP CORES [REF IS 10462 (PART 1)]		**THICKNESS OF INNER SHEATH (Min) mm**
Over	Up to and including	
_	25	0.3
25	35	0.4

35	45	0.5
45	55	0.6
55	-	0.7

10.4 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.

11.0 ARMOURING:

11.1 Armouring shall be single strip steel wire applied over the inner sheath as closely as practicable. The direction of the lay of the armour shall be left hand.

11.2 The armour shall consist of galvanized strip steel The dimensions of the galvanized steelwires shall be 4 X 0.8 mm (Nominal)

a. The joints in the armour strip shall be made by brazing or welding and thesurface irregularities shall be removed. A joint in the wire shall be at least 300-mm from the nearest joint in any other wire in the complete cable.

1 OUTER SHEATH:

2 The outer sheath shall be applied by extrusion. It shall be applied over the armouringshall consist of poly-vinyl chloride (PVC) compound, conforming to the requirements oftype ST-2 of IS 5831. Suitable additives shall be added to give anti termite protection.

1 The minimum thickness of the PVC outer sheath shall be as per IS:10462 and as detailed.

Calculated diameter under the outer sheath [IS 10462 Part 1] – mm		**Nominal thickness of the outer sheath (ts) - mm**
Over	**Up to and including**	
_	15	1.24
15	25	1.40
25	35	1.56
35	40	1.72

40	45	1.88
45	50	2.04
50	55	2.20
55	60	2.36
60	65	2.52
65	70	2.68
70	75	2.84
75	-	3.0

12.0 ACCEPTANCE TEST:

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

The following shall constitute the acceptance test.

a) Tensile test for aluminum.

b) Wrapping test for aluminum.

c) Conductor resistance test.

d) Test for thickness of insulation.

e) Test for thickness of inner and outer sheath.

f) Hot-set test for insulation.

g) Tensile strength and elongation at break test for insulation and outer sheath.

h) High voltage test.

i) Insulation resistance (volume resistivity) test.

13 ROUTINE TEST:

The following shall constitute routine tests:

Conductor resistance test.

High voltage test.

SPECIFICATIONS OF FEEDER PILLARS:

Sub feeder pillar panels shall be suitable for AC 440 V , 50 HZ supply, fabricated with 14gauge galvanised steel sheet duly pre-treated and pure polyester thick powder coated80 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 beearthed. 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 andvermin 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 6mm. 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 interconnection between switch gear , control gear, metering , safety relays, indicators etc.as per the approved single line diagram. The feeder pillar shall have proper arrangementfor termination of all incoming and out goings cables. All the bus bars shall be supportedon 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 atboth sides inter connected with 50x5 mm Al earthing bus along the width of feederpillar. Note:-The GA drawing for panel should be approved by consultant / engineer incharge before fabrication. The feeder pillar shall have space and proper arrangementsfor installation of incoming and outgoing MCCBs with R,Y,B LED type indicating lamps.HRC fuse bases, MCBs etc. complete with interconnection provisions with providingwiring and bus bars with required hardware, sleeves, ferrules, supporters, locks etc.Panel shall have proper space and arrangements for termination of incomer loop in loopout cables, outgoing service cables, with proper offsets in bus bars for cableterminations. The feeder pillar should have anti-theft tamper proof feature toautomatically send SMS alert if door opening is attempted by unauthorised person.

FEEDER PILLER PANEL TYPE-A and FEEDER PILLER PANEL TYPE-B DESCRIPTION BELOW-

BILLS OF MATERIALS FOR FEEDER PILLER PANEL TYPE-A		
	ITEMS DESCRIPTION	**MAKE**
	14/16SWG CRCA FABRICATED AND POWDER COATED RAL 7032 SIEMENS GREY, OUTDOOR TYPE WITH CANOPY	
	SIZE : H=1475, W=1400, D=450 MM (TENTATIVE)	
A	**MAIN INCOMMER FEEDER**	
1	250A TP 36KA MCCB TM RELEASED WITH ADJ. O/L PROTECTION	L&T OR Equivelent
2	EXTENDED ROTARY HANDLE FOR MCCB	L&T OR Equivelent

3	SPREADER TERMINALS FOR MCCB (SET OF 6)	L&T OR Equivelent
4	INDICATING LAMP RED, YELLOW, 230 VAC	C&S OR Equivelent
5	INDICATING LAMP BLUE, 230 VAC	C&S OR Equivelent
6	6A, SP, MCB , 10KA FOR CONTROL	L&T OR Equivelent
7	POWER SUPPLY, 12V DC FOR SENSORS	REPUTED
8	6A, DP, MCB , 10KA FOR POWER SUPPLY IP & OP	L&T OR Equivelent
9	SAFETY DEVICE KIT WITH SENSORS FOR ANTI THEFT TEMPER PROOF FEATURES & AUTOMATICALLY SEND SMS	REPUTED
10	POWER SOCKET 230V AC	REPUTED
11	CONTROL WIRES : 1.5 SQ.MM (GREY , B)	POLYCAB OR Equivelent
B	**AL. BUSBARS FOR 250A INCOMMER CURRENT DENISTY : 0.8A/SQ.MM : -**	
1	AL. BUSBARS , SIZE :1 X 30 X 10 PER PH.	REPUTED
2	AL. BUSBARS , SIZE : 1 X 30 X 6 N	REPUTED
3	AL. BUSBARS , SIZE : 1 X 25 X 6 EARTHING	REPUTED
4	INSULATOR , SIZE : 30 X 10	REPUTED
	OUTGOING FEEDER	
C	**40A HRC FUSES FEEDER (QTY: 54 NOS) (18 SETS OF 3NOS. EACH)**	
1	63A FUSE BASE	L&T OR Equivelent
2	40A FUSE LINK	L&T OR Equivelent
3	POWER TERMINALS	ELMEX OR Equivelent
4	END PLATE FOR ABOVE TERMINALS	ELMEX OR Equivelent
5	POWER WIRES : 10 SQ.MM (BLACK)	POLYCAB OR Equivelent

BILLS OF MATERIALS FOR FEEDER PILLER PANEL TYPE-B		
	ITEMS DESCRIPTION	**MAKE**
	14/16SWG CRCA FABRICATED AND POWDER COATED RAL 7032 SIEMENS GREY, OUTDOOR TYPE WITH CANOPY	
	SIZE : H=1475, W=1000, D=450 MM (TENTATIVE)	
	-	
A	**MAIN INCOMMER FEEDER**	
1	125A TP 35KA MCCB TM RELEASED WITH ADJ. O/L PROTECTION	L&T OR Equivelent
2	EXTENDED ROTARY HANDLE FOR MCCB	L&T OR Equivelent
3	INDICATING LAMP RED, YELLOW, 230 VAC	C&S OR Equivelent

4	INDICATING LAMP BLUE, 230 VAC	C&S OR Equivelent
5	6A, SP, MCB , 10KA FOR CONTROL	L&T OR Equivelent
6	POWER SUPPLY, 12V DC FOR SENSORS	REPUTED
7	6A, DP, MCB , 10KA FOR POWER SUPPLY IP & OP	L&T OR Equivelent
8	SAFETY DEVICE KIT WITH SENSORS FOR ANTI THEFT TEMPER PROOF FEATURES & AUTOMATICALLY SEND SMS	REPUTED
9	POWER SOCKET 230V AC	REPUTED
10	CONTROL WIRES : 1.5 SQ.MM (GREY , B)	POLYCAB OR Equivelent
B	**AL. BUSBARS FOR 125A INCOMMER CURRENT DENISTY : 0.8A/SQ.MM : -**	
1	AL. BUSBARS , SIZE :1 X 25 X 6 PER PH.	REPUTED
2	AL. BUSBARS , SIZE : 1 X 25 X 3 N	REPUTED
3	AL. BUSBARS , SIZE : 1 X 25 X 3 EARTHING	REPUTED
4	INSULATOR , SIZE : 30 X 10	REPUTED
	OUTGOING FEEDER	
C	**40A HRC FUSES FEEDER (QTY: 27 NOS) (9 SETS OF 3NOS. EACH)**	
1	63A FUSE BASE	L&T OR Equivelent
2	40A FUSE LINK	L&T OR Equivelent
3	POWER TERMINALS	ELMEX OR Equivelent
4	END PLATE FOR ABOVE TERMINALS	ELMEX OR Equivelent
5	POWER WIRES : 10 SQ.MM (BLACK)	POLYCAB OR Equivelent

Below mentioned test certificates are mandatory for feeder pillar.

