National Highways & Infrastructure Development Corporation Limited

NHIDCL

BUILDING INFRASTRUCTURE - BUILDING THE NATION

Ministry of Road Transport & Highways,
(Govt. of India)

National Competitive Bid
(Through CPP Portal, E-Tendering Mode)

For

"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh"

APRIL, 2021

National Highways & Infrastructure Development Corporation Ltd
3rd floor, PTI Building, 4-Parliament Street,
New Delhi – 110001

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SECTION-I

NOTICE INVITING BID
(E-TENDERING MODE ONLY)

राष्ट्रीयराजमार्गएवंअवसंरचनाविकासनिगमलिमिटेड

National Highways & Infrastructure Development Corporation Limited

MINISTRY OF ROAD TRANSPORT & HIGHWAYS,
GOVT. OF INDIA

Notice Inviting Bid

(Online e-tender through Central Public Procurement Portal)

No:NHIDCL/Infra/Ladakh/H&P/2021-22/192 **Date: 30.04.2021**

RFP No.: 09/RO-Ladakh/2021-22

RFP for the work of **"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh".**

The Ministry of Road Transport & Highways through National Highways & Infrastructure Development Corporation Limited (NHIDCL) is engaged inthedevelopmentofNationalHighwaysandInfrastructure works. Aspartofthisendeavor,ithasbeendecided to undertake **"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh"**

The National Highways & Infrastructure Development Corporation Limited representedbyitsManaging Directornow invites bids **on EPC mode (Engineering , Procurement, Construction)**from eligible contractors for the following project:

State/UT	Description of the work	Estimated Cost excluding GST (Rs)	Completion period	Defect Liability Period
Ladakh	**"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh"**	4,54,66,000/-	12 months	One year

The complete BID document can be viewed / downloaded from official portal of theCPPP website https://eprocure.gov.in/eprocure/app from 30/04/2021 to 21/05/2021 (upto 1100 hrs IST). Bidder must submit its Financial bid and Technical Bid at https:// eprocure.gov.in/eprocure/app on or before 21/05/2021 (up to 1100 hrs IST)

Bid through any other mode shall not be entertained. However, Bid Security Declaration, Document fee, Power of Attorney etc. shall be submitted physically by the Bidder on or before the date mentioned in appendix to ITB.Please note that the NHIDCL reserves the right to accept or reject all or any of the BIDs without assigning any reasonwhatsoever.

(Bipin Kumar Chand)
Executive Director (P)
NHIDCL RO-LADAKH,Yartsa House
nearChangspa ,Leh
UT of Ladakh194101
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(SECTION-II)

INSTRUCTION TO BIDDERS& APPENDIX TO BID

Table of Clauses

Section -II

Instructions to Bidders (ITB)

A. General

1. Scope of Bid

1.1 The Executing Agency (as defined in the Appendix to ITB) invites bids for "as described in these documents and referred to as "the works". The name and identification number of the works is provided in the Appendix to ITB.

1.2 The successful Bidder will be expected to complete the Works by the intended Completion Date specified in the Contract Data (Part I General Conditions of Contract).

1.3 Throughout these bidding documents, the terms "bid" and "tender" and their derivatives (bidder/tenderer, bid/tender, bidding/tendering, etc.) are synonymous.

2. Source of Funds

2.1 The expenditure on this project will be provided by Government of UT of Ladakh to the National Highways & Infrastructure Development Corporation Limited (NHIDCL).

3. Eligible Bidders

3.1 This Invitation for Bids is open to all bidders as defined in the Appendix to ITB.

3.2 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

4. Qualification of the Bidder

4.1 The bid is open to person/entity from India only and entity/firm/company having any share of the person resident outside India or is controlled by persons resident outside India, is not eligible for the bid.

4.2 All bidders shall include the following information and documents with their bids in Section-3, Qualification Information unless otherwise stated in the Appendix to ITB:

a) Scanned copy of original documents defining the constitution or legal status, ownership details, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;
b) Total monetary value of civil Engineering construction works performed for each of the last three years;
c) Scanned copy of Experience certificate in works of a similar nature and size for each of the last Five years with certificates from the concerned officer of the minimum rank of Executive Engineer-in-Charge or equivalent;
d) Scanned copy of certificate from Charted Accountant as a proof of turnover for the past three years; (as per format enclosed Annexure-B)

e) Scanned copy of certificate from Charted Accountant as a proof of Net Worth for thelatest audited financial year;(as per format enclosed Annexure-A)
f) Scanned copy of Information regarding any litigation or arbitration during the last five years in which the Bidder is involved, the parties concerned, the disputed amount, and the matter;
g) Scanned copy of the affidavit on the Stamp Paper, duly attested from the Notary Public, that the information furnished with the bid documents is correct in all respects.
h) Scanned copy of Undertakings as mentioned in Section III Cl.2.
i) Any other information/documents required to be completed and submitted by bidders, as specified in the Appendix to ITB & Section III, and to be uploaded by bidder on e-tender portal
j) Scanned copy of proof of payment for cost of tender documents
k) Scanned copy of Bid Security Declaration
l) A detail Technical proposal of the said project which includes the following detail :
   - Detailed structural design and drawings of work.
   - Structural form, materials and structural principles.
   - Methodology of work.
   - Details of various components such as water supply, sanitary system including Sewage Disposal System
   - Flooring, finishings, elevation items like local traditional shintang/bay window etc. ,Electrical layout including panel room,DG set etc, interior fit-outs likeglazed partitions and doors of retail shops,rolling shutters, doors, windows, passage and staircase railings, false ceiling in passages and at ceiling of double height atrium , retractable roofing system on terrace , bio-digestor water-proofing system and other components used in the construction work, type of foundation proposed etc.

4.3 a)Bids from joint venture (JV) are allowed. Maximum numbers of JV partners permitted are 03 (three). Lead Partner to qualify 40% of criteria as per clause 4.4 (a) and clause 4.6 and each JV partner to qualify 20% of criteria as per clause 4.4 (a) and clause 4.6. Jointly the JV must qualify 100% of all criteria.

b) **The bidder including individual or any of its JV member, who are either having 2 (two) on-going EPC Project(s) in NHIDCL or on-going Project(s) worth of ₹ 500 Crore (Awarded Cost) or more in NHIDCL, as on date of financial bid opening, shall not be eligible to bid for this Project (Issuance of LOA will be considered as on-going project).**

4.4 **To qualify for award of the contract, each bidder in its name should have the following; -**

a) achieved an averageannual financial turnover (in all classes of civil Engineering construction/fabrication works only) equivalent to 20% of estimated cost mentioned in NIB during last three year ending 31st March of the previous financial yearsduly certified by Chartered Accountant and shall have a minimum Net Worth of 5% (five percent) of the Estimated Cost at the close of the preceding financial year

b) Satisfactorily completed (not less than 90% of contract value), as a prime contractor (or as a nominated subcontractor duly approved by Executing Agency, provided further that all other qualification criteria are satisfied) similar works during last **Five** years ending last day of month previous to the one in which bids are invited should be either of the following:

i. One similar completed work** costing not less than amount equals to**80% of estimated costput to tender.**

or

ii. Two similar completed works** costing not less than amount equals to **60% of estimated costput to tender**.

or

iii. Three similar completed works** costing not less than amount equals to **40% of estimated cost put to tender**.

(**The "similar work" means Construction of RCC buildings or any other RCC infrastructure work)

(Escalation factor as specified in the appendix to ITB shall be used to bring the value of such completed works at the level of financial year i.e.**2021-22)**

Year	Multiplying Factor
One (1) (2020-21)	1.00
Two(2) (2019-20)	1.05
Three(3) (2018-19)	1.10
Four(4) (2017-18)	1.15
Five(5) (2016-17)	1.20

4.5 Each bidder must produce:

(i) An affidavit on a Stamp Paper, duly attested from the Notary Public, that the information furnished with the bid documents is correct in all respects; and

(ii) Such other certificates as defined in the Appendix to ITB.

(iii)Failure to submit the certificates/documents as specified above or in Appendix to ITB shall make the bid **non-responsive.**

4.6 Bidder who meets the minimum qualification criteria will be qualified only if their available bid capacity is equal to the total estimated cost as mentioned in NIB. The available bid capacity will be calculated as under:

Assessed available Bid capacity = (A*2.5-B)

Where

A= Maximum value of civil Engineering works executed in any one year during the last **Five** years (updated to the price level of the year indicated in Appendix) taking into account the competed as well as works in progress**.**

B= Value (updated to the price level of the year indicated in table below under note) of existing commitments, works **for which Appointed Date/Commencement Date has been declared or on-going works** to be completed during the period of completion of the works for which bid is invited. For the Sake of clarification, it is mentioned that works for which LOA has been issued but Appointed Date/Commencement Date not declared as on Bid Due Date shall not be considered while calculating value of B.

***Note**: The Statement showing the value of all existing commitments, works **for which Appointed Date/Commencement Date has been declared or on-going works**as well as the stipulated period of completion remaining for each of the works listed should certified from the bidder. For any wrong certificate the bidders shall be debarred for a period of 2 years. The factors for updation of the value of civil Engineering works to the price level of the year are indicated as under:*

Year	Year-1	Year-2	Year-3	Year-4	Year-5
Updation factor	1.00	1.05	1.10	1.15	1.20

4.7 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

(i) made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/or

(ii) Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc. or debarring by Government agencies.

(iii) Tampered the bid document in any manner.

5. One Bid per Bidder

5.1 Each Bidder shall submit only one Bid for the work. A Bidder who submits more than one Bid will cause the proposals with the Bidder's participation to be **disqualified.**

6. Cost of Bidding

6.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Executing Agency will, in no case, be responsible or liable for those costs.

7. Site Visit and Site Location

7.1 The Bidder, at his own cost, responsibility and risk, is encouraged to visit, examine and familiarise himself with the Site of Works and its surroundings including source of earth, water, road aggregates etc. and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense. He may contact the person whose contact details are given in the Appendix to ITB.

7.2 The work includes construction of following buildings/structures:

Construction of shopping complex building near Polo ground,Leh in UT of Ladakh including Electrical, PHE, Fire Fighting, and other services complete as per tender drawings, finishes matrix ,Schedule of Quantities, approved construction drawings, specifications.

B. Bidding Documents

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10:

Volume- I:-

i. Notice Inviting Tender
ii. Instructions to Bidders & Appendix to Bid
iii. Qualification Information
iv. Forms of Bank Guarantee, Agreement & LOA
v. Conditions of Contract & Contract Data
vi. Scope of work ,Technical specifications and Particular Specifications
vii. List of Approved Makes of Materials
viii. Tender Drawings
ix. Schedule of Quantities
x. Special Conditions of Contract
xi. Particular Specifications
xii. Finishes Matrix
xiii. Integrity Pact
xiv. Sample Guarantee Bond

Volume - II:-

Bill of Quantities

8.2 The bidder is expected to examine the Schedule of Quantities enclosed with bid document, tender drawings, Technical and Particular specifications, Finishes Matrix ,contract conditions ,particular specifications and special conditions of contract and access the site locations and include all transportation and miscellaneous cost while quoting the bid. The Schedule of quantities enclosed is indicative and it is the responsibility of the bidders to work out all quantities and their costs involved in the project and quote for the bid.

As the contract is on EPC mode , the selected contractor is required to deliver the project as per approved drawings in all respects and nothing extra shall be payable beyond the quoted amount.

8.3 The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, and specifications, Schedule of quantities, forms and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. Pursuant to clause 26 hereof, bids, which are not substantially responsive to the requirements of the Bid Documents, shall be **rejected.**

9. Clarification of Bidding Documents

9.1 A prospective Bidder requiring any clarification on the bid document may notify the Executing Agency in writing or by e-mail (scanned copy) at the Executing Agency's address indicated in the Notice Inviting Tender. The Executing Agency will respond

to any request for clarification received earlier than 7 days prior to the deadline for submission of bids. Copies of the Executing Agency's response will be hosted on website or which are required in the opinion of the Executing Agency including a description of the enquiry, but without identifying its source.

10. Amendment of Bidding Documents

10.1 Before the deadline for submission of bids, the Executing Agency may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents and shall be hosted on the NHIDCL website/e-procurement portal only.

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Executing Agency shall extend, as necessary, the deadline for submission of bids, in accordance with Clause 20.2.

C. Preparation of Bids

11. Language of Bid

11.1 All documents relating to the Bid shall be in the language specified in the Appendix to ITB.

12. Documents Comprising the Bid

12.1 The e-bid submitted by the bidder shall be in two separate parts. Part-I This shall be named Technical Bid and shall comprise of information submitted online as per Cl. 4.2 in Sec-II. Part-II It shall be named Financial Bid and shall comprise of (i) Priced bill of quantities.

12.2 **Documents comprising Technical and Financial BID**

The Bidder shall first upload all the project details, net worth details, turnover details and all other details required in this RFP for technical qualification. The Bidder shall ensure that all the details are updated as on the due date of submission of this bid.
The Bidder shall then apply for the RFP on the CPPP website https:// eprocure.gov.in/eprocure/app by submitting the documents mentioned below along with the supporting documents which shall comprise of the Technical BID on the CPPP portal :

Technical Bid

(a) Power of Attorney of the signatory of the bidder to commit BID;

(b) Copy of online receipt towards payment of Bid Security Declaration;

(c) Copy of online receipt towards payment of cost of Bid document of required amount;

(d) Affidavit duly notarized and undertakings as per Section III;

(e) Annual financial turnover (in all classes of civil Engineering construction & fabrication works only) during last three years ending 31st March of the previous financial year duly certified by Chartered Accountant. (as per Format Annexure-B);

(f) Net worth certificate duly certified by Chartered Accountant. (as per Format Annexure-A);

(g) Scanned copy of Experience certificate in works of a similar nature and size for each of the last Five years with certificates from the concerned officer of the minimum rank of Executive Engineer-in-Charge or equivalent;

(h) Scanned copy of Information regarding any litigation or arbitration during the last five years in which the Bidder is involved, the parties concerned, the disputed amount, and the matter;

(i) A detailed Technical proposal of the project as specified in RFP.

Financial Bid

(g) To be submitted online on GoI e-tendering portal (https://eprocure.gov.in/cppp) on or before Schedule time given in Data Sheet.

12.2.2 The Bidder shall submit the following documents physically by date and time given in Appendix to ITB:

(a) Original Power of Attorney of the signatory of the bidder to commit BID;

(b)Copy of online receipt towards payment of Bid Security Declaration;

(c) Copy of online receipt towards payment of cost of Bid document of required amount;

(d) Original Affidavit duly notarized and undertakings as per Section III;

(e) Annual financial turnover (in all classes of civil Engineering construction and fabrication works only) during last three years ending 31st March of the previous financial year duly certified by Chartered Accountant. (as per Format Annexure-B);

(f) Net worth certificate duly certified by Chartered Accountant. (as per Format Annexure-A);

(g) Scanned copy of Experience certificate in works of a similar nature and size for each of the last Five years with certificates from the concerned officer of the minimum rank of Executive Engineer-in-Charge or equivalent;

(h) Scanned copy of Information regarding any litigation or arbitration during the last five years in which the Bidder is involved, the parties concerned, the disputed amount, and the matter;

(i) A detailed Technical proposal of the project as specified in the RFP.

12.2.3 The documents listed at clause 12.2.2 shall be placed in an envelope, which shall be sealed. The envelope shall clearly bear the identification "BID for (Name of the Project)" and shall clearly indicate the name and address of the Bidder. In addition, the BID Due Date should be indicated on the right hand top corner of the envelope.

12.2.4 The envelope shall be addressed to the officer designated whose Name and Address is given in the Bid document.

12.2.5 If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the BID submitted and consequent losses, if any, suffered by the Bidder.

12.2.6 BIDs submitted by fax, telex, telegram or e-mail shall not be entertained and shall be summarily rejected.

12.3 The following documents, which are not submitted with the bid, will be deemed to be part of the bid.

Section	Particulars
1	Notice Inviting Bid
2	Instruction to the bidders
3	Conditions of Contract
4	Contract Data
5	Scope of work, Technical Specification
6	List of Approved Makes of Materials
7	Tender Drawings
8	Schedule of Quantities
9	Special Conditions of Contract
10	Special Conditions of Contract
11	Particular Specifications
12	Finishes Matrix
13	Integrity Pact
14	Sample Guarantee Bond

13. Bid Prices

13.1 The Contract shall be on EPC mode and the quoted bid price(exclusive of GST) includes complete work as per approved drawings submitted by the Contractor for the whole Works, as described in Clause 1.1 based on the priced Bill of Quantities submitted by the Bidder.

13.2 **The bidder shall quote bid prices on appropriate format enclosed as part of tender document on https:// eprocure.gov.in/eprocure/app.**

13.3 The bidder is required to quote the amount excluding GST. GST at the existing rate & applicable laws will be paid to the contractoralongwitheachbill, however, the contractor has to submit the proof of GST paymentfor the specific work to government before next bill. In case, of non submission of GST proof, the same will be recovered in the next bill.

13.4 Based on the amount quoted, the rates and prices shall be fixed for the duration of the Contract and shall not be subject to adjustment.

14. Currencies of Bid and Payment

14.1 The price shall be quoted by the bidder entirely in Indian Rupees. All payments shall be made in Indian Rupees.

15. Bid Validity& Bid Document Cost

15.1 Bids shall remain valid for a period of **120 days** after the deadline date for bid submission specified in Clause 20.

15.2 In exceptional circumstances, prior to expiry of the original time limit, the Executing Agency may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by e-mail. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 16 in all respects.

15.3 The Bidder isrequired to pay a non-refundable feeas mentioned in Appendix to ITBtowards cost of Bid Documentthrough RTGS/ NEFT/ other online mode to the NHIDCL's designated bank account. Detailsof designated bank account are as under:

Sr.No.	Particulars	Details
1.	Name of Beneficiary	NHIDCL ESTABLISHMENT ACCOUNT
2.	Beneficiary Bank Account No.	76513070002321
3.	Beneficiary Bank Branch Name and Address	Canara Bank (erstwhile Syndicate Bank) Leh Branch, Tsaskan Complex near LIC Office, Distt. Public library Road, Leh-194101
4.	Beneficiary Bank Branch IFSC	CNRB0017651

The Bidder must upload **Copy of the online payment receipt (UTR/ Reference No./Transaction ID)** towards payment of cost of Bid document.

15.4 Any bid not accompanied by Bid document fee/cost, shall be rejected by the Executing Agency as **non-responsive.**

16. Bid Security

16.1 **The Bidder is not required to submit the bid security in Cash/BG/NEFT/RTGS/ FDR/any other online mode.** However, the bidderhas to sign a Bid securing declaration accepting that if the bidder withdraw or modify its bid during the period of validity i.e. not less that 180 (one hundred eighty) days from the bid due date or if the bidder is awarded the contract and fail to sign the contract or to submit a performance security before the deadline defined in the request of the bid documents, the bidder will be suspended for participation in the tendering process for the works of NHIDCL and works under other Centrally Sponsored Scheme, for a period of one year from the bid due date of this work. The bid securing declaration shall be submitted as per the format mentioned in the RFP.A scanned copy of the Bid Securing Declaration shall be uploaded online while applying to the tender.

Note: Forfeiture/ Forfeit and/ or appropriation/ appropriate of bidsecurity mentioned anywhere in the RFP/Contract Agreement shall mean, "the bidder will be suspended for participation in the tendering process for the works of

NHIDCL and works under other Centrally Sponsored Schemes, for a period of one year from the bid due date of this work."

16.2 **The Bid Security will be forfeited:**

a) if the Bidder withdraws the Bid after its submission during the period of Bid validity;**or**
b) if the Bidder does not accept the correction of the bid price, pursuant to Clause 27; **or**
c) in the case of a successful Bidder, if the Bidder fails within the specified time limit to
   i. **Sign the Agreement**; and/or
   ii. **Furnish the required Performance Security;** and/or
   iii. **Submit the original documents as specified in Clause 12.2;**
   iv. **Corrupt or Fraudulent Practices as specified in Clause 35.**

17. Alternative Proposals by Bidders

17.1 Bidder shall submit offers that fully comply with the requirement of the bidding document including conditions of contract, conditional offer or alternate offer will not be considered further in the process of tender evaluationand the bid will be declared **non-responsive**.

18. Format and Signing of Bid

18.1 The Bidder shall submit e-bid comprising of the documents as described in Clause 12 of the ITB.

D. Submission of Bids

19. Marking of Bids

19.1 The documents to be submitted in Online Mode should be as per clause 12.2 of ITB

20. Schedule for Submission of Bids

20.1 Complete E-Bid to be uploaded on e-procurementportal before due date & time.

20.2 The Executing Agency may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Executing Agency and the bidders previously subject to the original deadline will then be subject to the new deadline.

20.3 The detailed schedule for submission of bid shall be, as given in Appendix to ITB.

21. Deleted

22. Modification and Withdrawal of Bids

22.1 Bidders may modify or withdraw their e-bids before the deadline prescribed in Clause20.

22.2 No bid may be modified after the deadline for submission of Bids.

22.3 Withdrawal of a Bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 15.1 above or as extended pursuant to Clause 15.2 shall result in the forfeiture of the Bid security pursuant to Clause 16.

E. Bid Opening and Evaluation

23. Bid Opening

Bid opening shall be carried out in two stages. Firstly, 'Technical Bid' of all the bids received shall be opened on the date and time mentioned in the Appendix to ITB. 'Financial Bid' of those bidders whose technical bid has been determined to be substantially responsive shall be opened on the subsequent date through online process of e-tender, which will be notified to such bidders.

23.1 The Executing Agency will open the "Technical Bid" of all the bids received within due date and time, in the presence of the bidders/bidders' representatives who choose to attend at the time, date and place specified in the **NIB**. In the event of the specified date for the submission of bids being declared a holiday for the Executing Agency, the Bids will be opened at the appointed time and location on the next working day.

23.2 In all other cases, the Bid Security Declaration, forms and validity shall be announced. Thereafter, the Executing Agency at the opening as the Executing Agency may consider appropriate, will announce the bidders' names and such other details.

23.3 TheExecuting Agency will prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Clause 23.1.

23.4

i. The bids accompanied with bid security declaration will be taken up for evaluation with respect to the Qualification Information and other information furnished in Part I of the bid pursuant to Clause 12.1.

ii. As soon as possible, the Evaluation Committee will finalize the list of responsive bidders whose financial bids are eligible for consideration.However, to assist in the examination, evaluation of technical bids, the Executing Agency may at his discretion, ask any bidder for clarification of his bid, however, no additional documents in support of clarification will be entertained.

23.5 The Executing Agency shall inform the bidders, whose technical bids are found responsive, of the date, time and place of opening of the financial bids. The bidders so informed, or their representative, may attend the meeting of opening of financial bids.

23.6 The financial bids of only the responsive bidders will be opened. The responsive bidders' names, the Bid prices, the total amount of each bid, pursuant to clause 22 and such other details as the Executing Agency may consider appropriate will be announced by the Executing Agency at the time of bid opening.

23.7 The Executing Agency shall prepare the minutes of the opening of the Financial Bids.

24. Process to be Confidential

24.1 Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any attempt by a Bidder to influence the Executing Agency's processing of bids or award decisions may result in the rejection of his Bid.

25. Clarification of Bids and Contacting the Executing Agency

25.1. To assist in the examination,evaluation, and comparison of Bids, the Executing Agencymay, at his discretion, ask any Bidder for clarification of his-Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by email, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Executing Agency in the evaluation of the Bids in accordance with Clause 27.

25.2 Subject to sub-clause 25.1, no Bidder shall contact the Executing Agency on any matter relating to his bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Executing Agency, he should do so in writing.

25.3 Any effort by the Bidder to influence the Executing Agency in the Executing Agency's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.

26. Examination of Bids and Determination of Responsiveness

26.1 During the detailed evaluation of "Technical Bids", the Executing Agency will determine whether each Bid

(a) meets the eligibility criteria defined in Clauses 3 and 4;
(b) the required documents uploaded by the bidder are in order; and
(c) is substantially responsive to the requirements of the bidding documents. During the detailed evaluation of the "Financial Bids", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications and drawings etc.

27. Correction of Errors.

27.1 Financial Bids determined to be substantially responsive will be checked by the Executing Agency for any arithmetic errors.

27.2 The amount stated in the Financial Bid will be corrected by the Executing Agency for the correction of errors and shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, the Bid will be rejected, and the Bid Security shall be forfeited in accordance with Sub-Clause 16.6(b).

28. Evaluation and Comparison of Financial Bids.

28.1 The Executing Agency will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 26.

28.2 In evaluating the bids, the Executing Agency will determine for each Bid the evaluated Bid price by adjusting the Bid price after making any correction for errors pursuant to Clause 27;

28.3 **If the Bid of the successful Bidder is seriously unbalanced** then an irrevocable and unconditional guarantee from a Bank should also be submitted in the same form given in Section-IV towards an Additional Performance Security **(the "Additional Performance Security"**) for an amount calculated as under:

a) If the Bid Price offered by the Selected Bidder is lower than 15% but upto 20% of the Estimated Project Cost, then the Additional Performance Security shall be 10% of the Bid Price offered by the selected Bidder.

b) If the Bid Price offered by the Selected Bidder is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be 20% of the Bid Price offered by the Selected Bidder.

c) This Additional Performance Security shall be treated as part of the Performance Security.

28.4 A bid, which is quoted unrealistically low and which cannot be substantiated satisfactorily by the bidder, may be rejected as non-responsive.

29. Deleted

F. Award of Contract.

30. Award Criteria.

30.1 Subject to Clause 32, the Executing Agency will award the Contract to the Bidder whose Bid has been determined:

i. To be substantially responsive to the bidding documents and who has offered the lowest evaluated Bid price.

31. Executing Agency's Right to accept any Bid and to reject any or all Bids

31.1 Notwithstanding Clause 30, the Executing Agency reserves the right to accept or reject any Bid, and to cancel the bidding process and reject all bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Executing Agency's action.

32. Notification of Award and Signing of Agreement.

32.1 The bidder who's Bid has been accepted will be notified of the award by the Executing Agency. This letter (hereinafter and in the Part I *General Conditions of Contract* called the "Letter of Acceptance") will state the sum that the Executing Agency will pay to the Contractor in consideration of the execution, completion and maintenance of the Works, by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

32.2. The notification of award will constitute the formation of the Contract.

32.3. The Agreement will incorporate all agreements between the Executing Agency and the successful Bidder. It will be signed by the Executing Agency and the successful Bidder within 7 days of receipt of valid Performance Security for full amount.

33. Performance Security.

33.1 **Within 15 (fifteen) days** after receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Executing Agency a balance Performance Security i.e. Three (**3%)percent of the Contract Price**, valid for the period of **28 days** after the expiry of defect liability period from the date of issue of certificate of completion of work plus additional security for unbalanced Bid in accordance with clause 28.3 of ITB and sign the contract. The performance Security for the work shall be as mentioned in the Appendix to ITB.

33.2 The performance security shall be either in the form of a Bank Guarantee in the name of the Executing Agency, from a Bank as per the details specified below or can be submitted by online mode directly into the NHIDCL's bank account as mentioned in **Data sheet.**Bank Guarantee shall be accepted from Public Sector Banks or Scheduled Private Sector Banks having Net Worth of Rs. 1,000/- Crores or more as per latest annual report of the bank. Authority reserves the right to add or remove any of names bank on which BG shall be accepted based on advisory from the Government/RBI. **The BGs issued by 'Foreign Banks' and 'Banks not mentioned in the list below' shall not be accepted.**

List of Public Sector Banks	List of Scheduled Private Sector Banks
1. Bank of Baroda	1. Axis Bank Ltd.
2. Bank of India	2. Bandhan Bank Ltd.
3. Bank of Maharashtra	3. CSB Bank Ltd.
4. Canara Bank	4. City Union Bank Ltd.
5. Central Bank of India	5. DCB Bank Ltd.
6. Indian Bank	6. Federal Bank Ltd.
7. Indian Overseas Bank	7. HDFC Bank Ltd.
8. Punjab National Bank	8. ICICI Bank Ltd.
9. Punjab & Sind Bank	9. Indusind Bank Ltd.
10. State Bank of India	10. IDFC First Bank Ltd.
11. UCO Bank	11. Jammu & Kashmir Bank Ltd.
12. Union Bank of India	12. Karnataka Bank Ltd.
	13. Karur Vysya Bank Ltd.
	14. Kotak Mahindra Bank Ltd.
	15. Lakshmi Vilas Bank Ltd.
	16. RBL Bank Ltd.
	17. South Indian Bank Ltd.
	18. Tamilnadu Mercantile Bank Ltd.
	19. Yes Bank Ltd.
	20. IDBI Bank Ltd.

33.3 Failure of the successful bidder to comply with the requirement of sub-clause 33.1 shall constitute sufficient ground for cancellation of the contract and forfeiture of the bid security converted into Performance Security (part) and debarment for a period of 2 years from the date of debarment.

34. Advances.

34.1 The Executing Agency will provide Mobilization Advance as provided in Part-I General Conditions of Contract.

35. Corrupt or Fraudulent Practices.

The Executing Agency will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question and will declare the firm ineligible, either indefinitely or for a stated period of time, to bid for any work with National Highways Authority of India, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for the contract, or in its execution.

For the purpose of this clause, the following terms shall have the meaning hereinafter respectively assigned to them

(a) **" Corrupt practice"** means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (For avoidance of doubt, offering of employment to, or employing, or engaging in any manner whatsoever, directly or indirectly, any official of the Authority who is or has been associated in any manner, directly or indirectly, with Bidding Process, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Authority, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process);

(b) **"Fraudulent practice"** means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process;

The Executing Agency requires the bidders/Contractors to strictly observe the laws against fraud and corruption enforced in India, namely, Prevention of Corruption Act, 1988.

Appendix to ITB

Clause No.

1.1 The Executing Agency is Executive Director(P),Regional Office, Ladakh, National Highways & Infrastructure Development Corporation Limited.

RFP No. 09/RO-Ladakh/2021-22

"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh"

1.1
3.1 Bidder may be a natural person, private entity, sole or partnership firm, company incorporated and registered in India.

4.4 (a) achieved an averageannual financial turnover (in all classes of civil Engineering constructiononly) equivalent to **20% ofthe Estimated Cost put to tender**during last three year ending 31st March of the previous financial yearduly certified by Chartered Accountant and shall have a minimum Net Worth of **5% ofthe Estimated Cost put to tender**at the close of the preceding financial year.

4.4 (b)

i. One similar completed work**costing not less than amount equals to**80% of the Estimated Cost put to tender**

OR

ii. Two similar completed works** costing not less than amount equals to **60% of the Estimated Cost put to tender**

OR

iii. Three similar completed works** costing not less than amount equals to **40% of the Estimated Cost put to tender.**

(**The "similar work" means Construction of RCC buildings or any other RCC infrastructure work)

15.3 Bid Document fee (Incl. 18% GST): **Rs.5,900/-(Rupees FiveThousand Nine Hundred only.)**

20.3 Schedule for submission of Bids

Sl. No.	Event Description	Date
1.	Invitation of RFP (NIT)	30.04.2021
2.	Last date for receiving queries through e-mail	06.05.2021 upto 1100 Hrs
3.	Pre-BID meeting through VC (Bidder may request link for VC through email)	07.05.2021 at 1500 Hrs
4.	Authority response to queries latest by	09.05.2021
5.	BID submission start date	10.05.2021
6.	BID Due Date for online submission	21.05.2021 (upto 1100 Hrs IST)
7.	Physical Submission of Bid	Before opening of Financial Bid
8.	Opening of Technical BIDs	22.05.2021 (1130 Hrs IST onwards)
9.	Declaration eligible / qualified bidders	To be intimated later
10.	Opening of Financial BID	To be intimated later
11.	Letter of Award (LOA)	To be intimated later
12.	Validity of BID	120 days from bid due date

33.1 Performance Security : Three(3%) percent of the Contract Price.

33.2 Bank Account details of NHIDCL **(only for Bid Document cost)** are given below:

Sr.No.	Particulars	Details
1	Name of Beneficiary	NHIDCL ESTABLISHMENT ACCOUNT
2	Beneficiary Bank Account No.	76513070002321
3	Beneficiary Bank Branch Name and Address	Canara Bank (erstwhile Syndicate Bank) Leh Branch, Tsaskan Complex near LIC Office, Distt. Public library Road, Leh-194101
4	Beneficiary Bank Branch IFSC	CNRB0017651

Format for CV

Photo

Format of Curriculum Vitae (CV) For Proposed Key Staff

1. Proposed Position: _____
2. Name of Staff: _____
3. Date of Birth: _____**(Please furnish proof of age)**
4. Nationality: _____
5. Educational Qualification:

(*Summarize college/university and other specialized education of staff member, giving names of schools, dates attended and degrees obtained).* ***(Please furnish proof of qualification)***
Contact Address with Phone and mobile numbers:

6. Membership of Professional Societies: _____
7. Publication:

(List of details of major technical reports/papers published in recognized national and international journals)

8. Employment Record:

(Starting with present position, list in reversed order, every employment held. List all positions held by staff member since graduation, giving dates, names of employing organization, title of positions held and location of assignments. For experience ***period of specific assignment must be clearly mentioned*****,** also give client references, where appropriate).

9. Summary of the CV

(Furnish a summary of the above CV. The information in the summary shall be precise and accurate. The information in the summary will have bearing on the evaluation of the CV).

A) Education:
i) Field of Diploma/Graduation and year
ii) Field of post-graduation and year
iii) Any other specific qualification
B) Experience:
i) Total experience : _____ Yrs
ii) Responsibilities held:

a) _____Yrs.
b) _____ Yrs.
c) _____ Yrs.
d) Relevant Experience: _____ Yrs.
C)Permanent Employment with the Firm (Yes/No):

If yes, how many years:
If no, what is the employment?
Arrangement with the firm?
Certification:

1 *I am willing to work on the project and I will be available for entire duration of the project assignment and I will not engage myself in any other assignment during the currency of this assignment on the project*
2 I, the undersigned, certify that to the best of my knowledge and belief, this

bio-data correctly describes myself my qualification and my experience.

Signature of the Candidate _____

Place _____
Date _____

Signature of the Authorized Representative of the firm_____
Place _____
Date _____

Note: Each page of the CV shall be signed in ink by both the staff member and the Authorized Representative of the firm.

(SECTION –III)

QUALIFICATION INFORMATION

The information to be filled in by the Bidder in this section on E-portal &**Scanned Copies of documents to be submitted online** will be used for the purposes of post qualification as provided for in Clause 4 of the Instructions to Bidders.

1. For Individual Bidders

1.1 Constitution or legal status of Bidder

[Upload scanned copy of Original]

Details of Ownership _____

Place of registration: _____

Principal place of business: _____

1.2 Power of attorney of signatory of Bid
[Upload scanned copy & also submit Original copy in physical form]

1.3 Total value of Civil Engineering construction work performed in the last three years (in Rs. Lakh) Refer ITB Clause 4.5 A(a)
(Upload scanned copies of Turnover certificates from Chartered Accountant & also submit original certificate from Chartered Accountant)

2018-2019----------
2019-2020----------
2020-2021----------

Total ----------
Average per year ----------

1.4 **(a)**Work performed as prime contractor, work performed in the past as a nominated sub- contractor duly approved by Executing Agency will also be considered, provided further that all other qualification criteria are satisfied (in the same name) on works of a similar nature during the last **Five** years to qualify as per ITB.

Project Name	Name of the Executing Agency*	Description of work	Contract No.	Value of Contract (Rs. Crore)	Date of issue of work order	Stipulated period of completion	Actual date of completion *	Remarks explaining reasons for delay & work Completed

** Attach certificate(s) from the minimum rank of Executive Engineer-in-Charge or equivalent*

Note: In case of nominated sub-contractor – a certificate from the minimum rank of Executive Engineer-in-Charge or equivalent of the Prime Executing Agency should be obtained from whom an approval for subcontractor has been obtained.

(b) Information on Bid Capacity (works for which bids have been submitted and accepted and works which are yet to be completed) as on the date 7 days before the last date for bid submission (as per Cl 4.6 of the ITB).

(i) Existing commitments and on-going works (B)

Description of works	Place & State	Contract No.	Name & Address of Executing Agency	Value of Contract (Rs. Cr)	Stipulated Period of Completion	Value of works remaining to be completed in the next N years (Rs Cr)	Escalation factor	Anticipated date of completion	Escalated value of remaining work during completion period of work for which bids are invited
1	2	3	4	5	6	7	8	9	10

ii) Details of works for which bid submitted and accepted (i.e. where contract signing is pending)

Description of works	Place & State	Name & Address of Executing Agency	Date of issue of Latter of Acceptance (LOA)	Value given in LOA	Stipulated period for completion	Value of work during completion period of work for which bids are invited
1	2	3	4	5	6	7

Upload copy of LOA

iii) Bid capacity (Bidder shall calculate, mention his bid capacity and enclose the supporting calculation)
A = Rs _____ Lakh (enclose the details)
B = Rs…_____Lakh (enclose the details)
Assessed Available Bid capacity = (A* 2.5 – B)

1.5. The bidder must provide information regarding Availability of Key Equipment essential for carrying out the Works.

Item of Equipment	**Requirement**	**Availability Proposals**			**Page no. of the proof attached**
		Owned/Leased/rented	**Nos./Capacity**	**Age/Condition**	
Tipper/Trucks					

Hydraulic Excavator					
Batch Mix Plant					
Concrete Mixer					
Water Tanker					
Transit Mixer					
Vibrators					
Concrete Pump					
Crane/Hydra					
Any Other Equipment/ Machinery required to carry out the work					

1.6. Qualifications and Experience of Key Personnel proposed for administration and execution of the Contract. **Attach biographical data for technical personnel.**

Position	Name	Qualification	Year of Experience (General)	Years of experience in the proposed position
Etc.				

Note : The detailed and signed CV's of all the Key Technical Personnel, signed by the key personnel himself, be uploaded along with the bid as per proforma given in Appendix to ITB.

1.7. Information on litigation/ arbitration history in which the Bidder is involved.

Other Party (ies)	Executing Agency	Cause of Dispute	Amount involved	Remarks showing Present Status

2. Bidders should provide the following affidavits/ undertakings as per formats enclosed hereafter: -

(i) Affidavit (it should be on stamp paper attested by Notary)
(ii) Undertaking that the Bids shall remain valid for the period specified in Clause 15.1.

AFFIDAVIT

(To be notarized by Notary)

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

2. The undersigned also hereby certifies that neither our firm M/s_____ have abandoned any work on National Highways in India nor any contract awarded to us for such works have been rescinded, during last **Five** years prior to the date of this bid.

3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.

4. The undersigned understand and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department Project implementing agency.

_____
(Signed by an Authorized Officer of the Firm)

_____
Title of Officer

_____
Name of Firm

_____
DATE

UNDERTAKING

I, the undersigned do hereby undertake on behalf of our firm M/s [Name of the bidder],that we shall not withdraw or modify our bid during the period of validity from the bid submission date.

I, on behalf of the bidder, [Name of the bidder], also accept the fact that in case the bid is withdrawn or modified during the period of its validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in the Bid, then [Name of the bidder] will be debarred for participation in the tendering process for the works of NHIDCL and other works under other Centrally Sponsored Schemes, for a period of two year from the bid due date of this work.

_____
(Signed by an Authorized Officer of the Firm)

_____
Title of Officer

_____
Name of Firm

_____
DATE

Annexure-A

Letter Head of the Statutory Auditor
(Giving phone number, address and email address)
CERTIFICATE OF NET WORTH BY STATUTORY AUDITOR

1. This certificate is being issued on the request of ……..(Name of the Bidder and address) for participating in tender in respect of National Highways and Infrastructure Development Corporation of India Ltd. in accordance with the applicable auditing standards and guidance Note issued by the Institute of Chartered Accountant of India.

2. We M/s ……..(Name of the Statutory Auditor) are statutory auditors of ……..……..(Name of the Bidder) for the year ended 31st March 20XX (appropriate year may be filled in).

   Note 1: In case the certificate is issued by any firm other than statutory Auditors of a company, the form no. ADT 1.duly filed with the Registrar of Companies is attached.

   Note 2: In cases the Bidder does not have statutory auditor, the firm of chartered accountants that audited last financial statements/books of accounts shall be treated as Statutory Auditor while in case of a company, the statutory auditor shall have same meaning as 'Auditor' defined under the Companies Act, 2013.

3. We have obtained all relevant record and information that were necessary for providing this certificate.

4. We have read and understood the tender documents relating to financial (**e.g. 'Turnover' and 'Net worth**), verified the standalone audited financial statements of …… (Name of the Bidder), books of accounts and other relevant records and information as at 31st March 20XX produced before us by ……..……..(Name of the Bidder), and on basis of such verification, information and explanation given to us, we certify that Net Worth of ……..……..(Name of the Bidder) as on 31 March 20XX has been computed strictly in compliance with the provision of clause 2.2.2.9(ii) of the RFP documents of the NHIDCL and as under:

Sr. No.	Particulars	Amount (₹ in lakh)	Remarks
1	Paid of Equity Share Capital (This does not include advance against equity and application money pending allotment)		
2	Reserves and Surpluses (Other equity in case of Financial Statements are prepared under Ind AS) created out of profits)		
2.1	Accumulated Profits		
2.2	Share/Security premium		
2.3	Other Reserves		
	Total		
	Less Accumulated losses, if any		
	Less Miscellaneous expenditure to the extent not written off or adjusted		
	Less Deferred Revenue Expenditure, if any		
	Less write back of depreciation, if any		
	Less any other reserve created out of profits like amalgamation,		

	capital restructuring, first time adoption of Ind AS or debt restructuring prior to full settlement of debts.		

5. This is certified that the Calculation of Net worth is based on **standalone financial statements** of ……..……..(Name of the Bidder) prepared in conformity with applicable Accounting Standards and it does not include following components:
   i. Advance against equity;
   ii. Share application money, pending allotment;
   iii. Redeemable or non-redeemable Preference share capital ;
   iv. Convertible and non-convertible debentures;
   v. Revaluation Reserves;
   vi. Accumulated losses;
   vii. Write back of depreciation;
   viii. Other comprehensive income, in cases where financial statements are prepared based on Ind AS;
   ix. Reserves created from restructuring of debt etc till their settlement of debts;
   x. Deferred Tax Liabilities; and
   xi. Impact of restructuring or amalgamation of the bidder.

For XYZ & Associates
Chartered Accountant
(FRN: ……)

Name of CA: ……..
Partner/Proprietor Membership No.: ……
Place: ……
Date: …….
UDIN: ……

Annexure-B

Letter Head of the Statutory Auditor
(Giving phone number, address and email address)

CERTIFICATE OF TURNOVER BY STATUTORY AUDITOR

1. This certificate is being issued on the request of ……..(Name of the Bidder and address) for participating in tender in respect of National Highways and Infrastructure Development Corporation of India Limited in accordance with the applicable auditing standards and guidance Note issued by the Institute of Chartered Accountant of India.
2. We M/s ……..(Name of the Statutory Auditor) are statutory auditors of ……..……..(Name of the Bidder) for the year ended 31st March 20XX (appropriate year may be filled in).

   Note 1: In case the certificate is issued by any firm other than statutory Auditors of a company, the form no. ADT 1.duly filed with the Registrar of Companies is attached.

   Note 2: In cases the Bidder does not have statutory auditor, the firm of chartered accountants that audited last financial statements/books of accounts shall be treated as Statutory Auditor while in case of a company, the statutory auditor shall have same meaning as 'Auditor' defined under the Companies Act, 2013.
3. We have obtained all relevant record and information that were necessary for providing this certificate.
4. We have read and understood the tender documents relating to financial and technical capacity (**e.g. 'Turnover' and 'Net worth**), verified the standalone audited financial statements of …… (Name of the Bidder), books of accounts and other relevant records and information as at 31st March 20XX produced before us by ……..……..(Name of the Bidder), and on basis of such verification, information and explanation given to us, we certify as under:

S.No.	Financial year	Turnover (₹ In lakh)
1	Year 1 (2019-2020)	
2	Year2 (2018-2019)	
3	Year 3 (2017-2018)	

In case financial statements of the latest financial year are not audited and therefore, the bidder cannot make it available, the bidder shall provide an undertaking to this effect and statutory auditor shall certify the same. In such case, the bidder shall provide the audited financial statements for five yearimmediately preceding the year for which the audited annual report is not being produced as per clause 2.2.2.8 of the RFP. In case,undertaking duly certified by statutory auditor is not submitted under such circumstances, the annual turnover for the year for which audited annual financial statements are not available shall be considered as 'Nil' for the purposes of arriving at the average annual turnover.

5. Annual Turnover updated to the price level of the year, based on factors indicated in table xxx of the tender documents, is given below:

Year	Year-1	Year-2	Year-3	Year-4	Year-5
Updation factor	**1.00**	**1.05**	**1.10**	**1.15**	**1.20**
Actual Turnover (₹ In lakh)					
Updated Turnover (₹ In lakh)					

Average Updated Turnover (to the price level of the year) = …… (₹ In lakh)

6. This is also certified that the Calculation of turnover is based on **standalone financial statements** of ……..……..(Name of the Bidder) prepared in conformity with applicable Accounting Standards and it does not include any component of indirect tax like GST.
7. This is also certified that the that turnover mentioned in para 5 is in individual capacity of ……..……..(Name of the Bidder) and its share in the Joint Venture where the work had been executed jointly with other party/parties and such a joint venture is not a separate legal entity. Further, the above turnover does not include any turnover related to joint venture or subsidiary having a separate legal entity.
8. This is also certified that turnover mentioned in para 5 is in respect of execution of construction/ civil /Engineering activities and does not include any trading activity of ……..……..(Name of the Bidder).

For XYZ & Associates
Chartered Accountant
(FRN: ……)

Name of CA: ……..
Partner/Proprietor Membership No.: ……
Place: ……
Date: ……
UDIN: ……

SECTION-IV
FORMS OFBANK GUARANTEES, LOA & AGREEMENT

Form of Bank Guarantee
[Performance Security/Additional Performance Security]

To

[National Highways and Infrastructure Development Corporation Limited]
[Yartsa House near Changspa Farm, Changspa, Leh, UT of Ladakh-194101]

WHEREAS_____[name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) No. Dated_ for construction of [~~name~~ of the Project] (hereinafter called the"Contract")

AND WHEREAS the Contract requires the Contractor to furnish an {Performance Security/ Additional Performance Security} for due and faithful performance of its obligations, under and in accordance with the Contract, during the {Construction Period/ Defects Liability Period and Maintenance Period} in a sum of Rs….. cr. (Rupees ……..….. Crore) (the "**Guarantee Amount**"[1]).

AND WHEREAS we, …….. through our branch at ..... . (the "**Bank**") have agreed to furnish this Bank Guarantee (hereinafter called the **"Guarantee**") by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Contract, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [Offg. Executive Director, of National Highways & Infrastructure Development Corporation Limited], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Contract shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Contract and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or

[1] Guarantee Amount for Performance Security and Additional Performance Security shall be calculated as per Contract.

otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Contract or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Contract or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Contract and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Contract or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on ****. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sentby post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

10. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Contract.

11. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

12. This guarantee shall also be operatable at our ICICI Branch at Leh,UT of Ladakh, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there-under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

13. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of [MoRT&H/NHAI/NHIDCL/State PWD/BRO], details of which is as under:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited NHIDCL UT Ladakh Project Account
2	Beneficiary Bank Account No.	362305000136
3	Beneficiary Bank Branch IFSC	ICIC0003623
4	Beneficiary Bank Branch Name	3623 Leh Ladakh Branch
5	Beneficiary Bank Address	ICICI Bank,Leh-194101

Signed and sealed this ……. day of ……., 20…… at ……..

SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)

FORM OF LETTER OF APPLICATION

To,

The Executive Director(P)
National Highways & Infrastructure Development Corporation Limited.
Yartsa House,Changspa Farm, Changspa,
Leh, UT of Ladakh-194101

Name of Work:Construction of shopping complex building near Polo ground,Leh in UT of Ladakh

Dear Sir,

Having examined the Bid Document, Instruction to Bidders Qualification Information, Scope of works, etc. for the subject work. We, hereby submit our technical and financial bid for the subject work.

It is certified that the information furnished in this document is true and correct. The proposal is unconditional and unqualified. We undersigned accept that NHIDCL reserves the right to reject any or all application without assigning any reason.

Thanking you,

Yours faithfully,

(Name)
(Authorized Signatory)
For and on behalf of M/s_____

Mobile No.:
Email Id:

FORM OF LETTER OF ACCEPTANCE

No. ……. Dated ……..

To
M/s…….

Sub.: ……. Name of Work ……

Sir,

Based on your bid submitted on …….. in compliance of bidding document of NHIDCL for execution of the work of …….. , it is hereby notified that your bid for a contract price of **Rs…… (Rupees in words……)** has been accepted by the Competent Authority.

You are hereby requested to furnish unconditional Performance Security in the form detailed in para 33.2 of ITB for an amount equivalent to **Rs…… (Rupees in words……)** within 15 days as per provisions of clause 33.1 of ITB of the bid document and failing which the actions as stipulated in clause- 33.3 of ITB shall be taken. You are also required to sign the contract agreement within 7 days from the receipt of the valid performance security.

Thanking you,

Yours faithfully,

(……..)
Authorized Signatory

FORM OF AGREEMENT

AGREEMENT

This agreement made the _____day of _____ 20…..._____ between the National Highways & Infrastructure Development Corporation Limited, New Delhi (hereinafter called "the Executing Agency" of the one part and _____ (here in after called "the Contractor") of the other part.

AND WHEREAS the Executing Agency invited bids from eligible bidders for the execution of certain works, viz ……

AND WHEREAS pursuant to the bid submitted by the Contractor, vide _____ (here in after referred to as the "BID" or "ÖFFER") for the execution of works, the Executing Agency by his letter of acceptance dated _____ accepted the offer submitted by the Contractor for the execution and completion of such works and remedying of any defects thereon, on terms and conditions in accordance with the documents listed in para 2 below.

AND WHEREAS the Contractor by a deed of undertaking dated _____ has agreed to abide by all the terms of the bid, including but not limited to the amount quoted for the execution of Contract, as stated in the bid, and also to comply with such terms and conditions as may be required from time to time.

AND WHEREAS the contractor has agreed to undertake such works and has furnished a performance security pursuant to clause 33 of the instructions to bidders (Section-I).

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this agreement words and expressions shall have the same meaning as are respectively assigned to them in the conditions of contract hereinafter referred to;

2. the following documents shall be deemed to form and be read and construed as part of this agreement viz.

    (a) Agreement,
    (b) Letter of Acceptance
    (c) Contractor's Bid including Financial Bid Form,
    (d) Contract Data,
    (e) Conditions of Contract
    (f) Scope of work & Technical specifications
    (g) List of Approved Makes of Materials
    (h) Bill of Quantities(Financial Bid)
    (i) Any other document listed in the Contract Data.
    (j) Tender Drawings
    (k) Finishes Matrix
    (l) Schedule of Quantities
    (m) Special Conditions of Contract
    (n) Special Conditions of Contract
    (o) Particular Specifications
    (p) Integrity Pact

(q) Sample Guarantee Bond

3. The foregoing documents shall be construed as complementary and mutually explanatory one with another. Should any ambiguity or discrepancy be noted then the order of precedence of these documents shall be subject to the order as listed above and interpreted in the above order of priority.

4. In consideration of the payments to be made by the Executing Agency to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Executing Agency to execute and complete the works and remedy any defects therein in conformity in all respects with the provisions of the contract.

5. the Executing Agency hereby covenants to pay the contractor in consideration of the execution and completion of the works and remedying of defects therein, the contract price or such other sum as may become payable under the provisions of the contract at the times and in the manner prescribed by the contract.

IN WITNESS WHEREOF the parties here to have caused this agreement to be executed the day and year above written. Signed, sealed and delivered by the said Executing Agency through his Authorized Representative and the said Contractor through his Power of Attorney holder.

Binding Signature of Executing Agency _____

For and on behalf of National Highways & Infrastructure development Corporation Limited, New Delhi

Binding Signature of Contractor _____

For and on behalf of M/s. _____

In the presence of
1. Name :
Address:

2. Name :
Address:

In the Presence of
1. Name:
Address:

2. Name:
Address:

FORMAT FOR POWER OF ATTORNEY FOR SIGNING OF BID

Know all men by these presents, We **(name of the firm and address of the registered office)** do hereby irrevocably constitute, nominate, appoint and authorize Mr./Ms (name), son/daughter/wife of **(Name)** and presently residing at **(Address)**, who is presently employed with us/ the Lead Member of our Joint Venture and holding the position of **(Designation),** as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our BID for the Project proposed or being developed by the National Highways & Infrastructure Development Corporation Ltd. (the "Authority") including but not limited to signing and submission of all applications, BIDs and other documents and writings, participate in Pre-BID and other conferences and providing information/ responses to the Authority, representing us in all matters before the Authority, signing and execution of all contracts including the agreement and undertakings consequent to acceptance of our BID, and generally dealing with the Authority in all matters in connection with or relating to or arising out of our BID for the said Project and/ or upon award thereof to us and/or until the entering into of the Contract with the Authority.

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

IN WITNESS WHEREOF WE,……., THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS …… DAY OF ……. 2…..

For ……..

(Signature, name, designation and address)
of person authorized by Board Resolution
(in case of Firm/ Company)/ partner in case of Partnership

Witnesses:
firm
1.
2.

Accepted

…… (Signature)

(Name, Title and Address of the Attorney)

(Notarised)

Person identified by me/ personally appeared before me/
Attested/ Authenticated*
(*Notary to specify as applicable)
(Signature Name and Address of the Notary)

Seal of the Notary
Registration No. of the Notary
Date:……

Notes:

- *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*
- *For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Appostille certificate.*

Bid Securing Declaration

(Refer Clause 16)

I hereby submit a declaration that the bid submitted by the undersigned, on behalf of the bidder, **[Name of the bidder],** either sole or in JV, shall not be withdrawn or modified during the period of validity i.e. not less than 180 (one hundred eighty) days from the bid due date.

I, on behalf of the bidder, **[Name of the bidder]**, also accept the fact that in case the bid is withdrawn or modified during the period of its validity or if we fail to sign the contract in case the work is awarded to us or we fail to submit a performance security before the deadline defined in clause 7 of the Request for Proposal (RFP), then **[Name of the bidder]**will be suspended for participation in the tendering process for the works of NHIDCL and works under other Centrally Sponsored Schemes, for a period of one year from the bid due date of this work.

(Signature of the Authorised Signatory)
(Official-Seal)

(SECTION –V)

CONDITIONS OF CONTRACT & CONTRACT DATA

Table of Clauses

Section-V

Conditions of Contract

A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

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

Compensation Events are those defined in Clause 41 hereunder.

The Completion Date is the date of completion of the Works as certified by the Engineer-in-Charge, in accordance with Clause 49.1.

The Contract is the Contract between the Executing Agency and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3.

The Contract Data defines the documents and other information, which comprise the Contract.