1. CPRI Tested for 70 kAmps short circuit test for one second;
2. ERDA Tested for Temperature Rise Test;
3. CPRI Tested for Temperature Rise Test;
4. ISO Certificates;
5. Supplier of prestigious govt organization.

APPROVED MAKES:

1. Compact Packaged substation (CSS) : Siemens /ABB / Schnieder / CGL

(Note: HT and LT switchgear in the CSS should be of same make)

2. Dry type transformer in CSS: ABB/ Raychem / Voltamp /Siemens /Schneider

3. LT switchgear: Siemens / ABB / Legrand / L&T / Schnieder

4. HT and LT cables: RPG / Ravin / CCI / Finolex / Havells/ Universal /KEI &Other ISI marked

makes (approved by discom) fulfilling the specifications with prior approval of engineer.

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 has been sent 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 Ill Digital Certificate to establish the identity of the bidder submitting the bid online. The bidders may obtain Class Ill Digital Certificate issued by an approved Certifying Authority authorized by the Controller of Certifying Authorities, Government of India. A Class Ill Digital Certificate is issued upon receipt of mandatory identity proofs along with an application. Only upon the receipt of the required documents, a Digital Certificate can be issued. For details please visit cca.gov.in.

NOTE:

I. It may take upto 7 working days for issuance of Class Ill Digital Certificate; hence the bidders are advised to obtain the Certificate at the earliest. Those bidders who already have valid Class Ill Digital Certificate need not obtain another Digital Certificate for the same. The bidders may obtain more information and the Application From required to be submitted for the issuance of Digital Certificate from **cca.gov.in**

II. Bids can be submitted till bid submission end date. Bidder will require digital signature while bid submission.

The digital certificate issued to the Authorized User of a Partnership firm / Private Limited Company / Public Limited Company and used for online biding 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 the 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 Digital Certificate of this Authorized User will be binding on the firm. It shall be the responsibility of Management / Partners of the concerned firm to inform the Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Certificate for the new Authorized User.

3. SET UP OF BIDDER'S COMPUTER SYSTEM:

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

4. KEY DATES:

The bidders are strictly advised to follow the time schedule (Key Dates) of the bid on 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 of 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 the Bid forms end 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 signing of the same by the Digital Signature of their authorized representative.

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 Date 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 upto 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 the bid till Bid submission end date

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. Number of partners in a Joint Venture shall not exceed 3 (three). 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 a 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 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] of above, as well as in the bid and in the Agreement tin case of a successful bid];
   e. The joint venture agreement should indicate precisely the role of all members of IV in respect of planning, design, construction equipment key personnel, work execution, and financing of the project. 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. The-joint venture agreement should be registered, so as to be legally valid and binding on all partners and
   g. a copy of the joint Venture Agreement entered into by the partners shall be submitted with the bid.
2. The figures for each of the partners of a joint venture shall be added together to determine the Bidder's compliance with the minimum qualifying criteria required for the bid. All the partners 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 a 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(ies) On behalf of the joint venture
5. Attach the agreement among all partners of the joint venture [and which is legally binding on all partners], which shows the requirements as indicted in the Instructions to Bidders'.
6. Furnish details of participation proposed in the joint venture as below:

DETAILS OF PARTICIPATION IN THE IOINT 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 meet at least 50% requirement of Technical and Financial eligibility criteria required for the bid.
   b. The other partner(s) must meet at least 25% requirement of Technical and financial eligibility criteria required for the bid.
   c. The lead partner and the other partners should together meet 100% of all the eligibility criteria required for the bid.
8. For the meeting the minimum qualification criteria of experience of similar nature work. Every partner can have experience of different works as defined in similar nature works and together should have the experience of all type of works described in similar nature works.

Annexure-H

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

ORGANIZATIONAL DETAILS
(To be contained in Envelope- A)

S.No.	Particulars	Details
1	Registration number issued by Centralized Registration System of Govt. of M.P. 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/ Proprietary Firm/Partnership Firm	
4	Entity of Organization Individual/ Proprietary Firm/ Partnership Firm (Registered under Partnership Act)/Limited Company (Registered under the Companies Act—1956)/ Corporation / Joint Venture	
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 —1
See clause 14 of Section 2 -ITB)

Envelope — B, Technical Proposal

Technical Proposal shall comprise the following documents:

S. No.	Particulars	Details to be submitted
1	Experience — Financial & Physical	Annexure - I (Format: I-1)
2	Annual Turnover	Annexure - I (Format: I-2)
3	List of technical personnel for the key positions	Annexure - I (Format: I-3)
4	List of Key equipments/ machines for quality control labs	Annexure - I (Format: I-4)
5	List of Key equipments/ machines for construction work	Annexure - I (Format: I-5)

Note:

1. *Technical Proposal should be uploaded duly page numbered and indexed.*
2. *Technical Proposal uploaded otherwise will not be considered.*

Annexure - I (Format: I-1)
(See clause 14 of Section 2 -ITB)

FINANCIAL & PHYSICAL EXPERIENCE DETAILS

A. Financial Requirement:

The bidder should have completed either of the below:

a) ***three similar works*** each costing not less than the amount ***equal to 20% of the probable amount*** of contract during the ***last 3 financial years; or***

b) ***two similar works*** each costing not less than the amount ***equal to 30% of probable amount*** of contract during the last ***3 financial years; or***

c) ***one similar work*** of aggregate cost not less than the amount ***equal to 50% of the probable amount*** of contract in any one financial year during ***the last 3 financial years;***

To be filled in by the contractor:

I. Details of successfully completed similar works shall be furnished in the following format

ii. Certificate duly signed by the employer shall also be enclosed for each completed similar work.

Agreement Number & Year	Name of Work	Date of Work Order	Date of Completion	Amount of Contract	Employer's Name and Address

Existing commitments— (Value of 'C' for Bid Capacity formula)

Agreement Number & Year	Name of Work	Date of Work Order	Date of Completion	Amount of Contract	Amount of balance work	Employer's Name and Address

B. Physical Requirement:

Execution of similar items of work in any one financial year during the last 3 financial years should not be less than the minimum physical. Requirement fixed for the work.

S.No.	Particulars	Actual Quantity Executed (To be filled in by the contractor)		
		Year - 1	Year – 2	Year - 3
	Physical qualification required	Yes		
1	Execution of Urban Roads			

	projects			
2	Construction of Under Ground Utilities			
3	Underground electrification work			

Note:

1. 1 Certificate duly signed by the employer shall be enclosed for the actual quantity executed in any one year during the last 3 financial years,
2. Similar works: The similarity shall be based on the physical size, complexity, methods technology or other characteristics of main items of work viz, earth work, cement concrete, Reinforced cement concrete, brick masonry, stone masonry etc.

Annexure-I(Format: I-2)

(See douse 14 of Section 2 -ITB)

ANNUAL TURN OVER

Requirement:

Average annual construction turnover on the construction works not less than 30% of the probable amount of contract during the last 3 financial years;

To be filled in by the contractor:

Financial Year	Payments received for contracts in progress or completed
1. 2016-2017	
2. 2015-2016	
3. 2014-2015	

Note:

i ***Annual turnover from construction should be certified by the Chartered Accountant.***

ii. ***Audited Balance sheet including all related notes, and income statements for the above financial years to be enclosed.***

Bid Capacity

Applicants who meet the minimum qualifying criteria in the evaluation as stated above are to be evaluated further for bid capacity as under:

Bid Capacity = (1.5A X B) - C

Where

A. = Maximum value of civil engineering works executed in any one year during the last five year (10% weightage per year shall be giv
en to bring the value of work executed at present price level)
B = Proposed contract period in years.
C = Amount of work in hand at present.