The Contractor is a person or corporate body whose Bid to carry out the Works has been accepted by the Executing Agency.

The Contractor's Bid is the completed bidding document submitted by the Contractor to the Executing Agency and includes technical and financial bids.

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The Defects Liability Certificate is the certificate issued by Engineer-in-Charge, after the Defect Liability Period has ended and upon correction of Defects by the Contractor.

The Defects Liability Period is the period named in contact data and calculated from the Completion Date.

Drawings include calculations and other information provided or approved by the Engineer-in-Charge for the execution of the Contract. Tender Drawings are the drawings enclosed with the RFP conveying indicative scope of the work .

Employer is Urban Local Bodies Department , UT of Ladakh represented by its “Director”.

The Executing Agency is the party (NHIDCL) as defined in the Contract Data, who employs the Contractor to carry out the Works. The Executing Agency may delegate any or all of its functions to a person or body nominated by him for specified functions.

The Engineer-in-Charge is the person named in the Contract Data (or any other competent person appointed by the Executing Agency and notified to the Contractor, to act in replacement of the Engineer-in-Charge) who is responsible for supervising the execution of the Works and administering the Contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price listed in the Executing Agency's Letter of Acceptance.

The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer-in-Charge by issuing an extension of time after the approval from Executing Agency.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works that shall have a mechanical, electrical, electronic, chemical, or biological function.

Projectmeans complete scope of works forming part of contract.

Schedule of Quantities means the indicative break-up of items and their quantities forming part of the work enclosed with the bid document RFP by Executing Agency.

The **Site** is the area defined as such in the Contract Data.

Site Investigation Reports are those that were included in the bidding documents and are factual interpretative reports about the surface and subsurface conditions at the Site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer-in-Charge.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.

A **Sub-Contractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Engineer-in-Charge after the approval from NHIDCL, which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, maintain, and handover to the Executing Agency, as defined in the Contract Data.

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer-in-Charge will provide instructions clarifying queries about these Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority.

(a) Agreement,
(b) Letter of Acceptance
(c) Contractor's Bid including Financial Bid Form,
(d) Contract Data,
(r) Conditions of Contract
(f) Scope of work ,Particular & Technical specifications
(g) Special Conditions of Contract
(h) Tender Drawings
(g) Schedule of Quantities,
(h) List of approved makes ,and
(i) Any other document listed in the Contract Data.

3. Language and Law

3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer-in-Charge's Decisions

4.1 Except where otherwise specifically stated, the Engineer-in-Charge will decide contractual matters between the Executing Agency and the Contractor in the role representing the Executing Agency.

5. Delegation

5.1 The Engineer-in-Charge, duly informing the Executing Agency, may delegate any of his duties and responsibilities to other people except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

7. Sub-contracting

7.1 The Contractor may subcontract any portion of work, up to a limit specified in Contract Data, with the prior approval of the Executing Agency in writing. Subcontracting shall not alter the Contractor's obligations.

7.2 The Contractor shall not be required to obtain any consent from the Executing Agency for:

a. the sub-contracting of any part of the Works for which the Sub-Contractor is named in the Contract;
b. the provision of labour or labour component.
c. the purchase of Materials which are in accordance with the standards specified in the Contract.

14.3 Beyond what has been stated in clauses 7.1 and 7.2, if the Contractor proposes sub-contracting of any part of the work during execution of the Works, because of some unforeseen circumstances to enable him to complete the Works as per terms of the Contract, the Executing Agency will consider the following before according approval:

a) The Contractor shall not sub-contract the Works more than the limit specified in Contract Data.
b) The Contractor shall not sub-contract any part of the Work without prior consent of the Executing Agency. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any of his sub-Contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents and workmen.

7.3 The Engineer-in-Charge should satisfy himself before recommending to the Executing Agency whether
a) the circumstances warrant such sub-contracting; and
b) the sub-Contractor so proposed for the Work possess the experience, qualifications and equipment necessary for the job proposed to be entrusted to him in proportion to the quantum of Works to be sub-contracted.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other Contractors, public authorities, utilities, and the Executing Agency between the dates given in the Schedule of Other Contractors, as referred to in the Contract Data. The Contractor shall also provide facilities and services for them as described in the Schedule. The Executing Agency may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

8.2 The Contractor should take up the works in convenient reaches as decided by the Engineer-in-Charge to ensure there is least hindrance to the smooth flow of traffic including movement of vehicles and equipment of other Contractors till the completion of the Works.

9. Personnel

9.1 The Contractor shall employ the technical personnel named in the Contract Data. The ED(P), NHIDCL will approve any proposed replacement of technical personnel (except Project Manager) only if their relevant qualifications and experience are substantially equal to or better than those of the personnel stated in the Contract Data. If the personnel stated in the contract data are not deployed on site by the contractor, a penalty of Rs. 50,000/- per month in case of Project Manager and Rs. 25,000/- in case of other key personnel will be imposed upto a maximum period of 3 months. Thereafter, it will be treated as a breach of contract and action will be taken as per clause 53. The replacement of Project Manager will be approved byEngineer-in-Charge after the approval of Competent Authority.

9.2 If the Engineer-in-Charge 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 seven days and has no further connection with the Works in the Contract.

10. Executing Agency's and Contractor's Risks

10.1 The Executing Agency carries the risks which this Contract states are Executing Agency's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Executing Agency's Risks

11.1 The Executing Agency is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Executing Agency’s country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor’s employees), natural calamities and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor’s design.

12. Contractor's Risks

12.1 All risks of loss of or damage to physical property and of personal injury and death, which arise during and in consequence of the performance of the Contract other than the excepted risks, are the responsibility of the Contractor.

13. Insurance

13.1 The Contractor at his cost shall provide, in the joint names of the Executing Agency and the Contractor, insurance cover from the Start Date to the end of defect liability period for events (a) to (d), in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

a) Contractor’s All Risk Policy (CAR Policy)loss of or damage to the Works, Plant , Materials etc.;
b) loss of or damage to Equipment;
c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
d) Personal injury or death.

13.2 Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer-in-Charge for the Engineer-in-Charge's approval before the Start Date. All such insurance shall provide for compensation to be payable in Indian Rupees to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Executing Agency may affect the insurance which the Contractor should have provided and recover the premiums the Executing Agency has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be debt due.

13.4 Alterations to the terms of insurance shall not be made without the approval of the Engineer-in-Charge.

13.4 Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports

14.1 The Contractor, in preparing the Bid, may rely on any Site Investigation Reports referred to in the Contract Data, if any, supplemented by any other information available to him, before submitting the bid. However, at the time of execution, the contractor shall carry out necessary site sub-soil investigation for design of the foundations in consultation with the Engineer-in-Charge.

15. Queries about the Contract Data

15.1 The Executive Director(P),RO-Ladakh NHIDCL will clarify queries on the Contract Data.

16. Contractor to Construct the Works & maintenance during defect liability.

16.1 The Contractor shall construct, install and maintain the Works during defect liability period in accordance with the documents forming part of the contract. No payment for maintenance during defect liability period is payable.

17. The Works to Be Completed by the Intended Completion Date

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Programme submitted by the Contractor, as updated with the approval of the Engineer-in-Charge, and complete them by the Intended Completion Date.

18. Approvals

18.1 The Contractor shall submit Specifications, Design and Drawings including quantities of each item showing the proposed Works to the Engineer-in-Charge within 15 days of signing of Contract Agreement, who shall approve them after proof checking within 7 days, if they comply with specifications and drawings.

18.2 The Contractor shall be responsible for detailed design and drawing of allthe Works.

18.3 The Engineer-in-Charge's approval shall not alter the Contractor's responsibility for design of all Works.

18.4 The Contractor shall obtain approval of third parties to the design of all the Works, where required, as directed by the Engineer-in-Charge.**The structural design of the buildings shall be made considering Seismic Zone V .The minimum grade of structural concrete shall be M25.**The contractor

shall arrange vetting of structural design and drawings from approved Government Institute like IITs/NITs/Government Engineering College, at his own cost.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer-in-Charge before their use.

18.6 The Contractor shall construct the structures as per contract specifications and as per the design approved by the Engineer-in-Charge. In case of any deficiencies, the same will be intimated to the contractor for rectification.

18.7 The Contractor shall submit shop drawings of all items procured from approved vendors/manufacturer's and obtain approval of Engineer-in-Charge before procurement to site.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Executing Agency. The Contractor shall notify the Engineer-in-Charge of such discoveries and carry out the Engineer-in-Charge's instructions for dealing with them.

21. Possession of the Site

21.1 The Executing Agency shall give complete possession of the Site to the Contractor on the date of signing of agreement.

22. Access to the Site

22.1 The Contractor shall allow access to the Site and to any place where work in connection with the Contract is being carried out, or is intended to be carried out and to any place where material or plant are being manufactured /fabricated / assembled for the works to the Engineer-in-Charge and any person/persons/agency authorized by:

a. The Executing Agency
b. The Engineer-in-Charge

23. Instructions

23.1 The Contractor shall carry out all instructions of the Engineer-in-Charge, which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit the Executing Agency to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by Auditors appointed by the Executing Agency if so required by the Executing Agency.

24. Maintenance

24.1 The contractor shall maintain the buildings/structure during the defect liability period of **One (1) year**which is reckoned from the actual recorded date of completion of the project. No separate payment will be made to the contractor for maintenance during the defect liability period.

25. Dispute and Arbitration

25.1 Dispute Resolution

(i) Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the "Dispute") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 25.2.

(ii) The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non- privileged records, information and data pertaining to any Dispute.

25.2 Conciliation

In the event of any Dispute between the Parties, either Party may call upon the Authority's Engineer-in-Charge, or such other person as the Parties may mutually agree upon (the "Conciliator") to mediate and assist the Parties in arriving at an amicable settlement thereof. Failing mediation by the Conciliator or without the intervention of the Conciliator, either Party may require such Dispute to be referred to the Chairman of the Authority and the Chairman of the Board of Directors of the Contractor for amicable settlement, and upon such reference, the said persons shall meet no later than 7 (seven) business days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the 30 (thirty) business day period or the Dispute is not amicably settled within 30 (thirty) days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within 30 (thirty) days of the notice in writing referred to in Clause 25.1. or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Clause 25.3 but before resorting to such arbitration, the parties agree to explore conciliation by the Conciliation Committees of Independent Experts set up by the Authority in accordance with the procedure decided by the panel of such experts and notified by the Authority on its website including its subsequent amendments. In the event of the conciliation proceedings being successful, the parties to the dispute would sign the written settlement agreement and the conciliators would authenticate the same. Such settlement agreement would then be binding on the parties in terms of Section 73 of the Arbitration Act. In case of failure of the conciliation process even at the level of the Conciliation Committee, either party may refer the Dispute to arbitration in accordance with the provisions of Clause 25.3.

25.3 Arbitration

(i) Any dispute which remains unresolved between the parties through the mechanisms available/ prescribed in the Agreement, irrespective of any claim value, which has notbeen agreed upon/ reached settlement by the parties, will be referred to the Arbitral Tribunal as per the Arbitration and Conciliation Act.

(ii) Deleted

(iii) The Arbitral Tribunal shall make a reasoned award (the "Award"). Any Award made in any arbitration held pursuant to this Clause 25 shall be final and binding on the Parties as from the date it is made, and the Contractor and the Authority agree and undertake to carry out such Award without delay.

(iv) The Contractor and the Authority agree that an Award may be enforced against the Contractor and/or the Authority, as the case may be, and their respective assets wherever situated.

(v) This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder. Further, the parties unconditionally acknowledge and agree that notwithstanding any dispute between them, each Party shall proceed with the performance of its respective obligations, pending resolution of Dispute in accordance with this Article.

(vi) In the event the Party against whom the Award has been granted challenges the Award for any reason in a court of law, it shall make an interim payment to the other Party for an amount equal to 75% (seventy five per cent) of the Award, pending final settlement of the Dispute. The aforesaid amount shall be paid forthwith upon furnishing an irrevocable Bank Guarantee for a sum equal to 120 % (one hundred and twenty per cent) of the aforesaid amount. Upon final settlement of the Dispute, the aforesaid interim payment shall be adjusted and any balance amount due to be paid or returned, as the case may be, shall be paid or returned with interest calculated at the rate of 10% (ten per cent) per annum from the date of interim payment to the date of final settlement of such balance.

25.4 Adjudication by Regulatory Authority, Tribunal or Commission

In the event of constitution of a statutory regulatory authority, tribunal or commission, as the case may be, with powers to adjudicate upon disputes between the Contractor and the Authority, all Disputes arising after such constitution shall, instead of reference to arbitration under Clause 25.3, be adjudicated upon by such regulatory authority, tribunal or commission in accordance with the Applicable Law and all references to Dispute Resolution Procedure shall be construed accordingly. For the avoidance of doubt, the Parties hereto agree that the adjudication hereunder shall not be final and binding until an appeal against such adjudication has been decided by an appellate tribunal or court of competent jurisdiction, as the case may be, or no such appeal has been preferred within the time specified in the Applicable Law.

26 Deleted

B. Time Control

27. Programme

27.1 The Engineer-in-Charge shall issue a Notice to Proceed for all the site locations to the contractor immediately after signing of agreement. The Contractor shall submit to the Engineer-in-Charge for approval a programme within **7 days from the signing of the Contract Agreement for each site separately,** showing the general methods, arrangements, order, and timing for all the activities in the Works, along with monthly cash flow forecasts.

27.2 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.

27.3 The Contractor shall submit to the Engineer-in-Charge for approval an updated Programme at intervals. If the Contractor does not submit an updated Programme within this period, the Engineer-in-Charge 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.

27.4 The Engineer-in-Charge's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Engineer-in-Charge again at any time. A revised Programme shall show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

28.1 The Engineer-in-Charge shall extend the Intended Completion Date only after the approval of NHIDCL if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Works, which would cause the Contractor to incur additional cost.

28.2 The Engineer-in-Charge shall decide whether and by how much time to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer-in-Charge for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new intended Completion Date.

29. Delays Ordered by the Engineer-in-Charge

29.1 The Engineer-in-Charge may instruct the Contractor to delay the start or progress of any activity within the Works.

30. Management Meetings

30.1 **Either the Engineer-in-Charge or the Contractor may require the other** to attend a management meeting. The business of a management meeting shall be to review the plans for the remaining Works and to deal with matters raised in accordance with the early warning procedure.

30.2 The Engineer-in-Charge shall record the business of management meetings and provide copies of the record to those attending the meeting. The responsibility of the parties for actions to be taken shall be decided by the Engineer-in-Charge either at the management meeting or after the management meeting and stated in writing to all those who attended the meeting.

C. Quality Control

31. Identifying Defects

31.1 The Engineer-in-Charge shall check the Contractor's work and notify the Contractor of any Defects that are noticed. Such checking shall not absolve the contractor from its obligations and its responsibilities. The Engineer-in-Charge may instruct the Contractor to search for a Defect and to uncover and test any work (existing work/work executed by the contractor) that the Engineer-in-Charge considers may have a Defect.

32. Tests

32.1 The contractor shall be solely responsible for:

a. Carrying out the mandatory tests prescribed in the CPWD Specifications 2019 (volume-I and volume II) and technical specifications forming part of contract.
b. For the correctness of the test results, whether preformed in his laboratory or elsewhere.
c. All charges related to cost of samples, transportation to third party lab and testing charges are deemed to be included in the Contract Price of Contractor and hence will not be reimbursed by Executing Agency.
d. The Authority may engage third party for testing of executed items. The payment for the same would be made by the Authority.

32.2 If the Engineer-in-Charge instructs the Contractor to carry out a test not specified in the Specification to check whether any work (executed by the contractor) has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect, the cost of such tests shall be borne by the Authority otherwise by the Contractor.

33. Correction of Defects noticed during the Defect Liability Period.

33.1 The Engineer-in-Charge shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins from the next day of Actual Recorded Date of Completion of Project and as defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

33.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the reasonable time specified by the Engineer-in-Charge’s notice as per good industry practice. If any defect including shrinkage cracks, other faults appears in the work within defect liability period, the Engineer-in-Charge shall give Notice to the Contractor of such defects before end of defect liability period and shall extend the defect liability period as long as defects remain to be corrected.

34. Uncorrected Defects/ Incomplete Works

34.1 If the Contractor has not corrected the Defect, to the satisfaction of the Engineer-in-Charge, within the time specified in the Engineer-in-Charge's notice/indent, the Engineer-in-Charge will assess the cost of having the Defect corrected and get the defects rectified through some other agency at the risk and cost of the Contractor and the Contractor will pay 1.2 times of this amount.

34.2 If the Contractor has not completed the work to the satisfaction of the Engineer-in-Charge, within the time specified in the Engineer-in-Charge's notice/indent, in no case exceeding one month, the Engineer-in-Charge will assess the cost of having the work completed and get the work completed through some other agency and the Contractor will pay this amount in addition to the damages specified as per clause 45.

D. Cost Control

35. Bill of Quantities

35.1 The Bill of Quantities to be submitted by the Contractor along with financial bid shall be for lumpsum cost for the construction, installation, testing, and commissioning of all components of the whole project and for comprehensive annual maintenance contract of the E&M system/equipments during the four year period beyond the one year Defect Liability Period ,to be done by the Contractor.

35.2 **Lumpsum cost quoted by the contractor will be the Contract Price.** The Contractor is paid as per clause 40.2 for **work done in accordance with the percentage weightage of each item as per Payment Schedule mentioned below:**

Payment Schedule

1.1 The Contract Price (exclusive of GST) for this EPC Agreement is **Rs. ……Crore.**

1.2 The Contractor shall enclose the computerized measurements (three copies) of all items of work executed(sub-head –wise and building-wise) till the date of submission of running bills for verification by Engineer-in-Charge and record.

1.3 Proportions of the Contract Price for different stages of Construction of the each building/structure shall be as specified below:

(Forintermittentpayments, Pro-ratapaymentwillbereleasedbasedonplinthareaonachievementofphysicalwork)

Sl. No.	Stageofactivity		Break-up of % of Item Contract Value	% of Item Contract Value
1.	Planning, Detailed Design & Approval from Statutory Bodies, third party vetting and approval of the same By the Engineer-In-Charge.			**1.50 %**
	1.1	On approval of All Architectural Drawings from local bodies and Engineer-in-Charge.	0.50%	
	1.2	On approval of All Structural Drawings including vetting by third party and approval from Engineer –in-Charge.	0.50%	
	1.3	On approval of All PHE, Electrical, Fire-Fighting Drawings (except shop drawings)	0.50%	
2.	On Completion of Foundation & plinth including plinth beams.			**7%**
	2.1	Excavation, Completion of Foundation & plinth including plinth beams	5%	

	2.2	Completion of back filling of plinth and PCC for flooring in ground floor etc.	2%	
3.	Completion of basic RCC structure including filler panel walls			**27.5%**
	3.1	On Completion upto Floor two level	8%	
	3.2	On Completion upto Floor three level	8%	
	3.3	On Completion upto Floor Four level(Terrace level)	8%	
	3.4	On Completion upto Floor five level (Upper terrace- over Terrace Pantry room), Mumty ,slab on lift well and DG room , waterproofing of all toilets, all terraces	3.50%	

4.	On Completion of finishing works i.e.,flooring, fixing of Doors, windows, ventilators, glass partition and glass doors to all shops, rolling shutters, staircase railings , passage railings, false-ceilings, elevational features, interior & exterior Painting etc.			**35%**
	4.1	All types of Flooring in building including wooden flooring in ground floor atrium, skirting, dado in all toilet /pantry.	12%	
	4.2	Fixing of doors, windows, ventilators, glass partition and glass doors, rolling shutters for all shops and rooms and glazing of front elevation	12%	
	4.3	Painting (Internal & External) including application of putty, polishing of wood work	4%	
	4.4	False-ceilings in double height atrium, in passages of all floors, stair-case railings, passage railings, etc	2%	
	4.5	All other miscellaneous works required for completion of the work etc.	5%	
5.	On completion of all water supply lines, fixtures , sanitary lines, fittings and drainage work , terrace water tanks for fire, domestic and hot water ,heat pumps etc.			**9%**
6.	Installation of Systems in Various Electrical & Mechanical Services			**13%**
	6.1	On delivery to site approved electrical items such as Switch Socket, internal light fittings, Fans, lightening conductor, Cables and Wires, cctv items etc.,	3.50%	
	6.2	On delivery to site items for approved passenger lift	3.50%	
	6.3	On delivery to site items such as approved Fire Extinguishers and other fire fighting equipment etc.,	1.50%	
	6.4	On delivery to site items such as approved Diesel Generator, panels, energy meters,power supply connection to mains etc.	1.50%	

	6.5	On completion of Installation, Testing & Integrated Commissioning of all electro-mechanical and fire-fighting services etc.	3.00%	
7.	On completion of Fire and domestic water UG sump, bore-well, Bio-digestor, boundary wall and gate, plinth protection, ramps, steps, pavements ,Terrace rectractable roofing system , anti-termite treatment , Art work etc.			**4.00%**
8.	Submission of completion certificate of the building,all statutory post-construction clearances, licenses and as-built drawings, handing over of building and successful closing of agreement etc.			**3.00%**
	Total			**100.00%**

36. Variations

36.1 Change in executed quantities either w.r.t. the Schedule of Quantities enclosed with the bid documents (Cost Estimate) or the quantities submitted by the contractor as per his design & drawings and approved by the Engineer-in-Charge shall not constitute variation or Change of Scope (COS). However, for any new items to be executed by the contractor as per the directions and approval of the Engineer-in-Charge will be considered as variation or change in scope for which Engineer-in-Charge will issue a notice to the contractor.

36.2 In case of change in design of the building by the Executing Agency or by the Engineer-in-Charge due to which the floor area increases or new building is asked to construct, the cost of new building/structure in such cases shall be dealt on the basis of quoted rates/cost of the nearest building under the contract.

37. Payments for Variations

The Contractor shall, within 14 days of the issue of order of Variation work, inform the Engineer-in-Charge, the rate which he proposes to claim, supported by analysis of the rates. The Engineer-in-Charge shall assess the quotation, analysis and determine the rate based on prevailing market rates (with 15% contractor's profit including over heads) within 15 days of the submission of the claim by the Contractor and approval from NHIDCL will be taken. As far as possible, the rate analysis shall be based on the CPWD Analysis of Rates (DAR) and the current schedule of rates of the district public works division/CPWD DSR.

38. Cash Flow Forecasts

38.1 When the Programme is updated, the Contractor shall provide the Engineer-in-Charge with an updated cash flow forecast.

39. Payment Certificates

39.1 The Contractor shall submit to the Engineer-in-Charge in accordance of clause 40.2 the value of the work executed with supporting documents.

39.2 The Engineer-in-Charge shall check the Contractor's statement within 7 days and certify the amount to be paid to the Contractor after taking into account any credit or debit for the month in question.

39.3 The value of work executed shall be determined, based on measurements submitted along with the running bills duly certified by the Engineer-in-Charge.

39.4 The value of work executed shall comprise the value of the quantities of the items executed in accordance with the payment schedule.

39.5 The value of work executed shall also include the valuation of Variations and Compensation Events.

39.6 The Engineer-in-Charge 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 to rectify the mistakes with detail justification acceptable to Executing Agency.

39.7 The final bill of the work shall be submitted by the contractor within one month of the recorded date of completion of the work; otherwise the Engineer-in-Charge certificate of the measurement and of the total amount payable for work accordingly shall be final and payment made accordingly within a period of sixty days.

40. Payments

40.1 Payments shall be adjusted for deductions for mobilization payments, 5% security deposit(retention money), other recoveries in terms of the Contract and taxes at source, as applicable under the law. The Executing Agency shall pay the Contractor the amounts Engineer-in-Charge had certified within 14 days of the date of each certificate.

40.2 The contractor shall submit to the Engineer-in-Charge bill in three copies and the Executing Agency shall make the payment certified by the Engineer-in-Charge.

40.3 The Contractor shall submit to the Engineer-in-Charge a bill prepared in accordance with the approved quantities and as per the Payment Schedule attached as Annexure-IV for the work executed . The minimum value of work of all the executed items for each building/Services should be 5% of the Total Cost (Civil, Architectural, Electrical,PHE & Fire Fighting) of building/structure for the purpose of claiming of running bill.

40.4 No escalation is payable on the Contract Price due to increase of prices of construction materials and minimum wages of labour. The Contract Price shall remain firm .Additional payment over and above the Contract Price shall be allowed only in case of notified variations by Engineer-in-Charge at approved rates.

40.5 GST charges at applicable rates on the actual value of the work done in every running bill shall be reimbursed subject to furnishing documentary evidence of having paid to Government the GST charges reimbursement paid in the previous bill. The documentary evidence shall be specific to the work.

41. Compensation Events

41.1 The following shall be Compensation Events unless they are caused by the Contractor:

a) The Engineer-in-Charge orders a delay or does not issue/approve drawings, specifications or instructions required for execution of works in reasonable time.
b) The Engineer-in-Charge gives an instruction for dealing with an unforeseen condition, caused by the Executing Agency, or additional work required for safety or other reasons.
c) Other contractors, public authorities, utilities or the Executing Agency does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

41.2 If a Compensation Event would prevent the Works being completed before the Intended Completion Date, the Intended Completion Date shall be extended. The Engineer-in-Charge shall decide whether and by how much the Intended Completion Date shall be extended after the approval of the Executing Agency.

41.3 The contractor shall not be entitled to compensation to the extent that the Executing Agency's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer-in-Charge/Executing Agency.

42. Currencies for payments

All payments will be made in Indian Rupees.

43. Deleted

44. Security Deposit / Retention Money

44.1 The Executing Agency shall retain security deposit of five (5%) percent of the amount from each payment due to the Contractor until Completion of the whole of the Works.

44.2 The security deposit/retention money (5%) and the performance security(3%) will be released to the Contractor when the Defect Liability period is over, and the Engineer-in-Charge has certified that the Defects, if any, notified by the Engineer-in-Charge to the Contractor before the end of this period have been corrected.

44.3 If the contractor so desires then the Security Deposit/retention money can be released on submission of unconditional Bank Guarantee at the following two stages:-

(a) At a point after the progress of work in financial term (gross value of work done) has reached 50% of the contract amount

(b) After the retention money has been deducted to the full value (5% of the Contract Amount).

45. Liquidated Damages

45.1 The Contractor shall pay liquidated damages to the Executing Agency at the rate or part thereof stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Executing Agency may deduct liquidated damages from payments due to the Contractor and/ or Performance Bank Guarantee. Payment of liquidated damages shall not affect the Contractor's other liabilities.

45.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer-in-Charge shall correct any overpayment of liquidated damages by the Contractor by adjusting in the next payment certificate. The contractor shall not be paid interest on the over payment of liquidated damages.

46. Advance Payment

46.1 **Mobilization Advance:**

The Authority shall make an interest-bearing advance payment (the “Advance Payment") @ “Bank Rate + 3%", not exceeding 10 % (ten percent) of the Contract Price, exclusively for mobilization expenses, if requested by the contractor in writing within one month of the order to commence the work. “Bank Rate" means the standard rate at which Reserve Bank of India is prepared to buy or re-discount bills of exchange or other commercial paper eligible for purchase under the Reserve Bank of India Act 1934

The Advance Payment for mobilization expenses shall be made in two installments each equal to 5% (five percent) of the Contract Price. The second 5% (five percent) mobilization advance would be released after submission of utilization certificate by the Contractor for the first 5% (five per cent) advance already released earlier.

The Contractor may apply to the Authority for the first installment of the Advance Payment at any time after issuance of order to commence the work, along with an irrevocable and unconditional guarantee from a Bank for an amount equivalent to 110% (one hundred and ten percent) of such installment, substantially in the form provided at Annexure-I, to remain effective till the complete and full repayment thereof. The recovery of mobilization advance shall be effected on achieving financial progressof 10% and fully recovered on achieving 80% financial progress on pro-rata basis along with interest.

46.2 **Secured Advance against Materials** :

Deleted

47. Securities

47.1 Subject to further condition in contract data, the Performance Security equal to **Three(3%) percent** of the contract price shall be provided to the Executing Agency no later than the date specified in the Letter of Acceptance and shall be issued in the form given in the Contract Data and by a prescribed bank. The Performance Security shall be valid until a date 28 days after the expiry of Defect Liability Period .The validity shall account for additional 45 days time to account for BG verification, signing of contract and start date

48 Cost of Repairs

48.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Liability Period shall be remedied/ rectified by the Contractor at their cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

49. Completion

49.1 When the whole of the works has been completed as per the provision of the Contract, the Contractor shall request the Engineer-in-Charge to issue a certificate of Completion of the Project. The Engineer-in-Charge shall, within 14 days of the date of receipt of such request, either issue to the Contractor, with a copy to the Executing Agency, a completion certificate, recording the date on which, the project was completed in accordance with the contract, or give instructions in writing to the contractor specifying all the works which, in the Engineer-in-Charge’s opinion, is required to be done by the Contractor before the issue of such completion certificate.

50. Taking Over

50.1 The Executing Agency shall take over the Site and the Works within fifteen days of the Engineer-in-Charge's issuing a certificate of Completion.

51. Final Account

The Contractor shall supply to the Engineer-in-Charge with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer-in-Charge shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer-in-Charge shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer-in-

Charge shall decide on the amount payable to the Contractor and issue a payment certificate within 56 days of receiving the Contractor's revised account.

52. "As built" Drawings

TheContractor is required to submit 'As Built Drawing' for the work executed before release of final bill payment.If the Contractor does not supply the "As Built' Drawings and/or manuals by the stipulated date or they do not receive the Engineer-in-Charge's approval, the Engineer-in-Charge shall withhold the amount equal to Rs. 5 lakhs from payments due to the Contractor.

53. Termination/Foreclosure

53.1 The Executing Agency may terminate the Contract if the Contractor causes a fundamental breach of the Contract.

53.2 Fundamental breaches of Contract include, but shall not be limited to, the following:

a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Engineer-in-Charge;
b) the Contractor is declared as bankrupt or goes into liquidation other than for approved reconstitution or amalgamation;
c) the Engineer-in-Charge/Executing Agency gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer-in-Charge;
d) the Contractor does not maintain a Security, which is required;
e) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in clause 45;
f) the Contractor fails to provide insurance cover as required under clause 13;
g) if the Contractor, in the judgement of the Executing Agency, has engaged in the corrupt or fraudulent practice in competing for or in executing the Contract. For the purpose of this paragraph, **" Corrupt practice"** means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (For avoidance of doubt, offering of employment to, or employing, or engaging in any manner whatsoever, directly or indirectly, any official of the Authority who is or has been associated in any manner, directly or indirectly, with Bidding Process, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Authority, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process);
h) **"Fraudulent practice"** means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process; if the Contractor has not completed at least thirty percent of the value of Work required to be completed after half of the completion period has elapsed;
i) if the Contractor fails to set up a field laboratory with the prescribed equipment, within the period specified; and

j) any other fundamental breach as specified in the Contract Data.

53.3 Without prejudice to any other right or remedies which the Executing Agency may have under this contract, upon occurrence of a Contractor's fundamental breach of contract, the Executing Agency shall be entitled to terminate this contract by issuing a Termination Notice to the Contractor ; provided that before issuing the Termination Notice, the Executing Agency shall by a Notice inform the Contractor of its intention to issue such Termination Notice and grant 15 days to the Contractor to make a representation, and may after the expiry of such 15 days, whether or not it is in receipt of such representation, issue the Termination Notice.

53.4 Notwithstanding the above, the Executing Agency may terminate the Contract for convenience.

53.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible but in no case later than 7 days.

53.6 Foreclosure- NHIDCL may foreclose the contract before the expiry of the scheduled contract period due to administrative decision by giving one month Notice.

54. Payment upon Termination / Foreclosure

If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer-in-Charge shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Executing Agency exceeds any payment due to the Contractor, the difference shall be a debt payable to the Executing Agency and Executing Agency may recover the same from Performance Bank Guarantee.

55. Property

All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Executing Agency for use for completing balance work if the Contract is terminated because of the Contractor's fundamental breach of contract.

56. Release from Performance

If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of the Executing Agency or the Contractor, the Engineer-in-Charge shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

F. Other Conditions of Contract

57. Labour

57.1 The Contractor shall, make arrangements of his own cost and expenses for the engagement of all staff and labour, local or others; for their payment, housing, feeding and transport; and for compliance with various labour laws/ regulations.

57.2 The Contractor shall, as asked by the Engineer-in-Charge, deliver to the Engineer-in-Charge a return in detail, in such form and at such intervals as the Engineer-in-Charge may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer-in-Charge may require.

58. COMPLIANCE WITH LABOUR REGULATIONS

58.1 During the currency of the Contract, the Contractor and his sub Contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be notified already or that may be notified under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Executing Agency indemnified in case any action is taken against the Executing Agency by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Executing Agency is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer-in-Charge/Executing Agency shall have the right to deduct any money due to the Contractor including from his performance security/ retention money. The Executing Agency/Engineer-in-Charge 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 Executing Agency. The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Executing Agency at any point of time.

58.2 SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.

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 Executing Agency 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 Executing Agency by Law. The principal Executing Agency 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 Executing Agency if they employ prescribed minimum (say 20) or more contract labour.

f) **Minimum Wages Act 1948**: - The Executing Agency 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 are 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 Executing Agency on matters provided in the Act and get these certified by the designated Authority.

l) **Trade Unions Act 1926**: - The Act lays down the procedure for registration of trade unions of workmen and Executing Agencys. 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, Travelling expenses from home up to the establishment and back etc.

o) **The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996** and **the Cess Act of 1996**: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Executing Agency 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 Executing Agency 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.

59. Drawings and Photographs of the Works

59.1 The contractor shall do photography/videography of the site firstly before the start of the work, secondly mid-way in the execution of different stages of work and lastly after the completion of the work. No separate payment will be made to the contractor for this.

59.2 The Contractor shall not disclose details of Drawings furnished to him and works on which he is engaged without the prior approval of the Engineer-in-Charge in writing. No photograph of the works or any part thereof or plant employed thereon, shall be taken or permitted to be taken by the Contractor or by any of his employees or any employees of his sub-Contractors without the prior approval of the Executing Agency in writing. No photographs/ Videography shall be published or otherwise circulated without the approval of the Executing Agency in writing.

Contract Data

Clause Reference

Items marked "N/A" do not apply in this Contract.

1. **The Tender Inviting Authority (also Executing Agency)** [Cl.1.1]

Executive Director(P),
Regional Office, Ladakh,
NHIDCL:Yartsa House ,near ChangspaFarm,
Changspa, Leh, UT of Ladakh – 194101

Employer (**Authority)**

Urban Local Bodies (represented by 'Director')
UT of Ladakh , Leh – 194101

Engineer-in-Charge

Designation: General Manager (P),PMU-Infra,Leh

Address: NHIDCL, PMU-Infra ,Leh

Email: nhidcl.infraleh@gmail.com [Cl.1.1]

3. The Time period for Completion of the Work is **12months**[Cl.1.1, 17&28] from start date.

4. Site is located at Leh,**in the Union Territoryof Ladakh** [Cl.1.1]

5. The Stipulated Start Date shall be from 7th day after the date of issue of the Notice to Commence with the work. [Cl.1.1]

6. (a) The name and identification number of the Contract **"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh".** [Cl.1.1]

(b) The Work consists of **"Construction of shopping complex building near Polo ground,Leh in UT of Ladakh" in clause 7.2 of section II (ITB).** [Cl.1.1]

3.1 (a) The law which applies to the Contract is the **law of Union of India**. [Cl.3.1]

(b) The language of the Contract documents is **English**. [Cl.3.1]

7.1 The limit of subcontracting is **49%.** [Cl.7.1]

8.1 Schedule of Other Contractor – **NIL** [Cl.8.1]

13.1. Amount for insurance are: [Cl.13.1]

a) Rupees equivalent to Contract price.
b) Rupees equivalent to 5% of Contract price.
c) Rupees equivalent to 5% of contract price
d) Rupees 20 lakhs for multiple incidents
And deductible as per premium rate.

14.1 Site Investigation Report – NIL [Cl 14.1]

27.3 Amount to be withheld for delays in submission of updated programme: Rs. 10,000 per dayup to a maximum limit of Rs. 5,00,000/-.

33 The Defects Liability Period for all items under the work is One (1) **year** from the actual recorded date of completion of the project.

45.1 (a) Amount of liquidated damages for delay in completion of works — 0.05 percent of the Contractprice, rounded off to the nearest thousand, per day with the minimum of Rs. 100000/- per day

(b) Maximum limit of liquidated damages for delay in completion of work. — 5 per cent of the Initial Contract Price rounded off to the nearest thousand

[Cl.45.1]

47.1. The standard form of Performance Security acceptable to the Executing Agency shall be an unconditional Bank Guarantee of the type as specified inthe Bidding Documents.

[Cl. 47.1]

54.1. The percentage to apply to the value of work not completed representing the Executing Agency's additional cost for completing the work shall be 20%.

[Cl.54.1]

SECTION - VI

Scope of Work& Technical Specifications

Scope of Work under this EPC Contract

The responsibility of investigations, designing, planning, procurement, construction, safety, quality, and risk of engineering lies with the contractor. The Scope of work under this Contract includes construction of following buildings/structures in all respects as per tender drawings/approved working drawings/finishes matrix/Schedule of Quantities/Technical and Particular Specification/Conditions and Special Conditions of Contract:

I)Construction of shopping complex building near Polo ground,Leh in UT of Ladakh including electrical, PHE, Fire Fighting and other services complete as per tender drawings, Schedule of Quantities, approved construction drawings, specifications.

All items of work, part of work or work itself shown on the tender drawings or mentioned in the tender document are to be executed by the contractor. Non-appearance of any of the items either in the tender drawings or in the tender shall not vitiate the purpose for which the buildings shall be constructed. The contractor is responsible for carrying out all mandatory tests (field and at third party labs) on materials used for the work specified in CPWD Specifications 2019, Volume-I and Volume-II. All costs towards material testing shall be borne by the Contractor.
The time period for the project completion of work is **Twelve (12) months.**

The indicative scope of workof the contractor includes the following items:-

1) Clearing of Site,barricading the site area by using GI sheets supported suitably by MS Structures up to 6mt Height , Name Boards for safety and site development display, site watch and ward

2) Geo-technical investigation of sub-soil characteristics by specialized agency to assess the safe bearing capacity of the soil strata for structural design of foundation.

3) Preparation of working drawings of Architectural/Structural design and drawings/PHE/Electrical/Fire Fighting /boundary wall with MS gate, all other services and obtain approval of Engineer-in-Charge for execution. The structural design and drawings shall be vetted from IITs/NITs/Govt. Engineering college or any other approved institution.

4) Excavation and Top soil preservation

5) RCC isolated/combined Foundation

6) PCC and soiling

7) Backfilling and Compaction

8) RCC Substructure and Superstructure including staircase

9) Plinth beam and plinth area construction

10) Masonry in AAC blocks

11) Internal and External plaster

12) Pneumatic Water supply system including water meter, sewage disposal system, plumbing fittings and sanitary fixtures

13) Waterproofing of toilets, terrace, chajjas, balconies, refuge area, and other sunk areas etc.

14) Flooring, toilets,Terrace pantry tiling ,terrace flooring

15) Wooden paneled doors. Glazed wooden windowsand ventilators(woodenframes and DGU comprising 6 mm clear toughened glass+10 mm air gap +6 mm thick clear toughened glass) including complete hardware required and mortice locks with level handles and finishing.

16) Elevation features of wooden Ladakhi Pentsag/Shintang and bay window

17) Internal and external painting

18) Electrical conduiting, wiring, switchboards, electrical fittings & fixtures.The electrical component of the project includes the following:

a. PVC conduit pipe recessed in ceiling and wall has been taken for wiring purpose with modular accessories.
b. Provision of light points, fan points, light plug point 6 amp and power sockets point 16 Amp etc shall been made as per requirements.
c. Provision of 40KVA SILENT D.G. SET WITH STANDARD AMF CONTROL PANELset shall be provided for back up supply to common services only e.g.
    a. Lights in Toilets, Passage, stairs and security light
    b. Water supply system
    c. Lift supply
d. Provision of separate energy meter for electric supply of shops for each shop shall be made in the Main Electrical Panel. A separate energy meter has been proposed for common services.
e. LED Luminaires has been proposed taking into consideration of Energy saving.

19) Fire fighting system including underground and overhead fire water tanks, fire pumps shall include the following:

The proposed firefighting system shall mainly be consisting of:

- ***Static Water Storage Tanks***
  - Overhead tank : 10 Kl
  - Underground : 10 Kl
- ***Fire Pumps***
  (a) Two nos. Terrace driven pump with 900 lpm (1w+1s) discharge and 35M. Head.

- Down comer system with wet risers having 63mm dia single headed, single outlet landing hydrant valve within fire hose cabinet for every 1000 Sq.m of floor area per floor as per requirements, so that no portion within the building is more than 30m from an internal hydrant.

- Each internal fire hydrant station shall be housed in a fire hose cabinet, which shall be consisting of:

  (a) 63mm dia single headed landing hydrant valve.
  (b) Two nos. 63mm dia and 15m long rubberized fabric lined fire hosepipe as per I.S: 636 –1988.

  (c) 63mm dia gunmetal male and female instantaneous type coupling as per I.S: 903.

  (d) 20mm dia gunmetal branch pipe with 5mm outlet nozzle as per I.S: 903.

  (e) 20mm dia first-aid fire hose reels with 36.5m with 5mm bore gunmetal nozzle as per I.S: 884-1969.

  (f) Fireman's axe.

Wet riser system, shall be connected with the fire pumps, which will be operated automatically. **Therefore, entire system will remain pressurized all the time, so that water is always available with required pressure, for firefighting purpose. There shall be a provision for the fire brigade inlet connection with non-return valves to the fire ring main for emergency purpose.**

Fire Extinguishers

- ❒ The following type of portable fire extinguishers shall be provided at all levels of the towers, at strategic locations as per requirements, generally to follow IS – 2190: 1992)

Location	**Type Of Fire Extinguisher**
Main Gate (Security Gate/s)	Multipurpose 5kg ABC
Near FHC	Multipurpose 5kg ABC & 4.5 Kg CO2 Type
Meter Room	4.5 Kg Co2 gas type

Panels- HT / LT	4.5 Kg Co2 gas type
DG Set	Combination of 5Kg ABC & 4.5Kg Co2
Lift	Multipurpose 5kg ABC Type
AHU/ Electric room/Pump room	4.5 Kg Co2 gas type
Parking Area	Multipurpose 5kg ABC Type

20) Machine room less Liftof 13 persons capacity as per municipality (NMC) norms

21) Roof top heat pumps system for hot water supply to all fixtures of toilets, pantry.
22) Underground and overhead tanks fire and domestic water tanks with associated plumbing works

23) Telephone, DTH Cabling and data cabling works to all retail shops

24) Fire Pumps, Water Supply pumps, panels and pump room

25) Meter room, feeder pillar, main cabling, Earth pits, and Lightning arrester etc. .Separate energy meters shall be provided for each retail shop in the ground floor electrical room and a common meter for the common services.

26) Site office, temporary store and sample room, Construction Machineries, First aid box, safety material, sanitary facilities for labour, temporary lighting for site area while executing works, water supply and construction power arrangements.

27) Associated works related to Green building features

28) Storage of water(Minimum capacity): **All overhead water tanks shall be housed in a glass house covered on all four sides and top with an access door made of aluminum section frame work and 6 mm glass panels.**

- Under Ground water tank for fire and domestic requirements = 10 KLD
- Over Head Fire HDPE storage tank (insulated) = 10 KLD
- Over Head HDPE Domestic water Tank (insulated) = 3 KLD
- Over Head Hot water Tank (insulated) = 3 KLD

29) Bio-Digestor for sewage treatment: Minimum capacity shall be 10 KLD.It shall be designed to perform even in -35 degree C temperature.

30) 200 mm dia borewell of minimum 100 m deep along with full depth uPVC casing pipe, submersible pump, supply and delivery pipes and electrical connections.

31)Following material for piping shall be used for PHE component :

- PPR pipes with insulation in chases, in shafts, PPR pipes on terrace and for underground installations for domestic water supply.
- Upvc pipe (Type-B) material for sewage & drainage pipes within the core of the building.
- Upvc pipe (Type-A) material for rainwater down-takes on the external fascia of the building.
- DWC pipes for external sewage disposal (manhole to manhole connection).
- RCC/DWC pipes for external storm water drainage (manhole to manhole connection).

32) Boundary wall on all four sides of the plot made of 300 mm thick PCC block masonry and MS grill on top of the boundary wall. A mild steel sliding gate of 6.0 m wide (in one or two leaves) shall be provided on front side.

33) IP based CCTV Surveillance system as per specifications and approved drawings.

34) A rectractable roofing system made of polycarbonate sheets and pre-painted MS framing system shall be provided on the terrace of the building as indicated in the tender drawing. Shop drawings of the system shall be submitted to Engineer-in-Charge for approval before procurement.

35)Obtaining all statutory NOC/approvals as applicable in UT Ladakh.

Note: **Above items are only indicative and for guidance & brief description of jobs, but sh ould not be considered limited to this list. Tenderer should refer to the detailed tender documents,finishes matrix,technical and particular specifications, Special Conditions of Contract and tender drawings, schedule of quantities for detailed items and scope of work included in this project. Any discrepancy in the above shall be brought to the notice of NHIDCL in the pre-bid meeting.**

GENERAL SCOPE/COMPLAINCE FOR GREEN BUILDING

Introduction:

NHIDCL has engaged consultant for providing Comprehensive services for Architectural, Green building Consultancy services best suiting the local climate, herein further referred as Architect-Consultant. The contractor has to follow the instruction given by Architect-consultant.

Proposed project is comprehensively designed in association with the Architect Consultant and their structural and MEP Building Consultants by suitably incorporating green building requirements to achieve desired Green Building features. However, if there are certain items which are not detailed out or mentioned in the tender shall also be required to be executed as per the instructions of Engineer-in-Cgarge in order to make it functional Green Building well responding to the local climate.

NHIDCL and their consultants has incorporated possible green building feature in the design, specification, Schedule of Quantities and scope of work. However, the achievement of green building functions is possible only upon contractor's commitment and compliance of relevant green building criteria.

Contractor to submit a narrative, supported with Invoices and certificate from manufacturer and test certificate and Photographs for the same for showing the compliance of green building Conditions.

Commitment, Compliance & Appraisal of green building Criteria:

The contractor shall commit and comply with the green building guidelines, advice and instructions of NHIDCL . Photos to be taken daily and especially to support the following conditions and submitted along with narratives. Failure to do so will be considered as non-compliance to tender agreement and result in charging of penalty. Some of the important GRIHA Criteria's along with their requirements have been briefly indicated hereunder:-

a) Preserve and protect landscape during construction/compensatory depository forestation:
1. Construction activities to been planned in a way that excavation & construction work, up to plinth level is not coinciding with rainy season and the site disruption is restricted to pre-designated areas.
2. Construction work and erosion control applications to be scheduled and sequenced during dry weather periods when the potential for erosion is the lowest.
3. Measures such as collecting runoff from construction areas and material storage sites; diverting water flow away from such polluted areas, so that pollutants do not mix with storm water runoff undisturbed areas.
4. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant-laden water directly to treatment device or facility. The plan shall indicate how the above is accomplished on site, well in advance of the commencing of the construction activity.

5. Topsoil removal and preservation to be compulsorily done. Topsoil shall be stripped to a depth of 200 mm from areas proposed to be occupied by buildings, roads, paved areas and external services. Topsoil is rich in organic content and is essential to establish new vegetation. It shall be stockpiled to a height of 400 mm in designated areas and shall be reapplied to site during plantation of the proposed vegetation. Topsoil shall be separated from sub-soil debris and stones larger than 50 mm diameter. The stored top soil may be used as finished grade for planting areas. If the topsoil is not stored on site, it can be alternatively given to the nursery or for gardening purposes. Documentation of topsoil preservation has to be maintained at site as per the requirement of Architect Consultant/NHIDCL.
6. Spill prevention and control plans to be made and submitted, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, petroleum products, fertilizers and solvents.
7. Protect & Preserve existing trees, if any, as per directions of Engineer-in-Charge-in-charge.
8. Slope construction techniques to control erosion to be used when construction during wet season is unavoidable. Sedimentation collection systems, drainage systems and run off diversion systems shall be installed before construction activity. The Architect-Consultant/ Engineer-in-Charge shall monitor the site conditions and progress of work and schedule appropriate timing and sequencing of construction.
9. Soil erosion to be avoided by maintaining a protective cover on the soil, and creating a barrier to the erosive agent (i.e., wind and water).
10. Stabilize bare soils on the site: by using erosion control mats, seeding / planting.
11. Remove sediment from runoff before it leaves the site: use stabilized construction entrances/exits, silt fences, sediment traps, check dams etc.
12. Plan soil disturbance activities for the dry season.
13. Making Silt fences to hold water, allowing sediment to settle out as an effective sediment control measure.

b) Provide minimum level of sanitation/safety facilities for construction workers:

1. Ensure the health and safety of workers during construction, with effective provisions for the basic facilities such as sanitation and drinking water, and safety PPEs/equipment's for workers, first aid box, etc. at site.
2. Ensure cleanliness of workplace with regard to the disposal of waste and effluent; provide clean drinking water and latrines and urinals as per applicable standard.

c) Reduce Air and Noise pollution during construction:

1. Cover skips and trucks loaded with construction materials and continually damp down with low levels of water.
2. Segregate, tightly cover and monitor toxic substances to prevent spills and possible site contamination.
3. Cover up and protect all drains on site.
4. Collect any wastewater generated from site activities in settlement tanks, screen, discharge the clean water, and dispose of remaining sludge according to environmental regulations.
5. Use low-sulphur diesel oil in all vehicle and equipment engines, and incorporate the latest specifications of particulate filters and catalytic converters. PUC of vehicles to be submitted.
6. No burning of materials on site.
7. Noise pollution to be reduced through careful handling of materials; modern, quiet power tools, equipment and generators; low impact technologies; and wall structures as sound shields.

d) Efficient water use during construction:-

1. The use of potable water during construction to be minimized.
2. Materials such as pre-mixed concrete for preventing loss during mixing or use recycled treated water and control the waste of curing water to be used.
3. Gunny bags to be used for column, plinth beams concrete curing and slabs to be cured by water ponding.

e) Utilization of locally available mud in the building structure:

1. Use of low-embodied energy locally available mud as the construction material. Use of locally available mud , brickwork, plaster, block-work, etc. in the building.

f) Reduce volume, weight, and time of construction by adopting an efficient technology:

1. Use pre-cast systems, ready-mix concrete, etc.
2. Replace a part of the energy-intensive materials with less energy-intensive materials and/or utilize regionally available materials, which use low energy/energy-efficient technologies.

g) Use low-energy material in the interiors:

1. Out of the total quantity of all interior finishes and products used in each of the categories mentioned below, a minimum of 70% should be low-energy finishes/ materials/ products, which minimize wood as a natural resource or utilize industrial waste by using products in any category as listed.

1.1 Sub-assembly/internal partitions/false ceiling/in-built furniture

1.2 Flooring
1.3 Doors/windows and frames

2. Before ordering materials contractor to ask Green Building Certificate from manufacturer or dealer and submit the same to Architect-Consultant and NHIDCL for approval or While ordering materials following should be considered:-

2.1 Purchasing materials that have a recycled content
2.2 Ordering paints with low odour and VOC emissions
2.3 Minimize packaging
2.4 Ordering in standard sizes to minimize on site cutting and wastage
2.5 Provide adequate storage that is weatherproof and secure
2.6 Follow suppliers' storage instructions
2.7 Keep harmful chemicals in secure areas
2.8 Protect lightweight materials from wind
2.9 Store liquids and sand away from drains and water courses

h) Water recycle and reuse (including rainwater):

1. Rainwater storage and recharge system to be implemented at site including ground water recharge where potable municipal water is normally used, to reduce the load on municipal supplies and to improve the groundwater level.

i) Reduction in waste during construction:

1. Ensure maximum resource recovery and safe disposal of wastes generated during construction and reduce the burden on landfill.
2. Keep record of the waste generated and take pictures.
3. Designate separate areas for storage of recyclables
4. Submit records tabulating the total waste material generated and the quantities which were diverted from landfills.
5. A minimum of 4% of the total site area should be allocated for storage of the waste. This storage area should be covered and the pollutants from the waste should not affect the surrounding.

j) Efficient waste segregation:

1. Different types of waste to be segregated in different categories of waste sections /areas during construction to promote the segregation of waste.

k) Use of low-VOC (volatile organic compounds) paints/ adhesives / sealants:

1. VOC Limits for Materials

Please follow the type of material & their VOC Limit as mentioned below:-

Paints:-

Non-flat paints - 150 g/L

Flat (Mat) paints - 50 g/L
Anti-corrosive/ anti-rust paints - 250 g/L
Varnish - 350 g/L

Adhesives:

Tile adhesives - 65 g/L
Wood - 30 g/L

l) Reduce the water use by the building:

1. Flow rates of Water Fixtures:-

Select water fixtures whose average flow rates / capacities should not exceed the values mentioned below. Baseline Flow Rates / Capacity for Water Fixtures in a Typical Household are:-

1. Flush fixtures - LPF 6/3
2. Flow fixtures - LPM 12

At a flowing water pressure of 3 bar

2. Flow fixtures include faucets, basin mixer, taps, showers, shower mixers. The baseline flows can be demonstrated at flowing water pressure of 3bar. Flowing water pressure of 3bar does not mean that the water supply inthe building is at 3 bar.

3. The building fixtures can operate at lower pressures but to show compliance under this credit, the design flow rates are to be submitted at 3 bar. The average flow rate is a simple arithmetic average of all the respective flush / flow fixtures

m) Minimize ozone - depleting substances:

1. Halon-free fire suppression and fire extinguishing systems to be used to eliminate or control the release of ozone-depleting substances into the atmosphere wherever applicable.

n) Ensure water quality:

1. Ensure groundwater and municipal water meet the water quality norms as prescribed in the Indian Standards for various applications (Indian Standards for drinking [IS 10500-1991], irrigation applications [IS 11624-1986]. In case the water quality cannot be ensured, provide necessary treatment to raw water for achieving the desired concentration for various applications.

TECHNICAL SPECIFICATIONS

A. TECHNICAL SPECIFICATION OFCIVIL WORKS:

1.0 GENERAL:

1.1 The work shall in general conform to the **Latest CPWD Specifications Volume-I and Volume-II 2019** (corrected up to the last date of submission/uploading of bid). Work under this Contract shall consist of furnishing all labour, materials, equipment, tools & plants and appliances necessary and required.

1.2 The Contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other Contractor(s) or by the Engineer-in-Charge-in-Charge and shall as far as possible arrange his work and shall place and dispose of thematerials being used or removed, so as not to interfere with the operations of otherContractor simultaneously working or he shall arrange his work with that of the others inan acceptable and coordinated manner and shall perform it in proper sequence to thecomplete satisfaction of others.