Annexure - I (Format : I-3)

(See clause 14 of Section 2-ITB & Clause 6 of GCC)

List of Technical Personnel for the Key Positions[1](to be referred for civil works)

S. No	Key Positions	Qualifications	Age	Similar Work Experience	Total Work Experience	Name of Personnel	Key Position	Qualification	Similar Work Experience	Total Work Experience
1.	**Project Manager - 1 No.**	**B.E. Civil**	**below 65 years**	**10 Years**	**15 Years**					
2.	**Site Engineer – 3 Nos**	**B.E. Civil**	**below 65 years**	**5 years**	**10 years**					
3.	**Architect – 1 No**	**B. Arch**	**below 65 years**	**5 years**	**10 years**					
4.	**Quality Assurance Engineer- – 1 No**	**B.E. Civil *with experience in QA/QC***	**below 65 years**	**5 years**	**10 years**					
5.	**Plant Engineer – 1 No**	**B.E. Mech/ Diploma in Mech**	**below 65 years**	**5 years**	**10 years**					
6.	**Quantity Surveyor – 3 Nos**	**B.E. Civil / Diploma Civil**	**below 65 years**	**5 years**	**10 years**					
7.	**Soil & Material Engineer – 2 Nos**	**B.E. Civil / Diploma Civil**	**below 65 years**	**5 years**	**10 years**					
Total	**12 Nos**									

Note:

1. Aforesaid personnel shall be deployed within the period starting from the date of award of contract as stipulated in the contract.

2. Approval of the superintending engineer about suitability of personnel shall be obtained before deployment.

Annexure - I (Format : I-3)

(See clause 14 of Section 2-ITB & Clause 6 of GCC)

List of Technical Personnel for the Key Positions[2](to be referred for underground electrification works)

S. No	**Key Positions**	**Qualifications**	**Age**	**Similar Work Experience**	**Total Work Experience**	**Name of Personnel**	**Key Position**	**Qualification**	**Similar Work Experience**	**Total Work Experience**
1.	**Project Manager -1 No.**	**B.E. electrical**	**below 65 years**	**10 Years**	**15 Years**					
2.	**Site Engineer – 3 Nos**	**B.E. electrical**	**below 65 years**	**7 years**	**10 years**					
3.	**Site supervisor-4 Nos**	**Diploma/ Iti in electrical**	**below 65 years**	**5 years**	**10 years**					
Total	**8 Nos**									

Note:

1. Aforesaid personnel shall be deployed within the period starting from the date of award of contract as stipulated in the contract.

2. Approval of the superintending engineer about suitability of personnel shall be obtained before deployment.

List of Key Equipment's / Machines for Quality Control Labs

Minimum requirement						
S.No.	**Name of Equipment/ Machinery**	**Quantity for works costing**			**Quantity Available with the Bidder**	**Remarks**
		UptoRs 5 Cr	**From Rs 5 Cr to 20 Cr**	**Above Rs 20 Cr**		
A)	**GENERAL**					
1)	**Weigh Balances**					
	a) 5-20 kg capacity Electronic type – Accuracy 1 gm	**Nil**	**Nil**	**1 No.**		
	b) 500 gm capacity-Electronic Type Accuracy 0.01 gm	**1 No.**	**1 No.**	**1 No.**		
	c) Electronic 5 kg capacity Accuracy 0.5 gm	**1 No.**	**1 No.**	**1 No.**		
	e) Chemical Balance 100 gm capacity-accuracy 0.001 gm	**Nil**	**Nil**	**1 No**		
2)	**Oven-electrically operated, thermostatically controlled (including thermometer), stainless steel interior (From 0ºC to 220ºC Sensitivity 1ºC)**	**1 No**	**1 No**	**1 No**		
3)	**Sieves : as per IS:460-1962**					
	a) I.S. sieves 450 mm internal dia of sieve sets as per BIS of required sieve sizes complete with lid and pan	**1 set**	**1set**	**3 set**		
	b) IS sieve 200 mm internal dia (brass frame and steel/or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid	**2 sets**	**2 sets**	**3 sets**		
4)	**Sieve shaker capable of sacking 200 mm and 450 mm dia sieves-electrically operated with time switch (for work costing more than 15 crore only)**	**Nil**	**1 No**	**3 No**		
5)	**200 tonnes compression testing machine**	**1 No**	**1 No**	**2 No**		
6)	**Stop watches 1/5 sec. accuracy**	**1 No**	**1 No**	**3 No**		
7)	**Glassware comprising beakers, pipettes, dishes, measuring cylinders (100 to 1000 cc capacity) glass roads and funnels, glass thermometers range 0ºC to 100ºC and metallic thermometers range up to 300ºC.**	**2 No. each**	**2 No. each**	**2 No. each**		
8)	**Hot plates 200 mm dia (1500 watt.)**		**1 No**	**2 No**		
9)	**Enamel trays**					
	a) 600 mm x 450 mm x 50 mm	**1 Nos**	**1 Nos**	**2 Nos**		
	b) 450 mm x 300 mm x 40 mm	**1 Nos**	**1 Nos**	**2 Nos**		
	c) 300 mm x 250 mm x 40 mm	**1 Nos**	**1 Nos**	**2 Nos**		
	d) Circular plates of 250 mm dia	**1 Nos**	**1 Nos**	**2 Nos**		
10)	**Water Testing Kit**	**Nil**	**Nil**	**1 No**		

B)	FOR SOILS					
1)	Water Tank	1 No	1 No	3 No		
2)	Liquid limit device with ASTM grooving tools as per IS:2720	Nil	1 No	1 No		
3)	Sampling pipettes fitted with pressure and suction inlets, 10 ml. Capacity	Nil	1 set	1 set		
4)	Compaction apparatus (Proctor) as per IS:2720 (Part 7) complete with collar, base plate and hammer and all other accessories	Nil	1 No	1 No		
5)	Modified AASHTO Compaction apparatus as per IS:2720 (Part 8) 1974 or Heavy Compaction Apparatus as per IS complete with collar, base plate hammer and all other accessories(for work costing more than 15 crore only)	Nil	1 No	1 No		
6)	Sand pouring cylinder with conical funnel and tap and complete as per IS:2720 (Part 28) 1974 including modern equipment.	1 Nos	2 Nos	2 Nos		
7)	Ennore Standard Sand	As required	As required	As required		
8)	Sampling tins with lids 100 mm dia x 75 mm ht. ½kg capacity and miscellaneous items like moisture tins with lid 50 grams etc.	Nil	Nil	4 Nos		
9)	Lab CBR testing equipment for conducting CBR testing, load frame with 5 Tonne capacity, electrically operated with speed control as per IS:2720 (Part 16) and consisting of following: (for work costing more than 15 crore only)	Nil	1 Set	1 Set		
	a) CBR moulds 150 mm dia – 175 ht.	Nil	6 No	6 No		
	b) Tripod stands for holding dial gauge holder	Nil	4 Nos	4 Nos		
	c) CBR plunger with settlement dial gauge holder	Nil	1 No	1 No		
	d) Surcharge weight 147 mm dia 2.5 kg wt.	Nil	6 Nos	6 Nos		
	e) Spacers disc 148 mm dia 47.7 mm ht. With handle	Nil	2 Nos	2 Nos		
	f) Perforated plate (Brass)	Nil	2 Nos	2 Nos		
	g) Soaking tank for accommodating 6 CBR moulds	Nil	2 Nos	2 Nos		
	h) Proving rings of 1000 kg, 2500 kg capacity	Nil	1 No each	1 No each		
	i) Dial gauges 25 mm travel-0.01 mm/division	Nil	2 No	2 No		
10)	Standard penetration test equipment	Nil	Nil	1 No		

11)	Nuclear moisture Density meter or equivalent(for work costing more than 15 crore only)	Nil	Nil	1 No		
12)	Speedy moisture meter complete with chemicals	I No	1 No	3 No		
13)	Unconfined Compression Test Apparatus (for work costing more than 15 crore only)	Nil	Nil	1 No		
C)	FOR BITUMEN AND BITUMINOUS MIXES					
1)	Constant temperature bath for accommodating bitumen test specimen, electrically operated, and thermostatically controlled (to accommodate minimum six Specimens)	Nil	1 No	1 No		
2)	Penetrometer automatic type, including adjustable weight arrangement and needles as per IS:1203-1958	Nil	1 No	1 No		
3)	Solvent extraction or centrifuge type apparatus complete with extraction thimbles with solvent and filter paper	1 No	1 No	1 No		
4)	Bitumen laboratory mixer including required accessories (20 ltrs.) (for work costing more than 15 crore only)	Nil	1 No	1 No		
5)	Marshall compaction apparatus automatically operated as per ASTM 1559-62 T complete with accessories (with 180 N Marshall Moulds) (for work costing more than 15 crore only)	Nil	1 set	1 set		
6)	Furol viscometer	Nil	1 No	1 No		
7)	Ductility meter (for work costing more than 15 crore only)	Nil	1 No	1 No		
8)	Softening point (Ring and ball app)	Nil	1 No	1 No		
9)	Distant reading thermometer	Nil	-	-		
10)	Rifle box	Nil	- 1 No	- 1 No		
11)	Automatic Asphlat content Meter	Nil	- 1 No	- 1 No		
12)	Thin film over test apparatus for modified binder either with PMB or CRMB(for work costing more than 15 crore only)	Nil	-	-		
13)	Mastic Asphalt Hardness testing equipment(for work costing more than 15 crore only)	Nil	-	-		
14)	Sand Equivalent test apparatus	Nil	1 set	1 set		
15)	Core cutting machine suitable for upto 150 mm dia core	1 set	1 set	2 set		
16)	Thermometers (Digital)	2 Nos	4 Nos	8 Nos		
D)	FOR CEMENT, CEMENT					