1.3 Regarding testing of civil & electrical & other materials, the testing of materials shall beconducted in Govt. Laboratory/ Govt. Engineer-in-Charge Colleges/ IITs/ NITs or from thelaboratory approved by Engineer-in-Charge. **The charges of samples, packing and transportation ,testing charges shall be borne by the Contractor.**

1.4 No payment shall be made for any damage caused by rain, snowfall, flood or any othernatural calamity, whatsoever during the execution of the work. The Contractor shall befully responsible for any damage to the govt. property and work for which the payment hasbeen advanced to him under the contract and he shall make good the same at his risk andcost. The Contractor shall be fully responsible for safety and security of his material, T&P,Machinery brought to the site by him.

1.5 The Contractor shall comply with the safety procedures, norms and guidelines (asapplicable) as outlined in the document Part 7 Constructional practices and safety- 2016,National Building code of India, Bureau of Indian Standards. A copy of all pertinentregulations and notices concerning accidents, injury and first-aid shall be prominentlyexhibited at the work site. Depending upon the scope & nature of work, a person qualifiedin first-aid shall be available at work site to render and direct first-aid to causalities. Atelephone may be provided to first-aid assistant with telephone numbers of the hospitalsdisplayed. Complete reports of all accidents and action taken thereon shall be forwarded to the competent authorities.

1.6 Contractor should spray curing water on concrete structure and shall not allow free flowof water. Concrete structures should be kept covered with thick cloth/gunny bags andwater should be sprayed on them. Contractor shall do water ponding on all sunken slabsusing cement and sand mortar.

1.7 **Approved Makes**:

Specification/brands names of materials to be used as per the scope of work are listed inthe bid documents. The Contractor should also consider the availability of spares parts/ componentsfor maintenance purposes while proposing any brand/ manufacturer. The materials of anyother brand/manufacturer may be proposed for use by the Contractor in case the brandsspecified below are not available in the market and/or Contractor intends to use someother brand better than the brands mentioned in this list. The alternate brand can be usedonly after the approval of Engineer-in-Charge. The list of approved makes is appended to this document.

1.8 **Method Statement:**
The Contractor shall submit a 'Methods statement' for each important activity for theapproval of the Engineer-in-Charge-in-charge soon after the award of work to him. The 'Methodstatement' is a statement by which the construction procedures for any activity ofconstruction is formulated and stated in chronological order. The 'Methods statement',should have a description of the item with elaborate procedures in steps to implement thesame, the specifications of the materials involved, their testing and acceptance criteria,equipment to be used, Precautions to be taken, etc.

1.9 The work shall be carried out in accordance with the Design Basis Report,Architectural drawings and structural drawings (proof checked/vetted by theContractor) and approved by the Engineer-in-Charge. The Technical Specificationsare to be read with and in general conforming to the Latest CPWD Specifications.

1.10 The Contractor shall procure the required materials in advance so that there issufficient time to testing of the materials and clearance of the same before use in thework. The Contractor shall provide at his own cost suitable weighing and measuringarrangements at site for checking the weight / dimensions as may be necessary forexecution of work.

2.0 **For Detailed Specification of J&K/DSR items of Civil works (Based on J&K SoR 2020/DSR 2019) mentioned in BOQ shall be as per latest CPWD Specification 2019 VOLUME I AND VOLUME II** (corrected up to the last date of submission/uploading of bid)

B. **TECHNICAL SPECIFICATION OFPUBLIC HEALTH WORKS**:

1.0 For Detailed Specification of DSR items of Public health works mentioned in SOQ shall be as per CPWD specification 2019 VOLUME I AND VOLUME II (corrected up to the last date of submission/uploading of bid)

2.0 For Non-scheduled item mentioned in SOQ shall be installed as per manufacturer's direction approved by the Engineer-in-Charge.

3.0 Specification/brands names of fixtures to be used as per the scope of work are listed inthe bid documents. The efforts should be made by the Contractor to use indigenousproducts. The Contractor should also consider the availability of spares parts/ componentsfor maintenance purposes while proposing any brand/ manufacturer. The materials of anyother brand/manufacturer may be proposed for use by the Contractor in case the brandsspecified below are not available in the market and/or Contractor intends to use someother brand better than the brands mentioned in this list. The alternate brand can be usedonly after the approval of Engineer-in-Charge. The list of approved makes is appended to this document.

C. TECHNICAL SPECIFICATION OFELECTRICAL WORKS:

1.0 INTERNAL ELECTRICAL WORKS INSTALLATION & ALLIED WORKS

For Detailed Specification of DSR items of Internal Electrical works mentioned in SOQ shall be as per CPWD General specification for electrical works Part 1 (Internal) 2013 (corrected up to the last date of submission/uploading of bid).

1.0 GENERAL

The electrical Installation work shall be carried out in accordance with Indian Standard Code of Practice. It shall also be in conformity with the current Indian Electricity rules and regulations of local Electricity Rules. Fire Insurance Rules, I.S. Codes and Indian Electricity Rules.

General Specifications for Electrical Works.

- Part -I - Internal Work - 2005.
- Part -II - External Work - 2007.
- Part -IV - Substation Work - 2007.

Wherever this specifications calls for a higher standard of material and or workmanship than those required by any of the above mentions regulations and specification then the specification here under shall take precedence over the said regulations and standards.

The details of scope of work subhead wise are given in the subsequent paras. The quantities worked out in schedule of quantities are based on particular equipment considered at design stage. The contractor is required to recheck the quantities based on equipment offered by him to achieve required parameters.

TECHNICAL SPECIFICATION FOR L.T CABELS

1.0 GENERAL

L.T. Cables shall be supplied, inspected, laid tested and commissioned in accordance with drawings, specifications, relevant Indian Standards specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drums. The recommendations of the cable manufacturer with regard to jointing and sealing shall be strictly followed.

1.2 MATERIALS

The L.T. Power cables shall be XLPE insulated PVC sheathed type aluminium conductor armoured cable conforming to IS : 7098 : 1988 (Part-I) with upto date ammendments where as control cable shall be XLPE insulated and PVC

sheathed copper conductor armoured/ unarmoured cable conforming to IS:7098 (Part-I) 1988.

1.3 INSTALLATION OF CABLES

Cables shall be laid directly in ground, pipes, masonry ducts, on cable tray, surface of wall/ceiling etc. as indicated on drawings and/or as per the direction of Engineer-in-Charge. Cable laying shall be carried out as per CPWD specifications.

1.4 INSPECTION

All cables shall be inspected at site and checked for any damage during transit.

1.5 JOINTS IN CABLES

The Contractor shall take care to see that the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoiding of cable joints. This apportioning shall be got approved from Engineer-in-Charge before the cables are cut to lengths.

1.6 LAYING CABLES IN GROUND

Cables shall be laid by skilled experienced workmen using adequate rollers to minimize stretching of the cables. The cable drums shall be placed on jacks before unwinding the cable. With great care it shall be unrolled on over wooden rollers placed in trenches at intervals not exceeding 2 metres. Cables shall be laid at depth of 0.75 metres below ground level. A cushion of sand total of 250mm shall be provided both above and below the cable, joint boxes and other accessories. Cable shall not be laid in the same trench or along side a water main.

The cable shall be laid in excavated trench over 80mm layer of sand cushion. The relative position of the cables, laid in the same trench shall preserved. At all changes in direction in horizontal and vertical planes, the cables shall be bent smooth with a radius of bent not less than 12 times the diameter of cables. Minimum 3 metre long loop shall be provided at both end of cable.

Distinguishing marks may be made on the cable ends for identifications of phases. Insulation tapes of appropriate voltage and in red, yellow and blue colours shall be wrapped just below the sockets for phase identifications.

1.7 PROTECTION OF CABLES

The cables shall be protected by bricks laid on the top layer of the sand for the full length of underground cable. Where more than one cables is laid in the same trench, the bricks shall cover all the cables and shall project a minimum of approximately 80mm on either side of the cables. Cable under road crossings and any other places subject to heavy traffic, shall be protected by running them through Hume Pipes of suitable size.

1.8 **EXCAVATION & BACK FILL**

All excavation and back fill required for the installation of the cables shall be carried out by the Contractor in accordance with the drawings and requirements laid down elsewhere. Trenches shall be dug true to line and grades. Back fill for trenches shall be filled in layer not exceeding 150mm. Each layer shall be properly rammed and consolidated before laying the next layer.

The Contractor shall restore all surface, roadways, side walks, kerbs wall or the works cut by excavation to their original condition to the satisfaction of the Engineer-in-Charge-In-Charge.

1.9 **LAYING OF CABLES ON CABLE TRAY/SURFACE OF WALL/CEILING**

Cable shall be laid on perforated M.S. Cable tray. Cables shall be properly dressed before cable ties/clamps are fixed. Wherever cable tray is not proposed, cables shall be fixed on surface of wall or ceiling slab by suitable MS clamps/ saddles**.** Care shall be taken to avoid crossing of cable.

1.10 **CABLES ON HANGERS OR RACKS**

The Contractor shall provide and install all iron hangers racks or racks with die cast cleats with all fixings, rag bolts or girder clamps or other specialist fixing as required.

Where hangers or racks are to be fixed to wall sides, ceiling and other concrete structures, the Contractor shall be responsible for cutting away, fixing and grouting in rag bolts and making good.

The hangers or racks shall be designed to leave at least 25mm clearance between the cables and the face to which it is fixed. Multiple hangers shall have two or more fixing holes. All cables shall be saddled at not more than 150mm centres. These shall be designed to keep provision of some spare capacity for future development.

1.11 **CABLES TAGS**

Cable tags shall be made out of 2mm thick aluminium sheets, each tag 1-1/2 inch in dia with one hole of 2.5mm dia, 6mm below the periphery. Cable designations are to be punched with letter/number punches and the tags are to be tied inside the panels beyond the glanding as well as below the glands at cable entries. Trays tags are to be tied at all bends. On straight lengths, tags shall be provided at every 5 metres / at both ends only.

1.12 **TESTING OF CABLES**

Prior to installation, burying of cables, following tests shall be carried out. Insulation test between phases, phase & neutral, phase & earth for each length of cable.

a. Before laying.
b. After laying.

c. After jointing.

On completion of cable laying work, the following tests shall be conducted in the presence of the Engineer-in-Charge-In-Charge.

a. Insulation Resistance Test (Sectional and overall).

b. Continuity Resistance Test.

c. Earth Test.

All tests shall be carried out in accordance with relevant Indian Standard code of practice and Indian Electricity Rules**.** The Contractor shall provide necessary instruments, equipments and labour for conducting the above tests & shall bear all expenses of conducting such tests.

TECHNICAL SPECIFICATION FOR CABLE TRAY

1.0 CABLE TRAY

The cable tray shall be fabricated out of slotted/perforated MS sheets as channel, sections, single or double bended**.** The channel sections shall be supplied in convenient lengths and assembled at site to the desired lengths. These may be galvanized or painted to the desired lengths. Alternatively, where specified, the cable tray may be fabricated by two angle irons of 50mm x 50mm x 6mm as two longitudinal members, with crosses bracings between them by 50mm x 5mm flats welded/bolted to the angles at 1 m spacing. 2mm thick MS perforated sheet shall be suitably welded/bolted to the base as well as on the two sides.

Typically, the dimensions, fabrication details etc.are shown in CPWD General Specification for Electrical Works - Part II -External, 1994**.**

The jointing between the sections shall be made with coupler plates of the same material and thickness as the channel section. Two coupler plates, each of minimum 200mm length, shall be bolted on each of the two sides of the channel section with 8mm dia round headed bolts, nuts and washers. In order to maintain proper earth continuity bond, the paint on the contact surfaces between the coupler plates and cable tray shall be scraped and removed before the installation**.**

The maximum permissible uniformly distributed load for various sizes of cables trays and for different supported span are as per CPWD General Specification of Electrical Work Part II -1994. The sizes shall be specified considering the same.

The width of the cable tray shall be chosen so as to accommodate all the cable in one tier, plus 30 to 50% additional width for future expansion. This additional width shall be minimum 100mm. The overall width of one cable tray shall be limited to 800mm.

Factory fabricated bends, reducers, tee/cross junctions, etc. shall be provided as per good Engineering practice. Details are typically shown in figure 3 of CPWD General Specification of Electrical Work Part-II -1994. The radius of bends,

junctions etc. shall not be less than the minimum permissible radius of bending of the largest size of cable to be carried by the cable tray.

The cable tray shall be suspended from the ceiling slab with the help of 10mm dia MS rounds or 25mm x 5mm flats at specified spacing as per of CPWD General Specification of Electrical Work Part II -1994. Flat type suspenders may be used for channels upto 450mm width bolted to cable trays. Round suspenders shall be threaded and bolted to the cable trays or to independent support angles 50mm x 50mm x 5mm at the bottom end as specified. These shall be grouted to the ceiling slab at the other end through an effective means, as approved by the Engineer-in-Charge, to take the weight of the cable tray with the cables.

The entire tray (except in the case of galvanized type) and the suspenders shall be painted with two coats of red oxide primer paint after removing the dirt and rust, and finished with two coats of spray paint of approved make synthetic enamel paint.

The cable tray shall be bonded to the earth terminal of the switch boards at both ends.

The cable trays shall be measured on unit length basis, along the center line of the cable tray, including bends, reducers, tees, cross joints, etc, and paid for accordingly.

Cable laid on cable tray shall be clamped on the tray at suitable intervals as per CPWD specifications.

TECHNICAL SPECIFICATION OF POINT WIRING

1.0 **SCOPE**

This section covers the general technical requirements and measurement of the various component in Internal Electrical Installation Works.

1.1 **TERMINOLOGY**

The definition of terms shall be accordance with IS 732: 1989 (Indian Standard Code of Practice for Electrical Wiring), except for the definitions of point, circuit and submain wiring, which are defined in Clause 1.2, 1.3 and 1.3.2 hereunder.

1.2 **POINT WIRING**

1.2.1 Definition :

A point (other than socket outlet point) shall include all works necessary in complete wiring to the following outlets from the controlling switch or MCB. The scope of wiring for a point shall, however, includes the wiring work necessary in tapping from another point in the same distribution circuit: -

a) Ceiling rose or connector (in the case of points for ceiling/ exhaust fan points, pre-wired light fittings and call bells)

b) Ceiling rose (in case of pendants except stiff pendants)

c) Back plate (in the case of stiff pendants)

d) Lamp holder (in the case of gooseneck type wall brackets, batten holders and fittings which are not pre-wired.

1.2.2 In the case of call bell points, the words “from the controlling switch or MCB” shall be read as “from the ceiling rose meant for connection to bell push”.

1.2.3 Scope

i) Following shall be deemed to be included in point wiring :

a) Conduit, accessories for the conduit and wiring cables between the switch box and point outlet, loop protective earthing of each fan/ light fixture.

b) All fixing accessories such as clips, nails, screws, Phil plug, rawl plug etc. as required.

c) Metal switch boxes for control switches, regulators, sockets etc. recessed or surface type and phenolic laminated sheet covers in case of piano type switches and outer & inner cover plates in case of modular type switches.

d) Outlet boxes, junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with switchboards for loose wires/ conduit terminations.

e) Control switch or MCB as specified.

f) Ceiling rose or connector as required.
g) Connections to ceiling rose, connector, lamp holder, switch etc.

h) Interconnection wiring between points on the same circuit, in the same switch box or from another.

i) Protective (loop earthing) conductor from one metallic switch box to another in the distribution circuits, and for socket outlets. (The length of protective conductor run alongwith the circuits/ submains is excluded form the scope of points)

j) Based conduit or porcelain tubing where wiring cables pass through wall etc.

ii) Following shall be deemed to be included in group control point wiring :

Conduit, accessories for the conduit and wiring cables between the Switchboard/ MCBDB to the first point or wiring cable between points forming a group including loop protective earthing of each fan/ light fixture. (Providing MCB/Switch is not included in this scope and will be measured separately].

All fixing accessories such as clips, nails, screws, Phil plug, raw plug etc. as required.

Junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with Switchboard/ MCBDB for loose wires/ conduit terminations.

Ceiling rose or connector as required.

Connections to ceiling rose, connector & Switch/ MCB etc.

Bushed conduit or porcelain tubing where wiring cables pass through wall etc.

1.3.2 POINT WIRING FOR SOCKET OUTLET POINTS

i) The light plug (5 / 6 Amp) point and power(15 / 16 Amp) point wiring shall be measured on linear basis, from the respective tapping point of live cable, namely, switchbox, another socket outlet point, or the Sub distribution board as the case may be, upto the socket outlet.

ii) The metal box with covers, switch/ MCB, socket outlet and other accessories shall be measured and paid as separate item.

iii) The power point may be 15/5 Amp or 16/6 Amp 6 pin socket outlet, where so specified in the Tender documents. (2 pin or 5 pin socket outlet shall not be permitted.)

1.3.3 SWITCH CONTROL GROUP POINT WIRING

i) In the case of points with more than one point controlled by one switch, such points shall be measured in part i.e. from switch to the first point outlet as one point and (from switch to first point of group controlled point). Subsequent looping points i.e one point to another point in the same group will be measured under group controlled point (from one point to another point).

ii) No recovery shall be made for non provision of more than one switch in such cases.

1.3.4 MCB CONTROL GROUP POINT WIRING

i) In the case of points with more than one point controlled by one MCB, such points shall be measured in part i.e. from MCB to the first point outlet as one point and will be measured under group controlled point (from MCB to first point of group controlled point). Subsequent looping points i.e one point to another point in the same group will be measured under group controlled point (from one point to another point).

ii) Providing MCB is not covered in this scope and will be measured separately and shall be separately paid for.

1.3.5 TWIN CONTROL LIGHT POINTS WIRING

i) A light point controlled by two numbers of two way switches shall be measured as two points from the fitting to the switches on either side.

ii) No recovery shall be made for non-provision of more than one ceiling rose or connector in such cases.

1.4 CIRCUIT AND SUBMAIN WIRING

1.4.1 Circuit Wiring

Circuit wiring shall mean the wiring from the distribution board upto the tapping point for the nearest first point of that distribution circuit, viz. upto the nearest first switch box.

1.4.2 Submain Wiring

Submain wiring shall mean the wiring from one Main/Distribution switchboard to another. Measurement of circuit and submain wiring.

i) Circuit and submain shall be measured on linear basis along the run of the wiring. The measurement shall include all lengths from end to end of conduit exclusive of interconnections inside the switchboard etc. The increase on account of diversion or slackness shall not be included in the measurement

ii) The length of circuit wiring with two wires shall be measured from the distribution board to the first nearest switch box in the circuit irrespective of whether the neutral conductor is take to switch box or not.

iii) When wires of different circuit are grouped in as single conduit the same shall be measured on linear basis depending on the actual numbers and sizes of wires run.

iv) When circuit wires and wires of point wiring are run in the same conduit, circuit wiring shall be measured on linear basis depending on the actual number and sizes of wires run in the existing conduit. As far as, practicable circuit wiring and point wiring shall be drawn in different conduit.

v) Circuit wiring and submain shall not be run in the same conduit.

vi) Protective (loop earthing) conductors, which are run along the circuit wiring and the submain wiring, shall be measured on linear basis and paid for separately.

1.5 OTHER WIRING WORKS

i) Except as specified above for point wiring, circuit wiring and submain wiring, other types of wiring shall be measured separately on linear basis alongwith the run of wiring depending on the actual number and sizes of wires run.

1.6 SYSTEM OF DISTRIBUTION AND WIRING

The main distribution board and branch distribution board shall be controlled or provided with linked switch fuse unit or miniature circuit breaker (MCB) of specified rating on the phase or live conductor or combined phase and neutral control gear for incoming and outgoing as indicated in the BOQ.

Distribution of submain and circuits.

As per final approved single line diagram.

1.6.1 Balancing of Circuits

i) The balancing of circuits in three wire or poly phase installations shall be arranged before handling to the satisfaction of the Engineer-in-Charge-In-Charge.

1.6.2 Wiring System

i) Unless and otherwise specified in the tender documents, wiring shall be done only by the “Looping System”. Phase of live conductors shall be looped at the switch boxes and neutral conductors at the point outlets.

ii) Lights, fans and call bell shall be wired in the ‘lighting’ circuits. 15/ 16 Amp socket outlets and other power outlets shall be wired in the ‘Power’ circuits. 5/ 6Amp socket outlets shall be wired in the ‘lighting circuits’.

iii) The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear

1.6.3 Run of Wiring

The type of wiring shall be as specified in tender document, i.e. conduit.

Surface wiring shall run, as far as possible, along the walls and ceiling so as to be easily accessible for inspection.

In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-Charge-In-Charge.

In all types of wiring, due consideration shall be given for neatness, good appearance and safety.

1.6.4 Passing through walls or floors

When wiring cables are to pass through a wall, these shall be taken through a protection (Steel/PVC) pipe or porcelain tube of suitable size such that they pass through in a straight line without twist or cross in them on either end of such holes. The ends of metallic pipe shall be neatly bushed with porcelain, PVC or other approved material.

Where a wall pipe passes outside a building so as to be exposed to weather, the outer end shall be bell mouthed and turned downwards and properly bushed on the open end.

All floor openings for carrying any wiring shall be suitably sealed after installation.

1.6.5 Joints in Wiring

i) No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.

ii) There shall be no joints in the through runs of cables. If the length of final circuit or submain is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.

iii) Termination of multi-stranded conductors shall be done using suitable crimping type thimbles.

1.7 CONFORMITY TO IE ACT, IE RULES AND STANDARDS

i) All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 1910 and Indian Electricity Rules, 1956, amended up to date and a certificate to this effect shall be submitted by the contractor to the Owners.

ii) The works shall also conform to relevant Indian Standard Codes of Practice shall be followed.

1.8 GENERAL REQUIREMENTS OF COMPONENTS

1.8.1 Quality of Materials

All material and equipments supplied by the Contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site.

1.8.2 Conformity of Standards

a) All components shall conform to relevant Indian Standard Specification, wherever existing. However, for conduits, wiring cables, piano switches and socket outlets, ISI marked materials shall only be permitted.

b) The Indian Standards, including amendments or revisions thereof upto the date of tender acceptance, shall be applicable.

1.8.3 Interchangeability

Similar parts of all switches, lamp holders, distribution fuse boards, switchgears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

1.9 CABLES

1.9.1 Wiring Cables

Conductors of wiring cables (other than flexible cables) shall be of aluminium or copper, as specified.

Stranded aluminium conductor shall not be used in wiring cables upto and including 6 Sq.mm. size.

Unless and otherwise specified, copper conductor of size 1.5 Sq.mm. and above used for wiring shall be stranded.

1.9.2 Flexible Cables

i) Conductor of flexible cables shall be of copper. The minimum cross sectional area of conductor for flexible cable shall be 0.0006 Sq. inch (14/.0076" or 14/0.193 mm).

ii) Only 3 core flexible cables shall be used for connecting single-phase appliances.

iii) Unless armour, or tough rubber, or PVC sheath mechanically protects the flexible cables, these shall not be used in workshops and other places where they are liable to mechanical damage.

iv) Flexible cable connection to bell push from ceiling rose shall be taken through steel conduit/ metallic casing and capping.

1.10 WIRING ACCESSORIES

1.10.1 Control Switches For Points

i) Combined switch cum socket shall not be permitted.

ii) Control switch shall be placed only in the live conductor of the circuit. No single pole switch or fuse shall be inserted in the protective (earth) conductor, or earthed neutral conductor of the circuit.

1.10.2 Socket Outlets

i) 5/ 6Amp and 15/ 16Amp 6 Pin socket outlets shall be installed at the following positions, unless otherwise specified.

a) Kitchen/ Pantry 23 cm above working platform and away from the likely positions of stove and sink.

b) Toilets in non-residential building – 1.25 mt. Above floor level.

c) At all other places – 23 cm above floor level.

1.10.3 Switch box covers

Phenolic laminated sheet of 3 mm thick of approved shade shall be used for switch box covers in case of piano type switches. For modular type switches/sockets suitable outer and inner cover plates as specified shall be provided over the standard box as recommended by the manufacturers of modular type switch/ sockets and no separate sheet cover is required to be provided.

1.10.4 Ceiling Rose

i) A ceiling rose shall not be used on circuit the voltage of which normally exceeds 250 Volts.

ii) Only one flexible cord shall be connected to ceiling rose. Specially designed ceiling roses shall be used for multiple pendants.

iii) A ceiling rose shall not embody fuse terminal as an integral part of it.

1.11 FITTINGS

The type of fittings shall be as specified in BOQ of tender documents.

1.11.1 Indoor Type Fittings

i) The contractors shall supply the specified model and make of the fittings. The standard constructional features of specified make and model as given in the tender document are acceptable.

ii) Where conductors are required to be drawn through tube or channel leading to the fitting, the tube or channel must be free from sharp angles or projection edge, and of such size as will enable them to be wired with the conductors used for the final circuit without removing the braiding or sheathing. A far as possible all such tubes or channels should be of sufficient size to permit looping back.

iii) Pendants in verandahs and similar situations exposed to wind shall be of fixed rod type.

iv) Fittings using discharge lamps shall be complete with power factor correction capacitors, either integrally or externally. An earth terminal with suitable marking shall be provided for each fitting for discharge lamps.

v) Fittings shall be installed such that the lamp is at a height specified in approved drawings or as directed by the Engineer-in-Charge.

1.12 ATTACHMENT OF FITTINGS AND ACCESSORIES

1.12.1 Conduiting Wiring System

i) All accessories like switches, socket outlets, call bell pushed and regulators shall be fixed in flush pattern inside the switch/ regulator boxes. Accessories like ceiling roses, brackets, batten holders, stiff pendants etc. shall be fixed on metal outlet boxes.

ii) Brass screws shall be used to fix the accessories to their bases.

iii) The switch box/ regulator box shall normally be mounted with their bottom 1.25 m from floor level, unless otherwise directed by the Engineer-in-Charge.

1.12.2 Fixing of Walls and Ceiling

i) PVC sleeves/ dash fasteners should normally be used for fixing to walls or ceiling.

ii) Plugging of walls or ceiling can be done in a better way where neatness is the first consideration. In all such cases, an approved type of asbestos or fiber fixing plug (rawl or Phil plug) with correct size of tools shall be used and done in a workmanlike manner.

1.12.3 **FANS, REGULATORS AND CLAMPS**

1.12.3.1 Ceiling Fans

i) Ceiling fans including their suspension shall conform to relevant Indian Standards.

ii) Any additional hardware items required for installation of ceiling fans including fan hooks/ clamps as specified below, shall be provided as specified in BOQ as a separate item.

iii) All ceiling fans shall be wired to ceiling roses or to special connector boxes, and suspended from hooks or shackles, with insulators between hooks and suspension rods. There shall be no joint in the suspension rod.

iv) For wooden or steel joists and beams, the suspension shall consist of MS flat of size not less than 40mm x 6mm, secured on the sides of the joists or beams by means of two coach screws of size not less than 5 cm for each flat. Where there is space above the beam, a through bolt of size not less than 1.5cm dia shall be placed above the beam from which the flats are suspended. In the latter case, the flats shall be secured from movements by means of another bolt and nut at the bottom of the beam. A hook consisting of MS rod of size not less than 1.5 cm dia shall be inserted between the MS flat through oval holes on their sides. Alternatively, the flats may be bent inwards to hold tightly between them by means of a bolt and nut, a hook of 'S' form.

v) In the case of 'I' beams, flats shall be shaped suitably to catch the flanges and shall be held together by means of a long bolt and nut.

vi) For concrete roofs, a 12mm dia. MS rod in the shape of 'U' with their vertical legs bent horizontally at the top at least 19cm on either side and bound to the top reinforcement of the roof shall be used.

vii) In buildings with concrete roofs having a low ceiling height, where the fan clamp mentioned under sub clause (vi) above cannot be used, or wherever specified, recessed type fan clamp inside a metallic box shall be used. The metallic box shall suitably be covered with 3mm thick phenolic laminated sheet.

viii) Canopies on top of suspension rod shall effectively hide the suspension.

ix) The leading in wire shall be of copper and nominal cross sectional area not less than 1.5 Sq.mm. and shall be protected from abrasion.

x) All ceiling fans shall be hung at a height as directed by the Engineer-in-Charge-In-Charge.

xi) In the case of measurement of extra down rod for ceiling fan including wiring, the same shall be measured in units of 10 cm. Any length less than 5cm shall be ignored.

xii) The wiring of extra down rod shall be paid as supplying and drawing cable in existing conduit.

1.12.3.2 Exhaust Fans

i) Exhaust fans shall conform to relevant Indian Standards.

ii) Exhaust fans shall be erected at the places indicated by the Engineer-in-Charge-In-Charge additional hardware items required for installation of ceiling fans including fan hooks/ clamps as specified below, shall be provided as specified in BOQ as a separate item.

1.12.3.3 Regulators

The metallic body of regulators of ceiling fans / exhaust fans shall be connected to earth by protective conductor.

1.12.3.4 Workmanship

Good workmanship is an essential requirement to be complied with. The entire work of manufacture/ fabrication, assembly and installation shall conform to sound Engineering practice.

The work shall be carried out under the direct supervision of an Engineer-in-Charge, employed by the contractor, who shall rectify then and there the defects pointed out by the Engineer-in-Charge-In-Charge during the progress of work. The qualification of Engineer-in-Charge or supervisor for over all supervision and to take instructions from the Engineer-in-Charge-In-Charge shall be as specified in the special conditions.

1.13 TESTING OF INSTALLATION

All the completed installations shall be tested as per specification for “Testing of Installation”.

1.13.1 Drawings

i) The work shall be carried out in accordance with the drawings enclosed with the tender documents and also in accordance with modification thereto from time to time as approved by the Engineer-in-Charge-In-Charge or as per the drawing prepared by the contractor based on inventory and approved by Engineer-in-Charge-In-Charge.

ii) All wiring diagrams shall be deemed to be ‘Drawings’ within the meaning of the term as used in the Conditions of Contract. They shall indicate the main switchboard, the distribution boards (with circuit numbers controlled by

them), the runs of various mains and submains and the position of all points with their controls.

iii) All circuits shall be indicated and numbered in the wiring diagram and all points shall be given the same number as the, circuit to which they are electrically connected.

1.14 COMMISSIONING OF COMPLETION

1.14.1 Before the workman leaves the work finally, he must make sure that the installation is commissioned, after due testing.

1.14.2 Completion Plan and Completion Certificate

i) For all E&M items , completion certificate after completion of work as required by NHIDCL/Employer shall be submitted to the Engineer-in-Charge.

ii) Completion plan drawn to a suitable scale in tracing sheet with three blue print copies of the same shall also be submitted.

a) General Layout of the building.

b) Locations of main switchboard and distribution boards.

c) Position of all points and their controls indicating the circuit numbers controlled by them.

d) Types of fittings, viz. C.F.L., L.E.D. bracket fans, Exhaust fans etc.

e) Name of work, job number, accepted tender reference, actual date of completion, name of Engineer-in-Charge, and name of the firm who executed the work with their signature.

NON-METALLIC CONDUIT WIRING SYSTEM

1.0 SCOPE

This section covers the detailed requirements for wiring work in non metallic conduits. This section covers both surface and recessed types of works.

1.1 APPLICATIONS

Conduit system used shall be Rigid.

Flexible conduits may only be permitted for interconnections between switchgear & DBs and conduit terminations in wall.

1.2 MATERIALS

1.2.1 Conduits :

i) All rigid conduit pipes shall be of Heavy grade F.R.L.S. PVC. The wall thickness shall be 1.6mm (16 SWG) for conduits upto 32mm dia. and 2mm (14 SWG) for conduits above 32mm dia and as per IS. These shall be solid drawn or reamed by welding, and finished with galvanized or stove enameled surface.

ii) The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given size wise in TableI., and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run.

iii) No conduits less than 20mm in diameter shall be used.

1.2.2 Conduits Accessories :

i) The conduit wiring system shall be complete in all respects, including their accessories.

ii) All conduit accessories shall be of slip joint type, and under no circumstances pin grip type or clamp grip accessories shall be used.

iii) Bends, couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works.

iv) a) Saddles for surface conduit work on wall shall not be less than 0.55mm (24 gauge) for conduits upto 25mm dia and not less than 0.9mm (20 gauge) for larger diameter. The corresponding widths shall be 19mm and 25mm.

b) The minimum width and the thickness of girder clips used for fixing conduits to steel joints, and clamps shall be as per Table-II.

1.2.3 Outlets :

i) The switch box regulator box shall be made of metal on all sides, except on the front. In case of welded mild steel sheet boxes the wall thickness shall not be less

than 1.2mm (18 gauge) for boxes upto a size of 20 cm x 30 cm and above this size 1.6mm (16 gauge) thick MS boxes shall be used. The metallic boxes shall be duly painted with anticorrosive paint before erection as per painting specification.

ii) a) Outlet boxes for light/ power sockets shall be of standard size of manufacturer to accommodate required number of modular switches, socket outlet.

b) Where a large number of control switches and/ or fan regulators are required to be installed at one place, these shall be installed in more than one outlet box adjacent to each other for ease of maintenance.

iii) An earth terminal with stud and metal washers shall be provided in each DB/MS box for termination of protective conductor and for connection to socket outlet/ metallic body of fan regulator etc.

iv) A metal strip shall be welded/ screwed, to the metal box as support if fan regulators are to be fixed herein.

v) Clear depth of the box shall not be less than 50mm, and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern.

vi) The fan regulators can also be mounted on the switch box covers, if so directed by the Engineer-in-Charge-In-Charge.

vii) The size of the switchbox in case of piano type switches shall be as below

a) Without any fan regulator/ Dimmer on the Switch box:- The size of the switch box shall be minimum 75mm x 75mm x 60mm deep to accommodate the number of switches meeting spacing requirements mentioned below.

b) With electronic/ resistance type fan regulator on the Switch box:- The size of the switch box shall be minimum 75mm x 75mm x 60mm to accommodate the number of switches and fan regulators meeting spacing requirements mentioned below.

Spacing Requirements

The spacing between any edge of live terminal of Switch/ socket and the body shall not be less than 26mm at any point.

viii) The size of the switch box in case of modular type switches shall be as per manufacturer's standard.

1.3 **INSTALLATION**

1.3.1 Common aspects for recessed and surface conduit works.

i) Conduit Joints

a) The conduit work in each circuit or section shall be completed before the cables are drawn in.

b) Conduit pipes shall be joined by means of slip joints and using proper adhesive

c) Cut ends of conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of the conductors while pulling them through such pipes.

d) The Engineer-in-Charge-In-Charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.

ii) Bends in Conduit

a) All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with bending radius of not less than 7.5 cm., or alternatively, by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.

b) No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet.

c) Conduit fittings shall be avoided as far as possible on conduit system exposed to weather. Where necessary, solid type fittings shall be used.

iii) Outlets

a) All outlets such as switches, wall sockets etc. may be either flush mounting type, or of surface mounting type, as specified in the additional specifications if any or as directed by the Engineer-in-Charge-In-Charge.

b) All piano type switches and accessories shall be fixed on the phenolic laminated sheet covers in flush pattern.

iv) Fixing Conduit On Surface

Conduit pipes shall be fixed by saddles, secured to suitable approved plugs with screws in an approved manner at an interval of not more than one metre, but on either side of the couplers or bends or similar fittings, saddles shall be fixed at a distance of 30 cm from the centre of such fittings.

Where conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips or clamps as required by the Engineer-in-Charge-In-Charge.

In long distance straight run of conduit, inspected type couplers at reasonable intervals shall be provided, or running threads with couplers and jam nuts shall be provided.

v) Fixing Outlet Boxes

Only a portion of the switch box shall be sunk in the wall, the other portion being projected out for suitable entry of conduit pipes into the box.

1.3.3 Additional requirements for recessed conduit works

i) Making Chase

a) The chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.

b) In the case of building under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.

c) In chase of exposed brick/ rubber masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

ii) Fixing Conduits in Chase

a) The conduit pipe shall be fixed by means of staples, J-hooks, or by means of saddles, not more than 60 cm apart, or by any other approved means of fixing.

b) All threaded joints of conduit pipes shall be treated with some approved preservative compound to secure protection against trust.

iii) Fixing Conduits in RCC work

a) The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

a) Fixing of standard bends or elbows shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with all long radius, which all permit easy drawing in of conductors.

iv) Fixing Inspection Boxes

Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary. The distance between inspection/ junction boxes shall not exceed 12.5 mts in straight run.

Location of inspection/ junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

These shall be mounted flush with the wall or ceiling concrete. Minimum 65mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be as per IS : 2667-1977.

Suitable phenolic laminated sheet cover shall be provided on the inspection box.

Suitable ventilating holes shall be provided in the inspection box covers.

v) Fixing Switch Boxes and Accessories

Switch boxes shall be mounted flush with the wall. All outlets such as switches, socket outlets etc. shall be flush mounting type, unless otherwise specified.

vi) Fish wire

To facilitate subsequent drawing of wires in the conduit, GI fish wire of 1.6mm / 1.2mm (16/ 18 SWG) shall be provided alongwith the laying of the recessed conduit.

vii) Bunching of Cables

a) Cables carrying direct current may, if desired, be bunched whatever their polarity, but cables carrying alternating current, if installed in metal conduit shall always be bunched so that the outgoing and return cables are drawn into the same conduit.

b) Where the distribution is for single phase loads only, conductors for these phases shall be drawn in one conduit.

c) In case of three phase loads, separate conduits shall be run from the distribution boards to the load points or outlets as the case may be.

1.3.4 Earthing Requirements

i) The entire system including the outlet boxes and other metallic accessories, shall be mechanically and electrically continuous by proper screwed joints, or by double check nuts at termination. The conduit shall be continuous when passing through wall or floors.

ii) Protective (loop earthing) conductor (s) shall be laid along the runs of the conduit between the metallic switch boxes and the distribution boards/ switchboards, terminated thereto. The conductors shall be of such size and material as specified. Depending upon their size and material, the protective earth conductors shall be either drawn inside the conduits alongwith the cables, or shall be laid drawn in outside the conduits. When laid external to the conduits, this shall be properly clamped with the conduit at regular intervals.

iii) The protective conductors shall be terminated properly using earth studs, earth terminal block etc. as the case may be.

iv) Gas or water pipe shall not be used as protective conductor (earth medium).

TABLE - I

Maximum number of PVC insulated 1100 V grade aluminium/copper conductor cable conforming to IS : 694 - 1990

Nominal Cross-Sectional area of conductor in sq.mm	20mm		25mm		32mm		38mm		51mm		64mm	
	S	B	S	B	S	B	S	B	S	B	S	B
1	2	3	4	5	6	7	8	9	10	11	12	13
1.50	5	4	10	8	18	12	-	-	-	-	-	-
2.50	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	6	9	7
35	-	-	-	-	-	-	3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

NOTE :

1. The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.

2. The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15 degrees.

3. Conduit sizes are the nominal external diameters.

TABLE - II

Girder clips or clamps

Size of Conduit		Width	Thickness
i)	20 mm	19 mm	0.9mm (20 SWG)
ii)	25 mm	19 mm	0.9mm (20 SWG)
iii)	32 mm & above	25 mm	1.2mm (18 SWG)

1.4 SPECIFICATION FOR PAINTING

1.4.1 SCOPE

This section covers the requirements of painting work in internal electrical installations, carried out manually by brush. This does not cover spray painting work of factory made items.

1.4.2 **PAIINTING WORK IN GENERAL**

1.4.2.1 PAINTS

Paints, oils, vanishes etc. of approved make, in original tin to the satisfaction of the Engineer-in-Charge-In-Charge shall only be use.

1.4.2.2 PREPRATION OF THE SURFACE

The surface shall be thoroughly cleaned and made free from dust or foreign matter before painting is started. The proposed surface may be inspected by the Engineer-in-Charge-In-Charge before the paint is applied.

1.4.2.3 APPLICATION :

i) Paint shall be applied with brush. The paint shall be spread as smooth and even as possible. Particular care shall be paid to rivets, nuts, bolts and over-lapping. Before drawing out in small containers, it shall be continuously stirred with a smooth stick, while painting work is taken up.

ii) Primary coat of anti-corrosive paint shall be given in the case of steel work, after preparation the surface. In all cases of painting work, finishing shall be with 2 coats of paint in approved shade.

iii) Each coat shall be allowed to dry out sufficiently before a subsequent coat is applied.

1.4.2.4 PRECAUTIONS

All furniture, fixture, glazing, floors etc. shall be protected by suitable covering. Al stains, smears splashing, dropping etc. shall be removed. While painting of wiring etc. it shall be ensured that the painting of wall and ceiling etc. is not spoiled in any way.

TESTING OF INSTALLATION

1.0 **SCOPE**

This section describes the details of test to be conducted in the completed internal electrical installation, before commissioning.

1.1 **GENERAL**:

1.1.1 TESTS

On completion of installation, the following tests shall be carried out :-

i) Insulation resistance test.
ii) Polarity test of switch.

iii) Earth continuity test.
iv) Earth electrode resistance test.

1.1.2 WITNESSING OF TESTS

Testing shall be carried out for the completed installations, in the presence of and to the satisfaction of the Engineer-in-Charge-In-Charge by the Contractor. All test results shall be recorded and submitted to the Department.

2.0 INSULATION RESISTANCE

The tests described below shall be made before the installation is permanently connected to the supply. For these tests large installations may be divided into groups of outlets, each containing not less than 50 outlets. For the purposes of this code the term 'outlet' includes every point and every switch except that a socket outlet, appliance or luminaire incorporating a switch is regarded as one outlet. The test voltage for insulation resistance measurement shall be 1000 V.

When measured with all fuse links in place, all switches (including, if practicable, the main switch) closed and, all poles or phases of the wiring electrically connected together, the insulation resistance to earth shall be not less than 1 mega ohm.

When measured between all the conductors connected to any one phase or pole of the supply and, in turn, all conductors connected to each other phase or pole the insulation resistance shall be not less than 1 mega ohm. Wherever practicable, so that all parts of the wiring may be tested, all lamps shall be removed and all current-using equipment shall be disconnected and all local switches controlling such lamps or other equipment shall be closed. Where the removal of lamps and/or the disconnection of current-using equipment is impracticable, the local switches controlling such lamps and/or equipment shall be open. Particular attention shall be given to the presence of electronic devices connected in the installation and such devices shall be isolated so that the test voltage does not damage them.

Where equipment is disconnected for the tests prescribed above, and the equipment has exposed conductive parts required by these clauses to be connected to protective conductors, the insulation resistance between the exposed conductive parts and all live parts of the equipment shall be measured separately and shall comply with requirements of the appropriate Indian Standard and the insulation resistance shall not less than 0.5 mega ohm.

3.0 POLARITY TEST OF SWITCH

In a two wire installation, a test shall be made to verify that all the switches in every circuit have been fitted in the same conductor, throughout, and such conductor, shall be labeled or marked for connection to the phase conductor, or to the non-earthed conductors of the supply.

In a three wire or a four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled, or marked for connection to one of the phase conductors of the supply.

The installation shall be connected to the supply for testing. The terminals of all switches shall be tested by a test lamp, one lead of which is connected to earth. Glowing of test lamp to its full brilliance, when the switch is in 'ON' position irrespective of appliance in position or not, shall indicate that the switch is connected to the right polarity.

4.0 TESTING OF EARTH CONTINUITY PATH

The earth continuity conductor, including metal conduits and metallic envelops of cables in all cases, shall be tested for electric continuity. The electrical resistance of the same alongwith the earthing lead, but excluding any added resistance, or earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

5.0 MEASUREMENT OF EARTH ELECTRODE RESISTANCE

5.1 Two auxiliary earth electrodes, besides the test electrode, are placed at suitable distance from the test electrode. A measured current is passed between the electrode 'A' to be tested and an auxiliary current electrode 'C' and the potential difference between the electrode 'A' and auxiliary potential 'B' is measured. The resistance of the test electrode 'a' is then given by

R = V/I

Where,

R- Resistance of the test electrode in ohms

V- Reading of the voltmeter in volts

I- Reading of the ammeter in amps

5.1.1 i) Stray currents flowing in the soil may produce serious errors in the measurement of earth resistance. To eliminate this, hand driven generator is used.

ii) If the frequency of the supply of hand driven generator coincides with the frequency of stray current, there will be wandering of instrument pointer. An increase or decrease of generator speed will cause this to disappear.

5.1.2 At the time of test, the test electrode shall be separated from the earthing system.

5.1.3 The auxiliary electrodes shall be of 13mm diameter mild steel rod driven upto 1 m into the ground.

5.1.4 All the three electrodes shall be so placed that they are independent of the resistance area of each other. If the test electrode is in the form of a rod, pipe or plate, the auxiliary current electrode C shall be placed at least 30 m away from it and the auxiliary potential electrode 'B' shall be placed mid-way between them.

5.1.5 Unless three consecutive readings of test electrode resistance agree, the test shall be repeated by increasing the distance between electrodes A and C upto 50 m, and each time placing the electrode B mid-way between them.

5.1.6 On these principles, “Megger Earth Tester” containing a direct reading ohm-meter, a hand driven generator and auxiliary electrodes are manufactured for direct reading of earth resistance of electrodes.

6.0 **TEST CERTIFICATE**

On completion of an electrical installation or an extension to an installation, a certificate shall be furnished by the Contractor, countersigned by the competent Engineer-in-Charge PMC Rep.

FORM OF COMPLETION CERTIFICATE

I/We certify that the installation detailed below has been installed by me/us and tested and that best of my/ our knowledge and belief it complies with Indian Electricity Rules 1956, as well as the Contract Specifications.

Electrical Installation at _____

Voltage and system of supply _____

2.0 EXTERNAL ELECTRICAL WORKS

For Detailed Specification of D.G. Set of Electrical works (Based on DSR 2018) mentioned in SOQ shall be as per CPWD General specification for electrical works Part VII (D.G SET) 2013. (corrected up to the last date of submission/uploading of bid).

CCTV Surveillance System:

Design concept & scope of work:

3.1 IP CCTV SURVEILLANCESYSTEM

3.1.1 DESIGNCONCEPT:

a) The entire IP surveillance system shall be designed to control and monitor the atrium, passages of different floors of the building. The entrance, stair case ,lift in all floors shall have IP Fixed dome cameras to monitor the connecting corridors

3.1.2 SCOPE OF WORK:

b) Supply, installation, testing and commissioning high quality fast-acting IP CCTV surveillance system along with power supply, power distribution and required accessories at specified locations.
c) The entire system shall be as approved by Engineer-in-Charge .
d) The CCTV Surveillance system shall be with power supply, accessories and other devices complete withsoftware.
e) The CCTV surveillance system should consist of IP Fixed dome cameras (indoor type), PTZ & fixed box cameras (outdoor type), software, server, power supply andcables.
f) Video management software shall offer both video stream management and video stream storage management. Recording frame rate and resolution in respect of individual channel shall beprogrammable. Hard disk of minimum 1 TB to store the footage shall be provided with the system.
g) Provide supervisory specialists and technicians at the job to assist in all phases of system installation, start up andcommissioning.
h) Cat 6cable/fiber cable connectivity with all required hardware upto networking switches of LAN, locations of networking switches in the building .
i) 230voltsACPowersupplydistributionfromUPStoeachlocationofcamerasalongwithDBs, JBs, cabling work etc. with required accessories.
j) Power supply unit as required forcameras.
k) Integrated testing and commissioning of CCTV system .
l) Training & handing over of all materials, equipment andappliances.
m) Any other items/accessories required for installation, testing and commissioning of CCTV system.
n) No extra cost shall be paid for any enabling miscellaneous items if required to complete the work as per the designconcept.

D. TECHNICAL SPECIFICATION OFLIFT WORK:

1.0 SCOPE OF WORK

These specifications cover the details of 1(One) nos. 13 persons capacity Machine room less Passenger lift including suitable Brake release tools to be designed supplied, inspection as may be necessary before dispatch, delivery at site, installation, testing, commissioning and handing over and the defects liability for a period of 1 year from the actual recorded date of completion of overall project.These specifications shall be read in conjunction with the General Conditions of Contract, Additional Conditions of Contract.

2.0 GENERAL

The equipment and installation covered by these specifications shall conform to codes of practice in force and highest standards of workmanship and materials. This work shall be done in accordance with the provisions of the Local Lifts Authority rules and shall also conform to requirements of local municipal by laws, and subsequent provisions, as also any state or local Act in force and latest Indian Standard 14665 and all latest applicable BIS, NBC code and 'CPWD General Specifications for Electrical Works (Part III, Lifts & Escalators) 2003'.

The Entire electrical installation shall be done in accordance with the Indian Electricity Act 2003, Indian Electricity Rules 1956 as amended to-date. The Electrical wiring shall strictly comply with IS:732 and latest applicable BIS and NBC code. The electrical works shall also conform to CPWD General Specification for Electrical Work Part-I (Internal) 1994 and Part-II (External) 1994 as amended up to date.

The Contractor shall follow all Statutory Requirements as well as best trade practices in the manufacture & installation of lifts. The Contractor shall arrange to obtain the statutory approval of the Inspectorate of Lifts as may be required for commissioning of the lifts and handover for operation after satisfactory tests.

3.0 DRAWINGS

Before commencing work, the Contractor shall prepare and submit all drawings for lift in required nos. necessary to show the general arrangement and details of lift installation, electrical etc. These drawings must be approved by the NHIDCL before installation and shall become part of the contract.

The Contractor shall, within 3(three) weeks of receipt of a Letter of award of contract, submit 4(four) copies of all working drawings showing pit, hoistway layouts clearly indicating and specifying all connected structural, electrical and architectural works including imposed structural static / dynamic loads (including breaking load on guides, reaction of buffers on lift pits, reaction on support points in machine room, lift well etc.) and electrical

ratings including calculations for selection of kW rating of motor. Within 10 days of receipt of letter of award of contract, the Contractor shall obtain from the NHIDCL all the information he needs to prepare his drawings and shall have any interaction with the Engineer-in-Charge to finalise all parameters and data for design. The Contractor will be responsible for any discrepancies, errors and omissions in the drawings or particulars submitted by him even if these have been approved by the Engineer-in-Charge. On approval of these drawings (within 2 weeks of submission of full documentation), the Contractor shall submit 5(five) copies of approved working drawings incorporating corrections / comments, if any, and shall immediately commence work.

On completion of work, the contractor shall supply four sets of CD's and 5 (five) copies of the detailed wiring diagram, 'As built' drawings and equipment operation & maintenance manuals and original certificates from 'Inspector of Lifts' for all the lifts. Further, a copy of such detailed diagram and a set of instructions for evacuation of passengers in case of breakdown of the lifts shall be framed and installed in the respective machine room by the Contractor.

The Contractor shall carry out all the work strictly in accordance with drawings, details and instructions of Engineer-in-Charge.

4.0 TESTS ON COMPLETION

The following tests shall be carried out to the satisfaction of the Engineer-in-Charge.

i. Insulation resistance and earth test for all electrical apparatus.
ii. Continuous operation of the lift under full load conditions and simulated starts and stops (150 nos. per hour each) for one hour at the end of which time the service temperature of the motor and the operating coils shall be tested. This shall be as per B.I.S. specification.
iii. The car shall be loaded until the weight on the rope is twice the combined weight of the car and the specified load. The load must be carried on for about 30 minutes, without any sign of weakness, temporary set or permanent elongation of the suspension rope strands.
iv. The following items shall be tested :
    a. Levelling accuracy at each landing in conditions of fully loaded and empty car.
    b. No load current and voltage readings both on 'Up' and 'Down' Circuits.
    c. Full load current and voltage readings both on 'Up' and 'Down' Circuits.

d. One and quarter load current and voltage readings both on 'Up and 'Down' Circuits.
e. Stalling current and voltage and time taken to operate overload.
f. Overload protection.
g. Gate sequence relays, if provided and installed.
h. Car and landing door interlocks.
i. Collective control and priority sequences, if installed.
j. Safety gear mechanism for car and counterweight with fully loaded car and also with only 68 kg load.
k. Speeds on Up and Down travel with full load, half load and empty car.
l. Door contacts.
m. Final terminal stopping device.
n. Normal terminal stopping device.
o. Car and counterweight buffers with contract load and contract speed.
p. Operation of controllers.
q. Manual operation of lift at mid-way travel.
r. Emergency operation.

v. Tests on completion shall also be performed to the satisfaction of Inspector of Lifts and a certificate will be obtained from the 'Lift Inspector ' by the contractor.

17.0 STATUTORY APPROVALS

All statutory approvals from commencement to commissioning of lifts shall be obtained by the Contractor from the Inspector of Lifts and / or other authorities. However, the client will provide all necessary assistance for providing documents, drawings and certificates pertaining to other contractors, if required.

The contractor shall pay necessary fees in connection with the approval of installation of lifts.

5.0 PERFORMANCE PARAMETERS

The following parameters shall be achieved in the installation :

*	Levelling Accuracy	$\pm$ 3 mm for 1.5 m/s speed $\pm$ 4 mm for 0.75 m/s speed
*	Jerk level	0.9 – 1.5 m/s^3
*	Noise level in car	58 dB
*	Noise level at 1 M in machine room	60 dB
*	Acceleration rate	0.6 – 1.0 m/s^2 (adjustable)
*	Max. car vibration	20 milli gals.

20.0 SUBMITTALS 'ALONGWITH TENDER' AND 'POST AWARD'

(A) The following items are required to be submitted induplicate **along with the Tender**.

i. Catalogues with offered items highlighted.
ii. List of imported components, if any.
iii. Compliance Statement for guaranteed performance parameters given in Specification .
iv. Confirmation that offer submitted meets the technical specifications & scope of work and there are no deviations and exclusions from NIT.
v. The contractor shall specify in his offer the full capability of his system in this regard.

(B) The successful contractor, **after award of the contract**,shall furnish following technical particulars of the equipment/devices for the approval by NHIDCL.

i) Single line/ schematic diagram of electronic control panel, lift & equipment etc.
ii) Layout of Hoist-way showing foundation details in the pit, machine room, electric control panel, Lift & equipment etc.
iii) Earthing layout.
iv) Inspection manual for equipment & accessories covered in the scope of supply (8 copies).
v) Technical literature of operation, control and maintenance etc. (8 copies) along-with CDS.
vi) Schedule of scope of maintenance service during defect liability period and CAMC.

The technical parameters furnished by the tenderer would be examined in detail during design submission stage. All improvements considered necessary to meet the tender Technical Specifications would have to be incorporated without any additional cost to NHIDCL with objective of providing high performance and safety Lifts.

21.0. MAINTENANCE DURING DEFECTS LIABILITY PERIOD AND FURTHER

FOUR YEARS CAMC PERIOD

Comprehensive maintenance during Defects Liability Period and next four years CAMC period shall include periodic servicing, prompt attention to Employer complaint, prompt rectification of all malfunctions and equipment failures, replacement of defective equipment / parts, replacement of light fittings, lubrication including lubricants, maintaining correct alignment and levelling of cars and ensuring smooth running, starts and stops etc. all complete to NHIDCL's satisfaction shall be done by the contractor at own cost.