	CONCRETE AND MATERIALS					
1)	**Water Tank**	**1 No**	**1 No**	**1 No**		
2)	**Vicat needle apparatus for setting time with plungers as per IS:269-1967**	**1 No**	**1 No**	**1 No**		
3)	**Moulds**					
	a) 150 mm x 300 mm ht. Cylinder with capping component along with the capping set and compound as per IS	**Nil**	**Nil**	**As Required**		
	b) Cube 150 mm, and 100 mm (each size)	**6 Nos**	**12 Nos**	**24 Nos**		
4)	**Concrete permeability apparatus**	**Nil**	**Nil**	**1 No**		
5)	**High frequency mortar cube vibrator for cement testing**	**Nil**	**Nil**	**1 No**		
6)	**Concrete mixer power driven, 1 cu.ft. capacity**	**Nil**	**Nil**	**1 No**		
7)	**Variable frequency and amplitude vibrating table size 1 m x 1 m as per the relevant British Standard**	**Nil**	**Nil**	**1 No**		
8)	**Flakiness index test apparatus**	**1 No**	**1 No**	**1 No**		
9)	**Aggregate impact test apparatus as per IS:2386 (Part 4) 1963**	**Nil**	**Nil**	**1 No**		
10)	**Los-Angeles abrasion test apparatus as per IS:2386 (Part 4) 1963**	**Nil**	**Nil**	**1 No**		
11)	**Flow table as per IS:712-1973**	**Nil**	**Nil**	**1 No**		
12)	**Equipment for slump test**	**1 No**	**1 No**	**2 No**		
13)	**Equipment for determination of specific gravity or fine and coarse aggregate as per IS:2386 (Part 3) 1963**	**1 No**	**1 No**	**2 No**		
14	**Compression and Flexural strength testing machine of 200 T capacity with additional dial for flexural testing**	**1 No**	**1 No**	**2 No**		
15	**Core cutting machine with 10/15 cm dia diamond cutting edge**	**1 No**	**1 No**	**2 No**		
16)	**Needle vibrator**	**1 No**	**1 No**	**2 No**		
17)	**Air entrainment meter**	**Nil**	**Nil**	**1 No**		
18)	**0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod**	**Nil**	**1 No**	**2 No**		
19)	**Soundness testing apparatus for cement (Lee Chattlier)**	**Nil**	**Nil**	**1 No**		
E)	**FOR CONTROL OF PROFILE AND SURFACE EVENNESS**					
1)	**Total Station**	**Nil**	**1 No**	**1 No**		
2)	**Precision automatic level with micrometer attachment**	**1 set**	**1 set**	**1 set**		
3)	**Distomat or equivalent**	**Nil**	**Nil**	**1 Set**		
4)	**Theodolite – Electronically**	**Nil**	**Nil**	**1 No**		

	operated with computerised output attachment					
5)	Precision staff	2 sets	4 sets	8 sets		
6)	3 meter straight edge and measuring wedge	1 sets	2 sets	8 sets		
7)	Camber template 2 Lane					
	a) Crown type cross – section	1sets	1 sets	4 sets		
	b) Straight run cross – section	1sets	1sets	4sets		
8)	Steel tape					
	a) 5 m long	2 Nos	4 Nos	8 Nos		
	b) 10 m long	2 Nos	4 Nos	8Nos		
	c) 20 m long	2 Nos	4 Nos	8Nos		
	d) 30 m long	2 Nos	4 Nos	8 Nos		
	e) 50 m long	1 No	4 No	8 No		
9)	Roughometer (Bump Integrator)	1 No. (when required)	1 No. (when required)	1 No. (when required)		

Note: Intention to procure/lease the equipement should be accompanied by documents to the effect. The nature of documents could be any one of the under:

i) Order to the manufacturer of the plant and equipment's.
ii) Confirmation from the manufacturer.
iii) Proof of payments in full or part.
iv) Agreement to lease the equipment.

Annexure - I (Format : I-5)

(See clause 14 of Section 2-ITB)

List of Key Equipment's/ Machines for Construction Work (Only for civil works)

		Minimum requirement				
S. No.	**Name of Equipment/ Machinery**	**Quantity Required with the bidder for works costing**			**Quantity Available with the bidder**	**Remarks**
		UptoRs 5 Cr	**From Rs 5 Cr to 20 Cr**	**Above Rs 20 Cr**		
1.	**a) Hot mix plant (40-60 TPH), fully computerized with four bin feeder lime/dust feeder as per IRC specification**	**1 No.**	**1 No.**	**1 No.**		
	b) Hot mix plant (40-60 TPH), fully computerized with four bin feeder lime/dust feeder as per IRC specification	**Nil**	**Nil**	**1 No.**		
2.	**Loaders**	**1 No.**	**1 No.**	**2 No.**		
3.	**Tippers**	**2 Nos.**	**5 Nos.**	**10 Nos.**		
4.	**Tandem Road Roller 8-10 ton**	**1 No.**	**2 No.**	**4 No.**		
5.	**Vibratory Road Roller**	**1 Nos.**	**1 Nos.**	**2 Nos.**		
6.	**Bitumen Sprayers and emulsion sprayer**	**1 Nos.**	**1Nos.**	**2 Nos.**		
7.	**Blower of suitable capacity**	**1 No**	**2 No**	**2 No**		
8.	**Sensor Paver finisher filled with vibratory screed**	**1No.**	**1No.**	**2 No.**	**-**	
9.	**for Concrete pavements**					
	i) Concrete Mechanical Mixer with arrangement for mixing ingredients by weight	**1 Cum capacity**	**1 Cum capacity**	**1 Cum capacity**		
	ii) Plate Vibrators	**1 Nos.**	**1 Nos.**	**2 Nos.**		
	iii) Pin Vibrators	**1 Nos.**	**1 Nos.**	**2 Nos.**		
	iv) Concrete sensor paver	**1 No**	**1 No**	**1 No**		
10	**Pneumatic tire Roller/Rubber wheeled roller of 12 to 15 tonne weight with tyre pressure of at least 0.56 Mpa**			**1 No**		
11	**Ready Mix Concrete batching mix plant with capacity 30 cum per hour**			**1 No**		
12	**Hydrostatic sensor paver finisher with dual application and electronic control for paving width of 7.00 Mtrs**			**1 No**		

Note: Intention to procure/lease the plants and machinery should be accompanied by documents to the effect. The nature of documents could be any one of the under:

- ***v) Order to the manufacturer of the plant and equipment's.***
- ***vi) Confirmation from the manufacturer.***
- ***vii) Proof of payments in full or part.***
- ***viii) Agreement to lease the equipment.***

Annexure — J

(See clause 14 of Section 2 -ITB)

FINANCIAL BID
(To Be Contained in Envelope-C)

NAME OF WORK_____

I/We hereby bid for the 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 fulfill all the terms and provisions of the said conditions of contract annexed- hereto so far as applicable, or in default thereof to forfeit and pay to the Jabalpur Smart City Limited or his successors in office the sums of money mentioned in the said conditions.

Note:

i. 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.

ii. 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.

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

iv. 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 Jabalpur Smart City Limited dated the _____ day of _____ 20_____

Signature of Officer
by whom accepted

Annexure — K

(See clause 15 of Section 2 -ITB)

MATERIALS TO BE ISSUED BY THE DEPARTMENT

N/A

Annexure—L

(See clause 21 of Section 2 -ITB)

LETTER OF ACCEPTANCE (LOA)

No. _____ Dated: _____

To,

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 Jabalpur Smart City Limited at your bided percentage _____ below/ above or at par the Bill of Quantities and item wise rates 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 valid up to three months after the expiry of defects liability period.