SECTION-VII

List of Approved Makes/Brands of Materials/Equipment
(CIVIL, INTERIOR, PLUMBING, BIO-DIGESTOR, ELECTRICAL, FIRE FIGHTING,LIFT)

Name of work:Construction of shopping complex building near Polo ground,Leh in UT of Ladakh

Sl. No.	Material/Equipment	Makes/Brands
A.	**CIVIL WORK**	
1	Cement	ACC, Ultratech, Ambuja, Vikram, Birla cement,JK Cement, Shree cement & Jaypee Cement
2	Reinforcement Steel / Structural Steel	SAIL, Tata Steel, RINL, Jindal
3	ALUMINIUM Extrusion / SECTIONS	Jindal, Hindalco, Indalco
4	Aluminium Accessories and Hardware	Hardima, Everite, Sigma, Argent, Classic,Jyoti
5	Aluminium Composite Panels	Alucobond, Reybond
6	Anchor Fastner/Dash Fastner	Hilti, Fisher, Canon
7	Ready Mix Concrete (RMC)	Ultratech, ACC, RMC India
8	Concrete Additive	Pidilite / Fosroc / Fairmate / MC Bauchemie/ Sika/ Cico
9	Door closer / Floor spring	Dorma,Godrej, Geze,Yale, Ozone
10	Door Locks	Godrej/Ingerroll Rand, Dorma
11	Factory made Laminated Door Shutters	Greenply , Kitply
12	Doors & Windows Fixtures / Fitting.	Godrej/Everite / Classic/ Crown / Earl Bihari

13	uPVCwindows/ventilators	Fenesta,Wintech,Winplast,Rehau
14	Paints (Exterior Emulsion Paint)	Asian (Apex Ultima)/ Berger (Weathercoat all Guard)/ ICI (Dulux weathershield max)
15	Paints - Other Paints / Primer	ICI Dulux/ Asian/ Berger/ Nerolac
16	Paints - Texture paint	Berger / Spectrum / Unilite Heritage /Asian
17	CC Paver blocks / Tiles (All Types)	KK / Uni Stone Products (India) Pvt. Ltd/ Hindustan Tiles/ NITCO
18	Epoxy Flooring	Fosroc/ Dr. Beck/ Flamaflor
19	False Ceiling - Calcium Silicate Boards & Tiles	India Gypsum/ Armstrong / Hilux / Saint Gobain (Gyproc)/Aerolite
20	False Ceiling - Metal	Armstrong / Hunter-Douglas / USG-Boral/ Saint Gobain/ Unimet
21	False Ceiling - Mineral fibre	Armstrong / Decosonic / USG-Boral/ AMF/ Saint Gobain (Gyproc)
22	Fire Rated Doors & Frames	Navair / Shakti-Hormann / Pacific/Promat
23	Fire Rated Glass	Asahi India Safety Glass Ltd./ Saint Gobain/ Pilington, Schott, Pyroguard, Glaverbel
24	Fire Retardant Paint	Viper FRS 881/ Nullifire/ Berger
25	Fire Seal	Sealz, Alstroflam/ Abacus
26	Fire: Door Closures, Mortice Dead locks	Becker Fire Solution/ Inersoll Rand/ Dorma/Godrej/ Geze/ Hafele
27	Fire: Panic Exit Devices	Becker Fire Solution/ Inersoll Rand LCN Series/ Dorma PHA Series/ D-line/Godrej
28	Glass : Float & Mirror	Atul / Saint Gobain/ Asahi India Safety Glass Ltd
29	Glass for Aluminum Doors/ Windows/ Structural Glazing	Saint Gobain / Pilkington/ Asahi India Safety Glass Ltd.

30	GRC Jali	Unistone/ Kuber Fibrostone/Everest Composites/ Birla white
31	GRC wall cladding	Unistone/ Kuber Fibrostone/Everest Composites/ Birla white
32	Grout: Non-Shrink	Fosroc / Sikka/Pidilite or equivalant
33	Laminates/ Veneers	Century/Archidply/Greenlam/Formica/Sunmica / Merino
34	Night Latch	Godrej / Dorma/ Ozone/Harrison/Link
35	Paints - Cement Based	Snowcem Plus/, Berger (Durocem Extra)/ Nerolac (Super Acrylic)/ TATA Cem, Asian
36	Plywood/Block board/Ply board	Duroply / Greenply/ Archidply/ Century/ Kitply/ National / Anchor/ Merino
37	Silicon sealants /Weather Sealant / Structural Glazing Sealant	GE- Silicon / Pidilite / Forsoc / Cico /Dow Corning / Sikka/ Wacker
38	Stainless Steel	Salem Steel/ Jindal or equivalent
39	Stainless Steel bolts, Screws, Nuts & Washers	Kundan / Puja / Atul
40	Stainless Steel Clamps	Hilti /Intellotech Koncept /Fisher
41	Stainless Steel Hinges	Hettich/ Godrej/ Dorma
42	Stone Adhesives	Fosroc / Sikka/Pidilite
43	Tiles: Ceramic Tiles	Kajaria / Somany/RAK/Nitco
44	Tiles: Glazed (Ceramic) tiles	Kajaria / Somany/RAK/Nitco
45	Tiles: Vitrified Tiles	Kajaria / Somany/RAK /Nitco
46	Vinyl Flooring	Wonder floor/Responsive
47	Water Proofing Materials	BASF/ Fosroc / Sikka / CICO / STP/ Pidilite/CHRYSO
48	Wooden Laminated Flooring	NITCO /Euro / Pergo /Armstrong
49	Expansion Joints	Sanfield (India) Ltd., MIGUA, TRISTAR

50	Automatic sliding door	Dorma or equivalent make
51	False flooring	Arena, unitile, or equivalent make
52	Roller blinds	Hunter dougles/ Phifer or equivalent make
53	M.D.F	Nuwood(Grade -I AND GRADE II), Durotuff
B	**PUBLIC HEALTH (PLUMBING)**	
1	Chinaware & CP Fittings	Hindware/Cera/Jaquar/Kohler
2	Butterfly Valve / Check Valve	Zoloto / Leader / Sant/ Audco/GPA
3	Ball Valves	Zoloto / Leader / Sant/ Audco/GPA
4	Cables	Skytone/Finolex/Polycab
5	PVC Copper Wire	Skytone/Finolex/Polycab
6	PP-R Pipes & Fittings	SFMC/Prince/Supreme
7	PP Pipe	Astral (Silencio) / Huliot(Ultra Silent), Poloplast
8	GI Pipes & Fittings	TATA/Jindal/Swastik
9	Rain Water Pipe (uPVC SWR Type-A)	Supreme/Prince/Astral
10	SS Sink	Hindware / Neelkanth / Nirali / Jayna /Neropure
11	Stainless Steel Grating	Camry / Chilly/Jayna
12	Air Release Valve	SANT/KARTAR/ZOLOTO
13	Gully Trap	Perfect / S.K.F/ R.K/ Hind / Anand
14	S.F.R.C. Manhole covers	K.K. Manhole and grating Co.
15	DWC Pipes	Astral / Supreme/ Prince
16	PVC encapsulated Foot rest	KK Manhole / KGM / Bentex
17	SUBMERSIBLE PUMP	GRUNDFOSS/ KSB / KIRLOSKAR/CROMPTON/MATHER & PLATT
18	HYDROPNEUMATIC SYSTEM	GRUNDFOSS/ KSB / ITT LOWARA/LUBI
19	HEATPUMP	AO SMITH/ SUNTEC/ JAQUAR
20	SOLAR PANEL	EMVEE/TATA/ELECTRA
21	BIO DIGESTER	DRDO APPROVED
22	Pressure relief Valve	Leader, Sant, TIMMIE, AIP
23	Thermostatic Valve	Oventrop, Scheneider, Schell
24	WC Pan Connector	MC Alpine, Viega, Supreme
25	Tube well Pumps	GRUNDFOSS/ KSB / ITT LOWARA/LUBI
26	Insulation	Armafex, Thermaflex, Armaflex, K-flex

C. ELECTRICAL WORK		
1	11kV Three HT Panel Board (Outdoor Type)	ABB/Schneider/Eaton/C&S
2	D.G. Batteries	Exide, TATA, Amron, Microtek
3	DG Set - Assembler	Kohler, Cummin, Cat, Powerica, Koel Green
4	DG Set - Alternator	CG, Stamford, Leroy Somer, Mecc Alte
5	DG Set - Engine	Mitsubishi, CAT, CUMMIN,MTU
6	Transformers	Ariva/Kirlosker/BHEL/Jindel Rectifier/EEE Switchgear
7	Servo Stabilizer	Legrand/Jindel Rectifier/Servokon Systems Limited/EEE Switchgear
8	Capacitor Fabricator	Epcos/Trinity/Legrand/Risha Control Private Limited In Delhi
9	MV/LV Panel Fabricator (TTA AND PTTA Panels)	Adlec Systems Private Limited In Delhi (Legrand)/Risha Control Private Limited In Delhi (L&T)/Tri Square Switchgears Private Limited (ABB)/AMBIT(SCHEINDER)/C&S
10	1.1KV Copper Wires as per IS:694/1990	RR kable/Polycab/KEI/Havells
11	MV/LV/ELV Cable-XLPE Insulated As Per IS:7098	RR kable/Polycab/KEI/Havells
12	Copper Bus Bars	RR Copper/Banco
13	Aluminium Busbars	Hindalco/Banco
14	Change Over Switch (Manual)	ABB/C&S/HPL/Indoasian/Socomec
15	LED Light Fixtures and Lamps	Havells/Philips/Wipro/Polycab/Light Technology
16	Lighting for Facade	Havells/Philips/Wipro/Polycab/Light Technology
17	Ceiling/Wall Fans & Exhaust Fans	Bajaj/Usha/Polycab/Crompton/Almonard/Khaitan/Orient
18	Lightening Arrestors	JMV/Triprotect/Dehn/OBO Bettermann
19	Earthing	JMV/Triprotect/Kors(Esteem)/Dehn/OBO Bettermann
20	Surge Protections	Argos/Schneider/JMV/OBO Bettermann/ABB

21	SFU/SDF/HRC FUSE	ABB/C&S/HPL/Indoasian/Socomec
22	MCB/ELCB/DB/RCCB Industrial Sockets-Sheet Metal Clad	Schneider/Legrand/C&S/L & T /ABB
23	Moulded Case Circuit Breaker (MCCB) Barriers, Spreader Links & Extended Rotary Handle	Schneider/Legrand/C&S/L & T /ABB
24	Air Circuit Breakers	Schneider/Legrand/C&S/L & T /ABB
25	Switches & Socket, Boxes And Faceplate Modular Type	Schneider/Legrand/Polycab/Panasonic
26	M.S. Conduit & Accessories	AKG/RM CON/BEC/Steel Krafts/Fitwell
27	PVC Conduit & Accessories	AKG/BEC/Polycab
28	Cable Trays & Raceway	Legrand/OBO/MEM/Rmcom
29	Time Switches	L&T Electrical & Automation Ic/Schneider/ Finder/Legrand/Crompton Greaves Limited/ABB/C&S
30	Push Buttons	L&T Electrical & Automation Ic/Teknik/Schneider/Kaycee/C&S
31	LED Type Indicating Lamps	L&T Electrical & Automation IC/Schneider/Kaycee/Teknik/ABB/C&S
32	Push Buttons Actuatos	L&T Electrical & Automation IC/Schneider/Kaycee/Teknik/ABB/C&S /MDS
33	HDPE Pipe	Dura-Line/BEC/Gemini/Supreme/Rex
34	Current/Potential Transformers Note:- For HT PANEL, CT, PT, Shall Be As Per Standard Fitment Of Panel Manufacture's	Kappa/Minilec/Pragati/Newtek Electricals/Kaycee
35	Selector Switches / Rotary Switches	Kaycee/Legrand/Salzer/L&T Electrical & Automation IC/Gepower/C&S/Teknict/Schneider/Rockwell
36	Crimping Type Lugs & Thimbles	Dowells/Comet/Jointwel/Action
37	Cable Glands	Dowells/Comet/HMI/MIC
38	Brass Cable Glands	Dowells/Comet/HMI/MIC/Polycab/Siemens/Braco

39	Pvc Cable Glands	Trinity/Lotus/Neptune/Havells
40	Panel Cooling Fans	Rexonard/Rittal/Finder/Philips
41	Relays	Minilec/Prok Devices/Procom/Finder/C&S
42	Multifunction Meters Door Mounted Dual Source Energy Meters	Newtek Electricals/C&S/Legrand/Neptune/Trinity
43	PLC/ Load Manager/ Sync. Relay	ABB/Siemens/Schneider/Allen Bredly
44	Fabrication Sheet	TATA Sheet/Bhushan Steel/Jindal Iron & Sheet
45	Automatic Transfer Switch	Asco/Russelectric/Eaton/Socomec
46	T.V. CO-Axial Cable	Delton/Bonton/RR Kable/ESC Cable
47	Solar	ABB/Wave shapes India/Delta
48	Street Light Poles	Sumip/Hensal/Bajaj
49	UPS	Emerson (Vertiv)/ Schnieder (APC)/ Eaton/ Socomec
50	Data/Telephone/TV Outlets	Schneider/Legrand/Polycab/Panasonic
51	Fire Extinguisher	Ceasefire/ Exflame/ Minimax/ Life Guard/ Safex
53	Battery Charger	Amaraja/ Sabnife/ Statcon/ Voltstat/ HBL

D	**FIRE PROTECTION SYSTEM**	
1	Air Release Valve/Air Cushion Tank	Zoloto/Advance/Leader/Audco/Castle
2	Anchor Fastener	Fischer / Hilti or equivalent
3	Ball Valves	L&T/ Audco /Zoloto/ Advance/Emerald/ KSB
4	Battery	Exide/ AMCO /Amararaja/ Panasonic
5	Butterfly valves	L&T/ Audco/ Zoloto / Advance/ KSB
6	Cables	As per electrical make list
7	Check Valve/Foot Valve/Sluice Valve/	L&T/Audco / Zoloto Advance/KSB

8	Fire Extinguisher	Minimax / Newage/ Eversafe/ Tyco –Johnsons Control
9	FB inlet/ Hose reel drum /Nozzle	Ceasefire / Newage /Minimax/HD/Tyco
10	Fire Pumps	Mather&Platt(WILO)/Grundfos/Kirloskar/Xylem – ITT/ Armstrong Fluid Technology
11	Electrical Motors	ABB/ Siemens/Kirloskar/C&G/BALDOR
12	GI clamps	Chilly/Hilti or equivalent
13	Gl / MS Pipes	Tata / Jindal- Hissar/ SAIL
14.	Cables	Sky tone/ Finolex/ National
15.	Suction strainer	Sant/Zoloto
16.	Vibration eliminator connectors	Resistoflex/ Kanwal
17.	Single phasing preventer	Siemens/Minilec/l&t
18.	Pipe coat material	Pypkote/ Coalteck/ Johnson control
19.	Main control panel	Risa control/Devco/ ec
20.	Pressure switches	Indfoss/Switzer
21.	pressure gauge	H.Guru/Fiebig
22.	Battery	Exide/ Prestolite
23.	Enamel paint	Asian, Nerolac, Berger
E	**LIFT**	
	Lifts	OTIS/ Kone / Mitsubishi/ Schindler

SECTION VIII

Tender Drawings

(Drawings are enclosed separately with the tender documents)

SECTION-IX

INTEGRITY PACT

This integrity Pact is made at **National Highways Infrastructure Development Corporation Limited (NHIDCL)**, RO-Ladakh on this ____day **of** _____ **2021**.

BETWEEN

NATIONAL HIGHWAYS &INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED(NHIDCL) hereinafter referred to as "The Principal" (which expression, unless repugnant to the context thereof, shall mean and include its legal representatives, heirs and assigns)

AND

_____hereinafter referredto as "TheBidder"(which expression, unlessrepugnant tothecontext there of, shall mean and includeitslegal representatives, heirs andassigns)

Preamble

Whereas, The Principal intends to award, under laid down organizational procedures, contract(s) for _____ _____**(hereinafter referred to as the 'Project').** The Principal necessarily requires full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/ transparencyin its relations with itsBidder(s)and/or Consultant(s).

In order to achieve these goals, the Principal has appointed _____ who will monitor the tender process and the execution of the contract for compliance with the Integrity Pact by all parties concerned, for all works covered in the Project. The contact details of Shri _____ are asunder-

_____

___

Section 1 - Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

a. No employee of the Principal, personally or through family members or through any other channel, will in connection with the tender for or the execution of a contract, demand, take a promise for or accept, for self or third person, any materialor immaterialbenefit,which the person is not legallyentitled to.

b. The Principal will, during the tender process treat all Consultant(s)/Bidder(s)with equity and reason. The Principal will in particular, before and during the tender process, provide to all Consultant(s)/Bidder(s)the same information and will not provide to any Consultant(s)/Bidder(s),confidential/additional information through which the Consultant (s)/Bidder(s) could obtain an advantage in relation to thetender process or the contract execution.

c. The Principal willexcludefrom the process all knownprejudiced persons. **The Principal shall** obtain bids from **only** those parties who have been short-listed or pre- qualified or through a process of open advertisement/web publishing or any combinationthereof.

(2) If the Principal obtains information on the conduct of any of its employees, Consultant (s) and/orBidder(s), which is a criminal offence under the IPC/PC Act, or if there be a substantive suspicion in this regard, the Principal will informtheChief Vigilance Officer and **subject to its discretion,**can **additionally**initiate disciplinary actions.

(3) The Principal will enter into agreementswithidentical conditionswithallConsultant(s)/Bidder(s)**for the different Work Packages in the aforesaid Project**

(4) The Principal will disqualify fromthe tender process all Consultant (s)/Bidder(s) in the range of Rs 50 Crore and above, who do not sign this Pact or violate itsprovisions.

Section 2 - Commitments of the Bidder(s) / Consultant(s)

(1) The Bidder(s) / Consultant (s) commit(s) itself/themselves to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

(a) The Bidder(s)/Consultant(s) will not, directly or through any other person or firm offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage, of any kind whatsoever, duringthe tenderprocess or during the execution of thecontract.

(b) The Bidder(s)/ Consultant (s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications,

certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the biddingprocess.

(c) The Bidder(s)/Consultant(s)will not use improperly,for purposeof competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

(d) The Bidder(s)/ Consultant (s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly the Bidder(s)/Consultant (s) of Indian Nationality shall furnish the name and address of the foreign principals, if any. Further details as mentioned in the "Guidelines on IndianAgents of Foreign Suppliers" shall be disclosed by the Bidder(s)/ Consultant(s). Further, as mentioned in the Guideline all the payments made to the Indian agent/representative have to be in Indian Rupees only.Copy of the "Guidelines on Indian Agents of Foreign Suppliers" is annexed and marked asAnnex-"A".

(e) The Bidder(s)/ Consultant (s) will, when submitting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of thecontract.

(2) The Bidder(s)/ Consultant (s) will not instigate third persons to commit offences outlined above or be an accessory to suchoffences.

Section 3: Disqualification from tenderprocess and/ or exclusion from future contracts.

(1) If the Bidder(s)/ Consultant(s), before awarding the Project or during execution

has committed a transgression by violating Section 2 above or in any other form so as to put his reliability or credibility in question, the Principal, at its sole prejudice to any other legal rights or remedies available to the Principal under the relevant clauses of GCC/SCC of the tender/contract.

(2) If the Consultant (s)/Bidder(s) has committed a transgression through a violation of any of the terms under Section 2 above or in any other form such as to put his reliability or credibility into question, the Principal will also be entitled to exclude such Consultant (s)/Bidder(s) from future tenders/contract award processes. The imposition andduration of the exclusion will be determined by thePrincipal,keeping in view the severity of the transgression. The severity will be determined by the circumstances of the case, in particular, the number of transgressions and/or

the amount of thedamage.

(3) If it is observed after payment of final bill but before the expiry of validity of Integrity Pact that the Consultant has committed a transgression, through a violation of any of the terms under Section 2 above or any other term(s) of this Pact, during the execution of contract, the Principal will be entitled to exclude the Consultant from further tender/contract awardprocesses.

(4) The exclusion will be imposed for a minimumperiod of six (6) months and a maximumperiodof three (3) years.

(5) If the Consultant (s)/Bidder(s) can prove that he has restored/recouped the damage to the Principal caused by him and has installed a suitable corruption prevention system,the Principalmay, at its sole discretion,revoke or reduce the exclusion period before the expiry of the period of suchexclusion.

Section 4: Compensation for Damages

(1) If the Principal has disqualified the Bidder(s)/ Consultant (s) from thetender process priorto the awarding of the Project according to Section 3, the Earnest Money Deposit (BID SECURITY)/Bid Security furnished, if any, along with the offer, as per terms of the Invitation of Tender, shall also be forfeited. The Bidder(s)/Consultant(s)understands and agrees that this will be in addition to the disqualification and exclusion of the Consultant (s)/Bidder(s)as may be imposedby thePrincipal, in terms of Section 3 above.

(2) If, at any time after the awarding of the Project, the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Security Deposit/Performance Bank Guarantee furnished by the Consultant, if any, as perthe terms of the NIT/Contract shall be forfeited without prejudice to any other legal rights and remedies available to thePrincipal under the relevant clauses of General/ Special Conditions of Contract.

The Consultant (s)/Bidder(s) be in addition to the Bidder(s)/ Consultant (s), as terms of Section 3 *above*. Understands and agrees that this willdisqualification and exclusion of the may be imposed by the Principalin

Section5:Previous transgression

(1) The Bidder(s)/ Consultant (s) herein declares that it has committed no transgressions in the last 3years with any other Company in any country

conforming to the anti corruption approach as detailed herein or with government/ any other Public Sector Enterprise in India that could justify its exclusion from the tender process.

(2) If at any point of time during the tender process or after the awarding of the Contract, it is found that the Bidder(s)/ Consultant (s) has made an incorrect statement on this subject, he can be disqualified from the tender process or if, as the case may be, that the Contract, is already awarded, it will be terminated for such reason and the Bidder(s)/ Consultant (s) can be black listed in terms of Section 3 above.

Section 6: Independent External Monitor / Monitors

(1) The Principal shall, in case where the Project Value is in excess of Rs 50 Crore and above, appoint competent and credible Independent External Monitor(s) with clearance from Central VigilanceCommission. The Monitor shall review independently, the cases referred to it to assess whether and to what extent the parties concerned complywith the obligations under this Integrity Pact.

(2) In case of non-compliance of the provisions of the Integrity Pact, the complaint/non-compliance is to be lodged by the aggrieved party with the Nodal Officer only, as shall be appointed bythe MD, NHIDCL. The Nodal Officer shall refer the complaint/non-compliance so received by him to the aforesaidMonitor.

(3) The Monitor will not be subject to any instructions by the representatives of the partiesandwillperform itsfunctionsneutrally andindependently. TheMonitorshall report to the Managing Director, NHIDCL.

(4) The Bidder(s)/ Consultant(s)accepts that the Monitor shall have the right to access, without restriction, all Project documentation of the Principal including that provided by the Consultant. The Consultant will also grant the Monitor, upon his/her request and demonstration of a validinterest, unrestricted and unconditional access to its project documentation. The Monitor is under contractual obligation to treat the information and documents of the Bidder (s) / Consultant (s)withconfidentiality.

(5) The Principal will provide to the Monitor, sufficient information about all meetings among the parties related to the Project, provided such meetings could have an impact on the contractual relations between the Principal and the Consultant.

(6) As soon as the Monitor notes, or believes to note, a violation of this Pact, he will so inform the Principal and request the Principal to discontinue and/or take corrective action, or to takeother relevant action (s). The Monitor can inthis regardsubmit non-binding recommendations. However, beyond this, the Monitor has no right to demand from the parties that they act in a specific manner and/or refrain from action and/or tolerateaction.

(7) The Monitor will submit a written report to the MD, NHIDCL

within 4 to 6 weeks from the date of reference or intimation to it and, should the occasion arise, submit proposals for corrective actions for the violation or the breaches of the provisions of theagreementnoticed bythe Monitor.

(8) If the Monitor has reported to the MD, NHIDCL, of a substantiated suspicion of an offence under relevant IPC/PC Act, and the MD, NHIDCL, has not, within the reasonable time taken visible action to proceed against such offence or reported it to the ChiefVigilance Officer, the Monitor may also transmit this information directly to the Chief Vigilance Officer, NHIDCL /MD.

(9) The word 'Monitor' means Independent External Monitor andincludesboth singular and pluralforms.

Section 7 Criminal Consultant(s)/charges against violating Bidder(s) / Subconsultant(s)

If the Principal obtains knowledge of conduct of a Bidder/ Consultant or any employee or a representative or an associate of a Bidder/ Consultant, which constitutes a criminal offence under the IPC/PC Act, or if the Principal has substantive suspicion in this regard, the Principal will forthwith inform the same to the Chief Vigilance Officer,NHIDCL/MD.

Section 8 - Duration of the Integrity Pact

This Pactshall come into force when both partieshave legally signed it. ThePact shall expire, in case of the Consultant (s), 3 (three) months after the last payment under the Contract is made and in case of the unsuccessful Bidder(s), 2 (two) months after the contract for the project has been awarded.

If any claims ismade/lodged during this time,the same shall be bindingand continue to be validdespite the lapse of thispact as specified above,unless it is discharged/determined by MD of NHIDCL.

The Bidder(s)/Consultant (s), however, understands and agrees thateven upon the completion of the Project and/or the lastpayment under the Contract having been made, if any transgression/violation of the terms of this Pact comes/is brought to the notice of the Principal, it may, subject to its discretion, blacklist and/or exclude such Bidder(s)/Consultant(s) as

provided for in Section 3, without prejudice to any other legal right or remedy so available to thePrincipal.

Section 9 - Other provisions

(1) This Agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi.

(2) Changes and supplements as well as termination notices need to be made in writing.

(3) If the Bidder/Consultant is a partnership or a consortium, this Agreement must be signedby allpartners or consortiummembers.

(4) Shouldone or several provisions of this Agreement turn out to be invalid, the remainder of this Agreement shall remain valid and binding. In such a case, the parties will strive to come to an Agreement in accordance to their original intentions.

(5) Wherever he or his as indicated in the above sections,the same may be read as he/she or his/her, as the case maybe.

SIGNED, SEALED AND DELIVERED	SIGNED, SEALED AND DELIVERED
For and on behalf of	For and on behalf of
Executive Director (P) **NHIDCL RO-Ladakh**	**(Authorized Signatory)** _____

Witness:

1) Signature	**1) Signature**
Name	**Name**
Address	**Address**
2) Signature	**2) Signature**

Name	**Name**
Address	**Address**

SECTION-X

FORM OF SUPPLEMENTARY AGREEMENT

Deleted

SECTION-XI

SPECIAL CONDITIONS OF CONTRACT
(CIVIL,PHE,INTERNAL ROADS,INTERIOR WORK,LANDSCAPING)

1.0 GENERAL :

1.1. Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, Schedule of Quantities, specifications of work, tender drawings , finishes matrix and any other documents forming part of this contract wherever the context so requires. The order of precedence of the above documents shall be interpreted as per General Conditions of Contract.

1.2. Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

1.3. The materials, design and workmanship shall satisfy the relevant Indian Standards (Latest), the job specifications contained herein and other national / international codes (Latest) referred to. Where the job specifications, stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standards/Specifications/Codes of practices for detailed specifications covering any part of the work covered in this tender, Contractor shall ensure that the work is executed as per the best and sound engineering practices and/or as per the instructions/directions of Engineer- in-Charge. The decision of EIC as regards the specification to be adopted and their interpretation and the mode of execution of work shall be final and binding on the Contractor and no claim whatsoever shall be entertained on this account.