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 the Engineer-in-charge for taking the possession of site and necessary instructions to start the work.

Yours Faithfully

Executive Engineer

Annexure — M

(See clause 22 of Section 2 -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] (hereinafter 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 WHEREAS 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, an 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 term of the Contract of the Works to be performed there under or of any of the Contract documents which maybe made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 3 (three) months from the date of expiry of the Defect Liability Period.

Signature, Name and Seal of the guarantor _____

Name of Bank_____

Address_____

Phone No, Fax No., E-mail Address, of Signing Authority _____

Date _____

*****An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

SECTION 3
Conditions of Contract
Part - I General Conditions of Contract [GCC]
Table of Clauses of GCC

18	Correction of Defects noticed during the Defect Liability Period	39	Compliance with Labour Regulations
D. Cost Control		40	Audit and Technical Examination . —
19	variations.- Change in original Specifications, Designs, Drawings etc.	41	Death or Permanent Invalidity of Contractor
20	Extra Items .	42	.Jurisdiction

A. General

1. DEFINITIONS

1.1. **Bill of Quantities:** means the priced and completed Bill of Quantities forming part of the Bid.

1.2. **Chief Engineer:** means Chief Engineer of the zone/ basin concerned:

13. **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:** 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. **Department:** means Department of the, State Government viz. Water Resources Department, Public Works Department, Public Health Engineering Department Rural Engineering Service and any other organization which adopts this document.

1.13. **Drawings:** means drawings including calculations and other information provided or approved by the Engineer-in-Charge.

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 the Contract Data.

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 far execution of work.

1.18. **Government:** means Government of Madhya Pradesh.

1.19. **In Writing:** means communicated in written form and delivered against receipt.

1.20. **Material:** means all supplies, including consumables, used by the Contractor for incorporation in the work.

1.21. **Superintending Engineer:** means Superintending Engineer-in-Charge of the Circle concerned.

1.22. **Stipulated period of completion:** means the period in which the Contractor is required to complete the work. The stipulated period 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 of signing of agreement for the work.

1.25. **Sub-Contractor**: means a person or corporate body who has a Contract with the Contractor, duly authorized 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, Tendered/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,

2. INTERPRETATIONS AND DOCUMENTS

2.1 Interpretations

In the contract, except where the context requires otherwise:

a. words indicating one gender include all genders;

b. Wards indicating the singular also include the plural and vice versa.

c. provisions including the word "agree", "agreed" or "agreement' require the agreement to be recorded in writing;

d. written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;

2.2 Documents Forming Part of Contract:

1. NIT with all amendments.
2. Instructions to Bidders (ITB, Bid Data Sheet with all Annexure's)
3. Conditions of Contract:
   I. Part I General Conditions of Contract and the 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, and

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 to the address or contact details given by the Contractor in [Annexure H of ITB]. The address and contact details for communication with the Employer/Engineer shall be as per the details given in the Contract Data. 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 of 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 with the approval of the Employer in writing, but will not assign the Contract. Subcontracting shall not alter the Contractors obligations.
b. Following shall not form part of subcontracting:
   I. Hiring of labour through a labour contractor.
   II. The purchase of Materials to be incorporated in the works.
   III. 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 G0MP.

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 attributable 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, ionising radiation or contamination by radio-activity, except as may be attributable 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 contact after holding mutual discussions.

8. Contractor's Risks -

8.1 All risks of loss 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, drawing, designs, other documents and/or information submitted by the contractor shall be the responsibility of the Contractor alone, notwithstanding the fact that the design/ 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 Corporation 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 and implements, and generally of all means used for the fulfillment of this contract whether such means may or may not be approved 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 dispute can be raised after 45 days of its first 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 dispute.

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 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 the work is 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 time lines 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 the 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 equipments 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 test prescribed under the specification shall be got carried out through laboratories accredited by national Accreditation Board of laboratories (NABL) By the Engineer-in-charge and the cost of such testing shall be deducted form 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 as per the Contract Data.

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 haying 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, and Drawings etc.

19.1 The Engineer-in-charge shall have power to make any alterations, omissions or additions to or substitutions in 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 Engineer-in-charge, 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 agrees to do the main work.

19.2 The time for the completion of the work shall be adjusted 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 included in the priced BOQ shall be treated as extra items.

21. Payments for Variations and / or Extra Quantities

21.1 The rates for such additional (Extra quantity), altered or substituted work / extra items under this clause shall be worked out in accordance with the following provisions in the irrespective 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 for 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 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 for 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 he 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 the 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 Engineer-in-charge 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 may 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 contract of the department, including the securities which become due for release.

(c) The department shall, further have an additional right to effect recoveries as arrears of land revenue under the M.P. Land-Revenue Code.

25. Tax -

25.1 The rates quoted by the Contractor shall be deemed to be inclusive of the commercial tax and other levies, duties, cess, toll, taxes of Central and State Governments, local bodies and authorities,

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

25.3 Any changes in the taxes due to change in legislation or for any other reason shall not be payable to the contractor.

26. Check Measurements

26.1 The department reserves to itself the right to prescribe a scale of check measurement of work in general or specific scale for specific works or by other special orders.

26.2 Checking of measurement by superior officer shall supersede measurements by subordinate officer(s), and the former will become the basis of the payment.

26.3 Any over/excess payments detected, as a result of such check measurement or otherwise at any stage up to the date of completion of the defect liability period specified in this contract, shall be recoverable from the Contractor, as per clause 24 above.

27. Termination by Engineer in charge

27.1 If the Contractor fails to carry out any obligation under the Contract, the Engineer in Charge may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

27.2 The Engineer in Charge, shall be entitled to terminate the Contract if the Contractor

a) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract;
b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstruction or amalgamation;
c) without reasonable excuse falls 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 the judgment of the Engineer in chargé 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 -

If the Contract is terminated 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 the Bid Data Sheet at the time of signing of the contract. The contractor shall have to ensure that such performance security and additional performance security, if any 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 deposit 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 Delectability Period.

30.3 The Security Deposit shall be refunded on completion of' Defect Liability Period plus 3(three) Months.

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 labor, 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 for any rise or fail in costs to the contractor is not covered by the provisions 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.

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 price adjustment may be either positive or negative, i.e. if the price adjustment is in favour of the Employer, the same shall be recovered from the sums payable to the Contractor.

32. Mobilization and Construction Machinery Advance

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

32.2 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 a 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.

32.3 The rate of interest chargeable shall be as per Contract Data.

32.4 The construction machinery advance, if applicable, shall be limited to 80% of the cost of construction machinery and admissible only for new construction machinery.

32.5 The advance payment shall be recovered as stated in the Contract Data by deducing 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 the Contract Data.

33.2 If applicable, the Engineer shall make advance payment against materials intended for but not yet incorporated in the Works and 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 adjusted, but the amount of the guarantee shall be progressively reduced by the amounts adjusted by the contractor.

33.3 The amount of secured advance and conditions to be fulfilled shall be as stipulated in the Contract Data.

3.4 The Secured Advance paid shall be recovered as stated in the Contract Data.

34. Payment Certificates

The payment to the contractor will be as follows for construction work:

(a) The Contractor shall submit to the Engineer monthly statements 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 labourfrom time to time employed by the Contractor on the Site and such other information as the Engineer may require.

39. Compliance with Labor Regulations

39.1 During continuance of the Contract, the Contractor and his Sub Contractors shall abide at all times by all existing labor enactments and rules made there under, regulations, notifications and bye laws of the, State or Central Government or local authority and any other labor law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labor 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 their under, regulations or notifications including amendments, If the Employer is caused to pay or reimburse, such amounts as may .be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/ byelaws/ Acts/Rules / regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct from any money due to the Contractor including his amount of performance 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. Audit and Technical Examination

Government shall have the right to cause an audit and technical examination of the works and the final bill of the contract including all supporting vouchers abstract etc

to be made after payment of the final bill and if as a result of such audit and technical examination any sun is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed by him to have been done under the contract and found not to; have been executed, the Contractor shall be liable to refund the amount of overpayment and it shall be lawful for Government to recover the same from him in the manner prescribed in clause 24 above and if it is found that the Contractor was paid less than what was due to him, under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Government to the Contractor.

41. Death or Permanent Invalidity of Contractor

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.

42. Jurisdiction

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

[End of GCC]

Contract Data

Clause reference	Particulars	Data
1.14	Employer	**EXECUTIVE DIRECTOR, JSCL, JABALPUR**
1.15	Engineer	Executive Engineer
1.16	Engineer in Charge	Assistant Engineer
1.12	Stipulated period of completion	18 months (including Rainy season)
3	Language & Law of Contract	Indian Contract Act 1872
4	Address & contact details of the Contractor	As per Annexure H
	Address & contact details of the Employer/ Engineer- phone, Fax, email.	Executive Director, JSCL
5	Subcontracting permitted for the Contract Value	Upto 10% by approval of employer
6	Technical Personnel to be provided the contractor—requirement, &	As per Annexure - I (Format I-3)
	Penalty, if required Technical Personnel not employed	As per rule
10	Specifications	As per Annexure E
	Drawings	As per Annexure N
12	Competent Authority for deciding dispute under Dispute Resolution System	As per rule
	Appellate Authority for deciding dispute under Dispute Resolution System	Executive Director, JSCL
13	Period for submission of updated construction program	7 days
	Amount to be withheld for hot submitting construction program in prescribed period	As per rule
14	Competent Authority for granting Time Extension.	As per rule
15	Milestones laid down for the contract	YES
	If Yes, details of Milestones	As per Annexure – O
	Liquidated damage	As per Annexure – P
17	List of equipment for lab	As per Annexure - Q
	Time to establish lab	As per rule
	Penalty for not establishing field Laboratory	As per rule
18	Defect Liability Period	60 months (3 years) after physical completion of work

21	Competent Authority for determining the rate	As per rule
27	Any other condition for breach of contract	_____ _

Contract Data

Clause reference	Particulars	Data
28	Penalty	Penalty Shall include (a) Security deposit as per clause 30 of General Conditions of Contract and (b Liquidated Damages imposed as per clause 15 or Performance Security (Guarantee) including Additional Performance Security (Guarantee), if any, as per clause 29 of General Conditions of Contract, whichever is higher
29	Performance guarantee (Security) shall be valid up to	Till issue of physical Completion Certificate as per Clause 35.1
30	Security Deposit to be deducted from each running bill	At the rate of 5%.
	Maximum limit of deduction of Security Deposit	Up to 5% of Final Contract Amount.
31	Price Adjustment formula and procedure to calculate	N.A.
31.1 (1)	Price adjustment shall be applicable	Price Adjustment shall be applicable only in case where the amount in NIT is more than Rs. 10 (Ten) Crores. This clause shall not have any bearing with the Contract Amount.
32	32:1 Mobilization and Construction Machinery Advance Applicable	No Mobilization and Construction Machinery Advance shall be payable.
	32.2 If yes, Unconditional Bank Guarantee	In the format prescribed in Annexure - S
	32.3 If yes, Rate of interest chargeable on advances	10% annual simple interest
	32.4 If yes, Type & Amount of Advance payment that can be paid	1. Mobilization advance - Not more than ... % of contract amount 2. Construction Machinery Advance — Not more than ... % of contract amount
	32.5 If yes, Recovery of advance 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 accrue 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.

Clause reference	Particulars	Data
33	33.1 secured Advance Applicable	No Secured Advance payable.
	33.2 if yes, Unconditional Bank Guarantee	In the format prescribed in Annexure —T
	33.2 if yes, Amount of Secured Advance :	75% of value of material as determined by the Engineer in Charge
	33.3 if yes, Conditions for secured advance .	a) The materials are in-accordance with the specification for Works; b) Such materials have been delivered to site, and are properly stored and protected against damage, or deterioration to the satisfaction of the Engineer. The contractor shall store the bulk material in measurable stacks.; c) The Contractor's records of the requirements, orders, receipt and use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer; d) The contractor has submitted with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Engineer for the purpose of valuation of the materials and providing evidence of ownership and payment thereof; e) Ownership of such materials shall be deemed to vest in the Employer for which the Contractor has submitted an Indemnity Bond in an acceptable format; and f) The quantity of materials are not excessive and shall be used within a reasonable time as determined by the Engineer.
	33.4 if yes, Recovery of Secured advance	The advance shall be repaid from each succeeding monthly payments to the extent materials [for which advance was previously paid) have been incorporated into the Works.
35	Completion certificate - after physical completion of the Work	As per Annexure - U
	Final Completion Certificate — after final payment on	As per Annexure-V

	completion of the Work	
36	Competent Authority	Executive Director, JSCL
37	Salient features of some of the major labour laws that are applicable	As per Annexure – W

Annexure—N

(See clause 10 of Section 3— GCC)

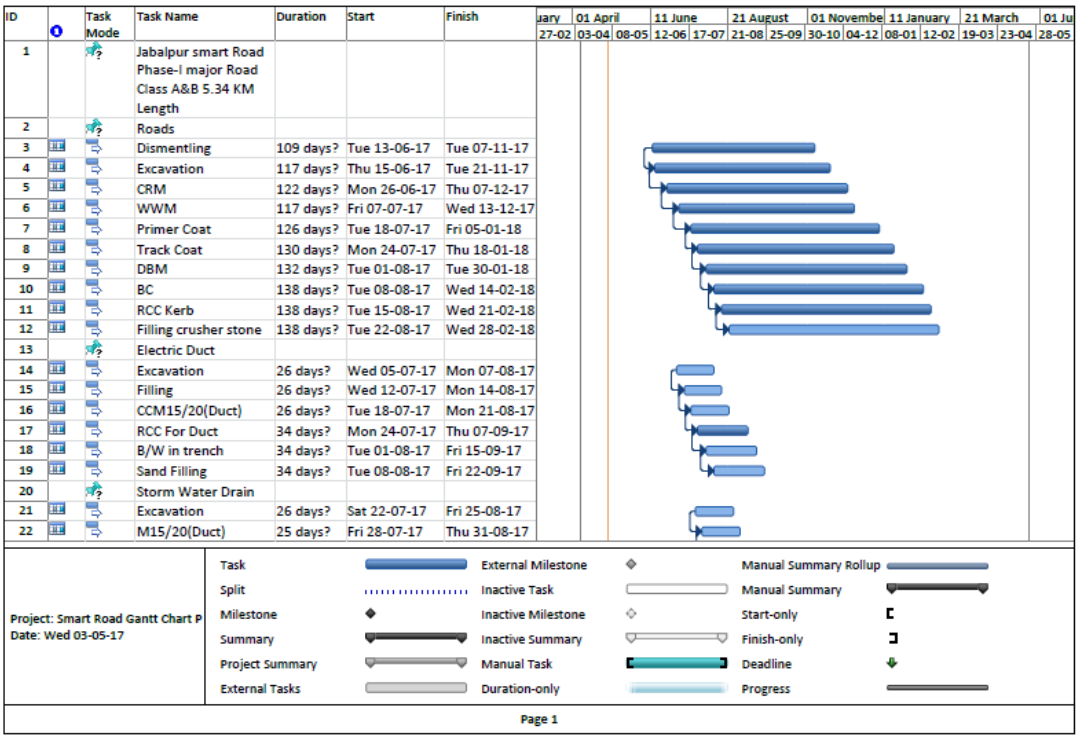
Drawings

NOTE:- PLEASE FIND THE DRAWINGS IN THE ANNEXURE-1A.

ANNEXURE—O

(See clause 15 of Section 3 -GCC)

Details of Milestones

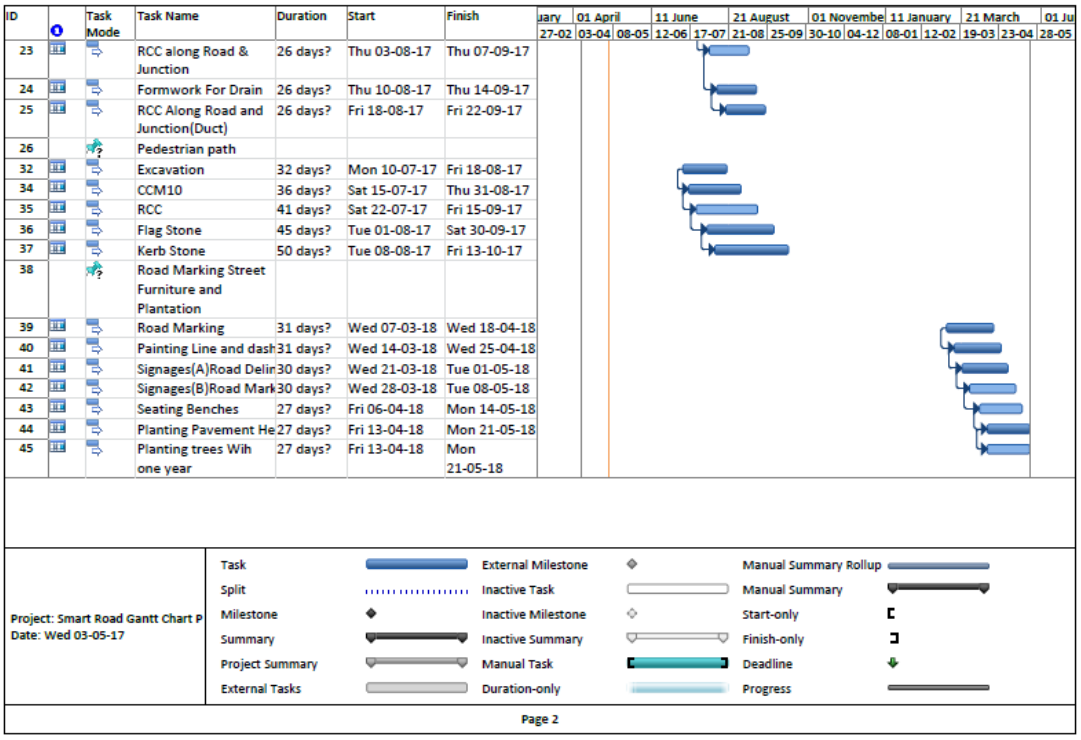


ID	Task Mode	Task Name	Duration	Start	Finish
1		Jabalpur smart Road Phase-I major Road Class A&B 5.34 KM Length			
2		Roads			
3		Dismentling	109 days?	Tue 13-06-17	Tue 07-11-17
4		Excavation	117 days?	Thu 15-06-17	Tue 21-11-17
5		CRM	122 days?	Mon 26-06-17	Thu 07-12-17
6		WWM	117 days?	Fri 07-07-17	Wed 13-12-17
7		Primer Coat	126 days?	Tue 18-07-17	Fri 05-01-18
8		Track Coat	130 days?	Mon 24-07-17	Thu 18-01-18
9		DBM	132 days?	Tue 01-08-17	Tue 30-01-18
10		BC	138 days?	Tue 08-08-17	Wed 14-02-18
11		RCC Kerb	138 days?	Tue 15-08-17	Wed 21-02-18
12		Filling crusher stone	138 days?	Tue 22-08-17	Wed 28-02-18
13		Electric Duct			
14		Excavation	26 days?	Wed 05-07-17	Mon 07-08-17
15		Filling	26 days?	Wed 12-07-17	Mon 14-08-17
16		CCM15/20(Duct)	26 days?	Tue 18-07-17	Mon 21-08-17
17		RCC For Duct	34 days?	Mon 24-07-17	Thu 07-09-17
18		B/W in trench	34 days?	Tue 01-08-17	Fri 15-09-17
19		Sand Filling	34 days?	Tue 08-08-17	Fri 22-09-17
20		Storm Water Drain			
21		Excavation	26 days?	Sat 22-07-17	Fri 25-08-17
22		M15/20(Duct)	25 days?	Fri 28-07-17	Thu 31-08-17

Project: Smart Road Gantt Chart P
Date: Wed 03-05-17

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

Page 1



ID	Task Mode	Task Name	Duration	Start	Finish
23		RCC along Road & Junction	26 days?	Thu 03-08-17	Thu 07-09-17
24		Formwork For Drain	26 days?	Thu 10-08-17	Thu 14-09-17
25		RCC Along Road and Junction(Duct)	26 days?	Fri 18-08-17	Fri 22-09-17
26		Pedestrian path			
32		Excavation	32 days?	Mon 10-07-17	Fri 18-08-17
34		CCM10	36 days?	Sat 15-07-17	Thu 31-08-17
35		RCC	41 days?	Sat 22-07-17	Fri 15-09-17
36		Flag Stone	45 days?	Tue 01-08-17	Sat 30-09-17
37		Kerb Stone	50 days?	Tue 08-08-17	Fri 13-10-17
38		Road Marking Street Furniture and Plantation			
39		Road Marking	31 days?	Wed 07-03-18	Wed 18-04-18
40		Painting Line and dash	31 days?	Wed 14-03-18	Wed 25-04-18
41		Signages(A)Road Delin	30 days?	Wed 21-03-18	Tue 01-05-18
42		Signages(B)Road Mark	30 days?	Wed 28-03-18	Tue 08-05-18
43		Seating Benches	27 days?	Fri 06-04-18	Mon 14-05-18
44		Planting Pavement He	27 days?	Fri 13-04-18	Mon 21-05-18
45		Planting trees Wih one year	27 days?	Fri 13-04-18	Mon 21-05-18

Project: Smart Road Gantt Chart P
Date: Wed 03-05-17

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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ANNEXURE—P
(See clause 15 of Section 3-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.

Note: *For arriving at the dates of completion of time span related to different milestones, delays which are not attributable to the Contractor shall be considered. The slippage on any milestone is if made good in subsequent milestones or at the time of stipulated period of completion, the amount retained as above shall be refunded. In case the work is not completed within the stipulated period of completion along with all such extensions which are granted to the Contractor for either Employer's default or Force Majeure, the compensation shall be levied on the contractor at the rate of 0.05% per day of delay limited to a maximum of 10% of contract price. The decision of Superintending Engineer shall be final and binding upon both the parties.*

Annexure – Q

(See clause 17 of Section 3 GCC)

List of Equipment for Quality Control Lab

ANNEXURE - R

(See clause 31 of Section 3 -GCC)

PRICE ADJUSTMENT

The formulas for adjustment of price are as follow:

R = Value of work as defined in Clause 31.2(3) of General Conditions of Contract

Weightages* of component in the work

S.No.	Component	Percentage of Component in the work
1.	Cement -P_c	
2.	Steel -P_s	
3.	Bitumen –P_b	
4.	POL P_f	

* Weightages of various components of the work shall be as determined by the competent Technical authority.

Adjustment for cement component

(ii) Price adjustment for increase or decrease in the cost of cement procured by the contractor shall be paid in accordance with the following formula:

V_c= 0.85 x P_c/100 x R x (C_1-C_0)/C_0

V_c= increase or decrease in the cost of work during the month under Consideration due to changes in rates for cement.

C_0= The all India wholesale price index for Grey cement on the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi (www.eaindustry.nic.in)

C_1= The all India average wholesale price Index for grey cement for the month under consideration as published by Ministry Government of India, New Delhi. (www. eaindustry.nic.in)

P_c= Percentage of cement component of the work

Note: For the application of this clause, index of Grey Cement has been chosen to represent Cement group.

Adjustment of steel component

(iii) Price adjustment for increase or decrease in the cost of steel procured by the Contractor shall be paid in accordance with the following formula:

V_s 0.85 x P_s x /100 x R x (S_1-S_o)/S_o

V_s= Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel.

S_o = The all India wholesale price index for steel (Bars and Rods) on the date of opening of Bids as published by the Ministry of Industrial Development, Government of India, New Delhi (www.eaindustry.nic.in)

S_i= the all India average wholesale price index for steel (Bars and Rods) for the month under consideration as published by Ministry of Industrial Development, New Delhi (www.eaindustry.nic.in)

P_s= Percentage of steel component of the Work.

Note : *For the application of this clause, index of Bars and Rods has been chosen to represent steel group.*

Adjustment bitumen component

(iv) Price adjustment for increase or decrease is the cost of bitumen shall be paid in accordance with the following formula:

V_b= $0.85xP_b/100xRx(B_I-B_0/B_o$

V_b= Increase or decrease the cost of work during the month under consideration due to changes in rates for bitumen.

B_0= The official retail price of bitumen at the IOC depot at nearest center on the date of opening of Bids.

B_i = The official retail price of bitumen of IOC depot at nearest center for the 15^{th} day of the month under consideration.

P_b = Percentage of bitumen component of the work.

Adjustment of POL (fuel and lubricant) component

(V) Price adjustment for increase or decrease in cost of POL (fuel and lubricant) shall be paid in accordance with the following formula:

V_f = $0.85x\ P_f/100xRx(F_i—F_o)/F_o$

V_f= Increase or decrease in the cost of work during the month under consideration due to changes in rates for fuel and lubricant.

F_0= the official retail price of High speed Diesel (HSD) a the existing consumer pumps of IOC at nearest center on the date of opening of Bids.

f_i = The official retail priee of HSD at the existing consumer pumps of IOC at nearest center for the 15th day of month of the under consideration.

P_f= Percentage of fuel and lubricants component of the work.

Note: For the application of this douse, the price of High Speed Diesel has been chosen to represent fuel and lubricants group.

Annexure - S

(See clause 32 of Section 3-GCC)

Bank Guarantee Form for Mobilization and Construction Machinery Advance

To

_____[name of Employer)
_____[address of Employer]
_____[name of Contractor)

In accordance with the provisions of the General Conditions of Contract, clause 31 ("Mobilization and Construction Machinery Advance") of the above-mentioned Contract _____[name and address of Contractor] (hereinafter called "the Contractor")' shall deposit with _____ [name of Employer) a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____[amount of Guarantee]* _____[in words].

We, the _____(bank of financial institution], as instructed by the Contractor., agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to _____(name of Employer] on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding '[amount of guarantee]* _____[in words].

We further agree that no change or addition to or other modification of the terms of the Contractor or Works to be performed thereunder or of any of the Contract documents which may be made between _____[name of Employer] 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 remain valid and in full effect from the date of the advance payment under the contract until _____ [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and Seal:_____
Name of Bank/Financial Institution: _____
Address: _____
Date: _____

* An amount shall be inserted by the Bank or Financial Institution representing the amount of the Advance Payment and denominated in Indian Rupees.

Annexure - T

(See clause 33 of Section 3 -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 here after 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

Executive Engineer/Engineer-in-charge

.....

.....

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).

Agreemented 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

Executive Engineer

.....

.....

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.

I) **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 of employment of children 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, Traveling 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. 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 1910 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.
2. The contractor shall make his own arrangements for supply of water and electricity at his expense required for execution of work. The JSCL shall neither make any such arrangements nor shall make any payments in this regard.
3. 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 JSCL. The JSCL shall not provide any place or room in the building under construction for storage of equipment's required for work. No amount shall be paid to the contractor in this regard.
4. 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 JSCL shall recover the amount paid through the running bills to the contractor and shall only be reimbursed after the replacement of the same. The JSCL 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.

5. Time being the essence of the contract, the contractor shall before drawl of agreement prepares a detail time bound work execution program which shall be approved by Engineer in charge. The contractor has to execute the work in strict accordance to the time bound execution program submitted by him, mutually agreed, approved.
6. Time schedule can be revised by the JSCL for any unforeseen unavoidable reasons whatsoever. It may be necessary to stop the work at certain place due to some unavoidable reasons and restart the work at later date. Such contingencies shall not vitiate the contract and shall not be considered a ground for extra claim for any reason whatsoever. However time extension shall be allowed only for such days for which the work was stopped by JSCL.
7. 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 JSCL shall not be liable for any claim in respect thereof.
8. The contractor shall finalize the layout of work, physically at site, and get approved by MPPKVV Co. Ltd. Jabalpur Before placing orders for material. Approval of above layout by

MPPKVV Co. Ltd. Jabalpur shall be general and shall not absolve the contractor with responsibility of its correctness.

9. 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.

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

11. The contractor shall submit the drawing in three sets to JSCL for this work duly approved by the Office of the electrical Inspector MP govt. and MPPKVVCo. Ltd. Jabalpur 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.

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

13. (A) The contractor shall have to arrange all free of cost facilities for the inspection, such as employ or material labor 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 JSCL and no claim for compensation shall be entertained in this regard .Copy of all such sanctions has to be submitted to Engineer In charge JSCL.

(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 JSCL. If required by the Engineer-in-Charge or concerned office of MPPKVV Co. Ltd. or 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. Jabalpur etc. at his own cost. He shall also provide free of cost all labor, material, equipment's 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 JSCL 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 JSCL officials for factory inspections of material if required.

14. 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.

15. 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.

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

17. 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.

18.**The complete installation shall be guaranteed for sixty calendar months after physical completion of work. During this period the contractor will have to maintain & operate entire system at his own cost by employing his manpower and required material without any extra cost to JSCL. The guarantee &maintenance period shall be reckoned from the date of charging and handing over the installation to MPPKVV Co. Ltd (physical completion). The date of handing over the installation to MPPKVV Co. Ltd. by contractor shall be the date of completion of physical work. All Compact type Packaged substations, Transformers, RMUs, VCBs, capacitor banks, feeder pillars, switches, fuses, CTs, PTs, cables, conductors, poles, earthing, lighting fixtures, etc. shall be guaranteed for 60 calendar months from the date of handing over the installation to MPPKVV Co. Ltd (physical completion). The contractor has to replace / repair the faulty or damaged material to the full satisfaction of JSCL/ MPPKVV Co. Ltd. in the event of failure / damage of any item during the said guarantee period.**

19. The contractor has to quote his rates for items 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.

20. The contractor shall note that during the execution of works there is likelihood in charge 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 been entitled to any compensation for any loss suffered by him on account or procurement of additional quantities of such items due to such changes.

21. Time schedule may be revised by the JSCL from time to time keeping in view of the approval of drawings or items or for any reasons whatsoever. It may be necessary to stop the work at certain places due to some unavoidable reasons and restart the work at later date. Such contingencies shall not vitiate the contract and shall not be considered a ground for extra claim.

22. The contractor shall not be entitled to many 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 JSCL shall not be liable for any claim in respect thereof.

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

24. **Performance security will be 5% of the contract value. The successful bidder shall bound to submit Performance Security in the form of FDR format scheduled bank or a bank guarantee of 5% of contract value at the time of agreement & in addition to this 5% will be deducted from bills as security deposit. This Performance Security (5%) and security deposit (5%), that is total 10% shall be released after satisfactory completion of the contract after the maintenance period.**

SECTION 4

BILL OF QUANTITIES (BOQ)

NOTE:- PLEASE FIND ATTACHED ANNEXURE-1B FOR DETAILED BOQ(BILL OF QUANTITY).

SECTION 5
AGREEMENT FORM
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 meaning as are respectively assigned to them in the conditions of contract hereinafter referred to and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein Contract Price or such other Sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be ready and construed as part of this Agreement viz.
   - i. Letter of Acceptance
   - ii. Contractor's Bid
   - iii. Condition of Contract: General and Special -
   - iv. Contract Data
   - v. - Bid Data
   - vi. Drawings
   - vii. Bill of Quantities and
   - viii. Any other documents listed in the Contract Data as forming part of the Contract.

In witnessed whereof the parties there to have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____ was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____ in the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____

ANNEXURE 1 A

List of Drawings

S. No.	Drawing No	Drawing
1.	Drawing No 1 & 2	Typical Cross Section Teen Patti to Goumata Chowk & Satkar Hotel to Home Science College road
2.	Drawing No 3	Typical Cross Section of Road from Bloom Chowk to Madan Mahal Police Station
3.	Drawing No 4	Typical Cross Section of Road from Madan Mahal Police Station to Ranital Junction
4.	Drawing No 5	Typical Cross Section of Road from Ranital Junction to Baldeobagh junction
5.	Drawing No 6	Typical Cross Section of Road from Yatayat Tiraha to Pranjape Chowk (Hanuman Mandir)
6.	Drawing No 7	Drawing of Electrical Duct
7.	Drawing No 8	Drawing of Drains
8.	Drawing No 9	Drawing of Table top

ANNEXURE 1 B

List of Bill of Quantities

S. No.	BoQ
1.	Abstract
2.	BoQ Teen Patti to Goumata Chowk & Satkar Hotel to Home Science College road
3.	BoQ Bloom Chowk to Madan Mahal Police Station
4.	BoQ of Road from Madan Mahal Police Station to Ranital Junction
5.	BoQ of Road from Ranital Junction to Baldeobagh junction
6.	BoQ of Road from Yatayat Tiraha to Pranjape Chowk (Hanuman Mandir)