1.4. The Contractor shall execute the whole and every part of the Works in the most professional and workman-like manner and both as regards materials and in other respects in strict accordance with specifications and latest Indian and international codes.

1.5. The Contractor shall also conform exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Engineer-in-Charge and lodged in his office

and to which the Contractor shall be entitled to have an access for the purpose of inspection at such office or on the site of the work during office hours. The Contractor will submit four sets of duly signed and stamped working drawings in hard copies for approval.

1.6. Excavated good earth declared surplus or otherwise shall be disposed of at designated locations as per the directions of the Engineer – in – charge,which shall be different from the disposal site for clay soil.

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

1.8. Disposal of surplus excavated earth including mud, liquid mud, dismantled RCC, dismantled brick work etc. shall be made only in the dumping yard approved by local authority. It will be the responsibility of the contractor to get the permission for dumping yard from local authority as required. If any royalty/fees is payabletolocal authority, such royalty/fees shall also be borne by the contractor. Disposal shall be carried out strictly as per the regulations of local authority. However, the above materials shall not be removed out of owner's premises without prior written authorization of EIC.

1.9. The Contractor shall put in place a Vehicle Wash area to ensure that the vehicles exiting the construction work site are free from sediment to avoid dirtying the public roads.

1.10. The Contractor shall carefully protect and preserve all bench marks, site details, pegs and other things used in the setting out of the building for Construction. All preliminary works such as establishment of a set of bench marks, permanent DGPS, Total Station/theodolite stations, centre line pillars, etc including required materials, tools, plants, equipment, labour, etc. for performing such functions necessary and ancillary there to for the commencement and during the progress of the work and till physical completion of the work shall be carried out by the Contractor at his own cost. It shall be Contractor's responsibility to shift the existing benchmark to his work site to set out the necessary control points and alignment of the various works. The Contractor shall also provide DGPS instrument with other required precision Survey Instruments as per site requirement and/or as directed by EIC. The work of setting out shall be deemed to be a part of general works preparatory to the

execution of the work and no separate payment shall be made for the same.

1.11. The work will be carried out in accordance with the architectural drawings and structural drawings approved by the Engineer-in-Charge. The structural and architectural drawings shall have to be properly correlated before executing the work.

1.12. In case of any difference noticed between Architectural and Structural drawings, the Contractor shall intimate the differences/discrepancies to EIC well in advance prior to scheduled start of the relevant item of works and shall obtain final decision in writing of the Engineer-in-Charge before executing the particular portion of the work. The delay caused on account of non-timely action by the Contractor in resolution of the differences whatsoever shall not be considered as compensation event for extension of time unless otherwise accepted by EIC.

1.13. In case of any discrepancy in the description of the item of the schedule of quantities submitted along with bid by the contractor and approved architectural drawings relating to the relevant item, the provision of former shall prevail unless given otherwise in writing by the Engineer-in-Charge,

1.14. Shop drawings giving complete information for the fabrication of the component parts including the location, type, size, length and details of connections shall be prepared well in advance by the contractor before the actual fabrication and got approved from the Engineer-in-Charge. Delay in submission of the drawings by the contractor causing consequent delay in approval by the Engineer in charge shall not absolve the contractor of his responsibilities.

1.15. Wherever the Schedule of quantities item stipulates design, the Contractor shall have to supply designs and shop drawings which shall have to be vetted by any IIT/NIT/Govt Engineering College or any other Institute of repute as approved by Engineer – in – charge, and all costs towards the same, including charges for vetting shall be deemed to have been included in the quoted rates.

1.16. Plumbing drawings are schematic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the structural, architectural and other services drawings. Detailed drawings shall be prepared by the Contractor and got approved by EICwell in advance prior to start of the relevant item of work.

1.17. Architectural drawings shall take precedence over plumbing or other services drawings in respect of overall dimensions unless and otherwise directed by EIC.

1.18. All temporary works, ancillary works, enabling works, including dewatering of surface and subsoil water, preparation and maintenance of temporary drains at the work site, preparation and maintenance of approaches to working areas, wherever required, for execution of the work, shall be the responsibility of the Contractor and all costs towards the same shall be deemed to have been included in the quoted prices

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

1.20. The Contractor shall at his own expense and without extra charges, take all precautions such as shoring for all depths or any other arrangement as approved by Engineer-in-Charge for ensuring that there shall be no sliding / collapsing of the excavated earth and nothing extra shall be payable on account of shoring/other arrangements.

1.21. Earth work in excavation and filling for, building works shall be governed under provisions of CPWD Specifications and Delhi Analysis of Rates (DAR), plan of internal road works and any other works not related to building works shall be governed by MORTH Specifications and MORTH Standard Data Book for Analysis of Rates.

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

1.23. The rate for every item of work to be done under this contract shall be for all levels, leads and heights and nothing extra shall be paid on this account.

1.24. For items covered by J&K SoR/CPWD Specifications, reference may be made to the relevant CPWD Specifications. Where it is felt that the CPWD Specifications concerned does not reflect the full scope of work under any item, reference may be given to Indian Standards or any other relevant Specifications.

1.25. Should work be suspended by reason of rain, strike, lockouts or any other cause, Contractor shall take all precautionary measures for the protection of works and at his own cost and shall make good any damage arising from any of these causes to satisfaction of EIC

1.26. Work shall normally be done in a single shift/day. However if the work is required to be executed in more than one shift in a day for meeting the time lines, the Contractor with prior approval of the Engineer – in – charge, shall have to make necessary arrangements for the same and all costs towards the same shall be deemed to have been included in the quoted rates

1.27. Defect liability period shall start from the date of taking over of entire project after its completion in all respects as per the scope of the contract by the Engineer – in – charge. Taking over of the entire project shall be reckoned as actual date of completion of the project.

1.28. Labour Camp:

NHIDCL shall not permit the contractor to set up labour camp within the site boundary. Contractor shall make his own arrangements to set up labour camps. The facilities like dwelling units, water supply, lighting arrangement, drainage and sanitation as stipulated in the contract shall be arranged by the Contractor and all costs towards the same shall be deemed to have been included in the quoted rates.

The Contractor shall put in place an arrangement for controlled entry and exit of labourers / workers / technicians with Gate Passes or Identification Badges with Colour photographs individually authorized by the Contractor and all costs towards the same shall be deemed to have been included in the quoted prices.

1.29. Precision Works

Machine foundations, equipment installations are precision works. Contractor shall ensure utmost precision in location of holding down bolts, slots, pockets and the like with (+/-) 1 mm tolerance.

1.30. Maintenance of Register of Tests -

All the registers of tests carried out at Construction Site or in outside laboratoriesshall be maintained by the contractor which shall be issued to the contractor byEngineer-in-charge. Contractor shall be responsible for safe custody of all the test registers.

1.31. Method Statement

The contractor shall submit a 'Methods statement' for the approval of the EIC soonafter the award of work to him. The 'Methods statement' is a statement by which the construction procedures for important activities of construction are stated, checked, and approved. The 'Methods statement', should have a description of the item with elaborate procedures in steps to implement the same, the specifications of the materials involved, their testing and acceptance criteria, equipment to be used, precautions to be taken, mode of measurement, etc.

1.32. Floors & Levels :

a)Floor 1 shall be the lowest floor above the average ground level ofthemain building to be constructed at site. The Floor above Floor 1 shall benumbered in sequence as Floor 2, Floor 3 andso on. The number shall increaseupwards.

b) Floor Level - Top level of structural slab shall be the floor level.
c) Plinth Level - Floor 1 level shall be the plinth level.

2.0WORK PROGRAMME:

2.1 The Contractor shall, within 10 days after the date of award of the work, submit his detailed work programme preferably in Microsoft Project, detailed Project quality plan for works executable at site and also at manufacturer's place, safety plan, for the approval of the Engineer in - charge, which shall clearly set out his proposed schedule for the whole of the Works, the time for completing the major sections of the Works and his schedule for mobilizing the materials and equipment necessary for implementing the Works in a timely cohesive and efficient manner. The Contractor shall submit the above Resource Mobilization Plan on the basis of site/region prevalent labour constants/productivity factors and separately a Project Material Procurement Plan clearly mentioning the procurement strategy

for long lead items.

2.2 **Slab Cycle Requirements**:

The Contractor shall plan and design Concrete Strength at various stages of work commensurate to the slab cycle requirements through submitted shuttering plan / design which shall be the sole responsibility of the Contractor and this shall not absolve him of his responsibilities despite approvals accorded by EIC.The quoted rate shall be deemed to include the cost of the above.

2.3 Project Review Meetings

The contractor, immediately on award of work shall submit details of his key personnel to be engaged for the work at site. In addition, he shall furnish the Engineer-in-Charge detailed organogram involved with the work.
The Contractor shall present the programme and status at various review meetings as required.

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

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

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

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

3.0 WATER AND POWER

3.1 Water: Contractor shall make his own arrangement for water, required and suitable for construction. This shall also include arrangement of adequate water for hydro-tests of liquid/water retaining structures or any other installations as directed by EIC.

3.2 Power: Contractor shall make his own arrangements for power required for construction of the Project. Alternately, he may apply for and arrange power at the project site. All associated activities for obtaining necessary approvals and sanctions for construction power shall be coordinated by the contractor, the cost of which shall be deemed to be included in the quoted rates. All installations / fixtures & fittings / cabling for construction power shall be in the scope of the contractor without any additional cost to the NHIDCL. The delay on part of the Contractor in timely getting the statutory clearances and establishing required installation for adequate power supply shall not be accounted for extension of time and also shall not absolve him of Contractual responsibilities

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

4.0 MEASUREMENTS, BILLING & TERMS OF PAYMENT :

4.1 All works shall be measured in metric system based on actual work done as per the terms and conditions of the tender document.

4.2 Contractor shall submit supporting computerized measurements of work executed with every stage payment

4.3 **Terms of Payment**: Following shall be the terms of payments for the subject work:-

Running Account Bills:

The running bills shall be paid in stages. The above progressive payments are subject to deduction towards income tax and other recoveries as applicable as per the terms of the contract.

5.0 CONTRACT DRAWINGS

The contractor shall keep mandatorily one copy each of approved drawings, conditions of contract, specifications, instructions and schedule of quantities at the site of works available for reference by any authorized representative of

Employer/Engineer- in-charge, at all times during the progress of the works. The drawings shall be displayed and arranged as directed by the Engineer- in-Charge.

6.0 WORK TO BE CARRIED OUT BY SPECIALISED AGENCIES:

6.1 Followingspecializedworksshouldbegotexecutedonlythroughagencies specializedin thefieldandthecontractorshallberequiredtosubmitthedetailsofsuchagenciesto theEngineer-in-Chargeandobtainnecessaryapproval prior to their engagement:-

- Anti-termite Treatment
- Water Proofing Work
- Fire-fighting systems
- Bio-Digestor for sewage Treatment
- Plumbing with polypropylene pipes using advanced technology for jointing.
- Retractable roofing at terrace
- Art work

6.2 The specialized agency should have successfully completed at least one work of similar nature.

6.3 The contractor shall submit the following details of the specialized agency before execution of work for approval of EIC :

List of similar works carried out by the agency during the last five years along with the name of work, name and address of clients, year of execution, value of work done and brief specification of the work. The credentials for such completed works shall be obtained from the Project Manager / Executive Engineer concerned along with contact address.

6.4 Notwithstanding the approval of the Engineer-in-Charge for the specialized agencies, the services of the specialized agencies shall be removed whereverthe Engineer-in-Charge is not satisfied with the performance of the specializedagency. Thereupon, the Contractor shall immediately arrange for an alternate specialized agency conforming to prescribed eligibility criteria. Nothing extra shallbe payable on this account. Further, no extension of time shall be permissible onthis account.

7.0 MOCK-UP

7.1 The concept of Mock Ups is to assess the performance parameters / quality standards specified for specified item in the project. The main objective of the section is to address issues prior to construction to minimize disruption to the critical path of construction program and is as follows;

- Determine whether the contractor possesses required skill level necessary to construct the activity, assemblies or systems such that the as-built construction will satisfy specified requirement.
- To understand the sequence of operation and discuss alternative sequencing options if any.
- To assess the standard of workmanship and aesthetics to be replicated throughout the project.
- To recognize and resolve potential areas of conflict prior to the commencement of construction.

7.2 The contractor shall prepare the full scale mock up at site for activity showing the following but not limited to:

- Flooring patterns, hardware, accessories, exterior windows(sill, corner, jamb),structural glazing, Doors, Glazing works, External Façade systems, false ceiling, electrical and mechanical fixtures, wall panelling system , false ceiling system etc.,
- To determine the acceptable standard of workmanship, the Contractor shall execute a sample unit (one of each type decided by the Engineer-in-charge) completing all items of works and services such as walls, floors, roof, plastering, joinery including fittings, sanitary fittings, plumbing, electrification, painting, one toilet& fittings, doors, windows, wood works etc. complete in all respects. The brands of various materials incorporated as well as finishes will be approved by the Engineer-in-charge. These will be guiding samples for future execution of the rest of the Units.

7.3 The contractor shall construct mock ups for the purpose of testing as given in the particular specification for the following items of work:

- Elevation Shingtang
- Art work in atrium wall , cornices at beam column junction and on columns (Refer Art work tender drawing)

7.4 Contractor shall build mock-ups for each form of construction and finish required, including materials indicated for the completed work as per given specifications.

7.5 Mock up shall be constructed by the same personnel who will be constructing actual construction of the said activity or system on the project along with acting site supervisors, key personnel during actual construction.

7.6 Contractor shall furnish the Mock up schedule taking care to ensure that sufficient time period is available between erection / installation of the mock

up and actual execution of that item of work to enable EIC to incorporate changes and take corrective actions if any.

7.7 The Contractor shall establish the acceptable quality of workmanship as desired by the EIC for each of the items of the Works and their elements by preparing specimens and mock ups as directed by the EIC.

7.8 Nothing extra shall be payable for preparing the specimens and the mock ups. No claims of any kind whatsoever including the claim of extension of time will be entertained due to the incorporation of this requirement.

7.9 In case of non-approval of the mock-ups by EIC on account of quality issues or other reasons attributable to the Contractor, the mock ups shall be rebuilt up by the Contractor at no extra cost and time to EIC.

8.0 MATERIALS AND SAMPLES:

The contractor shall arrange a sample room at site for displaying approved samples which shall be maintained till the completion of the work. Nopaymentwillbe madetothecontractorforthesamplesprocured.

The sample approval shall be given in writing by EIC within 15 days after submission of the sample with supporting catalogues and other documents as required by EIC.

The delay in submittal of the samples by the Contractor and further cascading delay in subsequent approvals and procurement shall not attract any extra cost and time to the Contract.

9.0 RECOMMENDED MAKES OF MATERIALS.

9.1 A list of recommended makes of materials is laced with contract

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

The products/materials shall be as per the Brand specified in the list of approved makes

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

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

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

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

b) Where it is difficult to guarantee uniformity in colour and other properties, contractor shall make all efforts to match the colour, shade, texture of the product with the approved sample. If in the opinion of the Engineer-in-Charge there is significant variation in properties, the Engineer-in-Charge shall direct the contractor to remove the same from the siteimmediately and replace with products matching with the approved sample within reasonable period. The decision of Engineer-in-Charge shall be final and binding. Nothing extra shall be paid on this account.

10.0 COMPLETION CERTIFICATES/ NOC FROM LOCAL STATUTORY BODIES

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

The application on behalf of NHIDCL/Employer for submission to relevant authorities along with copies of required certificates complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction / commissioning of the work is not delayed for want of the approval / inspection by concerned authorities.

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

11.0 COMPLETION DRAWINGS :

11.1 During the execution of the Works a set of drawings shall be retained in the Contractor's Site Offices for the exclusive purpose of recording approved changes made to the Work as the construction proceeds. On completion of the Work, the Contractor shall submit required details and "Mark- up" of changes if any in all drawings of the project to the EIC. The Contractor shall submit the "AS BUILT" drawings after completion of the project . These drawings shall include and show all the changes / deviations made from the approved working drawings during the course of construction and also the other details as called for by the Engineer-in-Charge.

12.0 TOOLS, PLANTS AND MACHINERY

The Contractor shall provide and install at site, T &P as stipulated in the Contract. The deployment of T&P shall be planned as per work requirement to suit the nature, quantum and speed of the work for lifting/hoisting construction materials/equipment etc. The T&P shall be maintained in good working condition throughout the progress of work. All adequate precaution regarding formal upkeep of valid Statutory/Safety credentials of major construction equipment

as directed by EIC, their installation, operation, maintenance, materials etc., shall be taken care of. The operating staff to be deployed shall be properly qualified and adequately trained and experienced. All safety precautions shall be taken during the project duration, against possible accident. The Contractor shall deploy his representative to effectively enforce the safety rules and regulations in this regard. Nothing extra shall be payable on this account for the above.

Construction Equipment & Mechanisation of Construction Activities

The above list is only minimal and indicative. The contractor shall deploy all necessary tools and plants as per the requirement of the work.
The Contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and Time Schedule, progressively deploy adequate equipment, and tools & tackles and augment the same as decided by Engineer-in-Charge depending on the exigencies of the work so as to suit the construction schedule.

The Contractor shall mechanise the construction activities to the maximum extent by deploying all necessary construction equipment/ machinery in adequate numbers and capacities.

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

The work is to be completed in specified periodof 15months,hence thecontractor shall adopt a suitable system complying with BIS standards regarding stripping time, with requisite number of sets of centring and shuttering. Nothing extra shall be payable on account of the above and the rates shall be restricted to the quoted rates for the corresponding item.

14.0 CEMENT & STEEL:

14.1 For Cement and Steel and other materials, as prescribed, the quantities brought at site shall be entered in the respective material at site accounts and shall be treated as issued for maintenance of daily consumption.

The procurement of Cement and Reinforcement Steel, and,

their issue and consumption shall be governed as per conditions laid down hereunder.

14.1.1 Cement

The Contractor shall procure 43 grade (Conforming to IS:8112) Ordinary Portland Cement, as required in the work, from reputed manufactures of cement, having a production-capacity of one million tonnes per annum or more, such as ACC, Ultratech, etc., as approved by Engineer-in-Charge. Procurement of cement of other type and grade shall be on prior approval of the EIC for specific area of application.

The Cement shall be brought at site in bulk supply as per requirement of work or as decided by the Engineer-in-Charge.

The cement godowns of the capacity to store appropriate quantity of cement as decided by the Engineer-in-Charge shall be constructed by the Contractor at site of work for which no extra payment shall be made. The Contractor shall facilitate the inspection of the cement godowns by the Engineer-in-Charge at any time.

14.1.2 Steel

Reinforcement steel shall mean Fe-500D unless otherwise specified. The Contractor shall procure steel reinforcement TMT bars (of Fe 500 D grade having elongation ratio more than 14.5%) conforming to IS:1786-2008 or latest / Structural steel conforming to IS:2062,from main producers of Steel like SAIL, TISCOetc., or as approved by the Engineer-in-Charge. The Contractor shall have to obtain and furnish test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work.

The structural steel, reinforcement steel shall be stored by the Contractor at site of workstrictly on hard elevated bed or wooden sleepers enclosed within demarcated area (fabrication yard, reinforcementyard)in sucha way as to prevent distortion, corrosion and nothing extra shall be paid on this account. Bars of different sizes (diameters) and lengths shall be stored separately away from the scrapsto facilitate easy counting and checking.

Coefficient of weight i.e. the weight per unit length of the steel procured by the Contractor shall be ascertained at site before using it and certified by the Engineer-in-Charge. In case, weight per unit length is beyond the rolling margin as laid down in the BIS: 1786 / IS:1852 for reinforcement steel / structural steel respectively, the steel

will be rejected and shall be removed from the site of work forthwith. In case weight per unit length is more than the standard coefficient of weight for the diameter, but is within the rolling margin, thenthe payment shall be made as per the standard weight per unit length, and, where the weight per unit length is lesser than the standard coefficient of weight for the diameter, but is within the rolling margin, the payment shall be restricted with respect to the actual weight per unit length of the diameter.For this Coefficients indicated in CPWD Specifications or any other BIS Standards shall be adopted.

The standard sectional weights referred to in standard table under para5.3.4, of the CPWD Specifications 2019 are to be considered for conversion of length of various sizes of Steel Reinforcement bars into weight and are as per clause 6.2 of IS 1786.

14.2 The actual issue and consumption of steel and Cement on the work shall beregulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steeland cementshall be worked out .

14.3 Steel and Cement brought to site and remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.

15.0 ITEMS OF WORK REQUIRING PERFORMANCE GUARANTEE BOND

The following items of works require submission of performance guarantee bond:

A. **Water proofing treatment system**
B. **Anti-termite treatment**

For the above works , the Contractor shall give a guarantee to the effect that the work shall remain structurally stable and shall guarantee against faulty design, workmanship, fabrication, erecting, installation, leakages etc including defective material, if any. The Contractor shall furnish a Guarantee Bond, as per prescribed format. The Guarantee Period shall be for 10 (Ten) years after completion of defect liability period.

16.0 REPORTS TO BE SUBMITTED

The Contractor shall prepare and submit monthly progress reports (Including Progress Photographs) for the month to the EIC in three copies within first 7 days of the following /next month. Reporting shall continue until the Contractor has completed all work including the outstanding work as on the completion date as stated in the Taking-Over Certificate for the Works. Each report shall include but shall not be limited to the following:

(a) the status of supply and delivery of major materials and Plant to be incorporated in the Works, and the supply of major items of the Contractor's construction plant;

(b) records of personnel and Contractor's equipment on site;

(c) Activities executed/achievements during the month.

(c) copies of quality assurance documents, test results and certificates of materials;

(d) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and

(e) comparisons of actual and planned progress, with details of any aspects which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome such aspects.

(f) Areas of concern/problems/hold ups& its impact and action plans

And any other reports sought by the EIC.

17.0 QUARRY MATERIALS

The Contractor shall be wholly responsible to identify the suitable sources for quarry materials required for the Works, such as earth, sand, stone, gravel, murrum, etc., and to make his own arrangements(within the contract price) for collection and transportation of the materials irrespective of the leads and lifts required. The party managing the quarry identified by the Contractor should have proper license from the UT of Ladakh. All materials supplied by the Contractor shall satisfy

the requirements set forth in the Specifications contained in this Bid and shall be subject to the approval of the EIC. The Contractor shall take this into account while offering his rates and no claims whatsoever shall be entertained for extra costs on this account. All the seignorage(royalty)charges, levies etc., payable to Government shall be paid by the Contractor and are deemed to be included in the quoted rates.

18.0 INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES/BUILDINGS

18.1 The Contractor shall prepare General Maintenance of Traffic Plan which will be subject to the approval of the EIC. In case any operation connected with the Works requires temporary diversion of the traffic, or obstruction or closure of any road, or any other 'right of way', the approval of the EIC and the respective competent authorities shall be obtained at least one week in advance.

18.2 The Contractor shall at all times during execution of the Works, ensure an uninterrupted flow of traffic/occupants of existing buildings on the work locations.

18.3 The Contractor shall at all times during execution of the Works, provide convenient access to parts, steps, bridges or drives for all entrances to property abutting the work sites and maintain them clear, tidy and free from mud or objectionable matter.

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

18.5 The Contractor shall not claim any extra cost or payment on account of all or any of the works specified in above clauses.

19.0 CONTRACTOR TO CO-ORDINATE HIS WORK WITH OTHER CONTRACTORS

Various other works may be progressing simultaneously in the project site. The Contractor shall co-ordinate with the other concerned Contractors and take into account the inter-relation with other works while planning his daily construction activities, so as to eliminate any hindrance to any work(s) and/or to avoid any damages to the work(s) already carried out by other Contractors. The Contractor shall co-ordinate with the

other concerned Contractors for all such works as per the Engineer's directions at no extra cost and he shall provide unhindered access to the T&P and machinery of the other contractors as per the directions of EIC.

20.0 SHIFTING OF UTILITY LINES

During the course of execution of the Works under this Contract, the Contractor is bound to undertake shifting of any Utility line(s) that are required to complete the Works satisfactorily. However, NHIDCL reserves the option to get such work carried out by other agency, but this shall not relieve the Contractor of any of his responsibilities and obligations under this Contract*implying that this shall not be treated as compensation event for extension of time unless otherwise consented by EIC.*

21.0 MOBILISATION OF MEN, MATERIALS AND EQUIPMENTS:

All expenses towards mobilization at site and demobilization including bringing the equipment, work force, materials, dismantling the equipment, clearing the site etc. shall be deemed to be included in prices quoted and no separate payments on account of such expenses shall be entertained.*The EIC shall have exclusive rights to accept or reject any material or equipment and also the manpower engaged by the Contractor during complete tenure of the Project. This can also lead to demobilisation of the supervisory manpower including key persons of the Contractor/ Specialized agency in case of their non-satisfactory performance.*

22.0 LIGHTING& WATCH AND WARD:

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

22.2 The Contractor shall be responsible for the watch and ward of the all construction premises and buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installation till handing over of ~~all~~ the works to NHIDCL/Employer. Nothing extra shall be payable on this account.

23.0 TENDER DRAWINGS

The hard copies of tender drawings are not being attached with the tender documents. Soft copies are uploaded along with bid document on CPPP/NHIDCL website. The bidders are required to go through the drawings before bidding for the work. A set of the drawings is available in the office of the NHIDCL, which the contractor may study during working hours, before quoting the rates if he so desires.

24.0 APPLICABLE PERMITS

24.1 The contractor(s) shall give to the Municipality, police and other authorities all necessary notices etc. that may be required by law and obtain all requisite licenses for temporary obstructions, enclosures etc. and pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night.

24.2 The Contractor shall ensure that applicable permits mandated by the local bodies are obtained as required under the Applicable Laws. An indicative but not exhaustive list of some of the applicable permits are mentioned below for the guidance of the Contractor.

24.3 Consequences on account of failure to obtain the mandatory permits shall be the sole responsibility of the contractor and no claim what so ever shall be entertained by the EIC. Any liability incurred by EIC on account of such failure shall be recovered from the amounts/ payments due to the Contractor.

- Permission of the UT Government for extraction of boulders from quarry;
- Permission of Pollution Control Board for installation of crushers;
- Permission of the UT Government for drawing water from river/reservoir;
- Licence from Inspector of factories or other competent authority for setting up Batching Plant;

- Clearance of Pollution Control Board for setting up Batching Plant;
- Clearance of Pollution Control Board for Asphalt Plant;
- Clearance of Pollution Control Board for installation of diesel generator sets;
- Fire safety clearance from fire authorities;
- Permission of UT Government for cutting of trees, if any;
- Permit for employing unskilled/semiskilled labour during day/night;
- Permitfordismantling/reconstruction/underpinning/strengthening of affected structures, disposal of solid waste/excess material or soil, setting up of temporary campus on government/private/leased land;
- Clearance for any urban structure affecting the landscape/ environment from the concerned authority;
- Permission from Archaeological Survey of India for construction of any structure within the prescribed radius of protected monuments;
- Permissions from the public utilities for diversion of utilities including reinstatement/reconstruction to original specifications;
- Approvals for electric supply/distributions;
- Approval of Traffic Police for diversions and running of vehicles on specified routes; and
- Any other permits or clearance required under the Applicable laws.

25.0 QUALITY ASSURANCE

Detailed quality assurance programme to be followed for the execution of Contract under various divisions of works will be mutually discussed and agreed to.

The Contractor shall establish document and maintain an effective quality assurance system as outlined in recognised codes.

Quality Assurance System plans/procedures of the Contractor shall be furnished in the form of a QA manual. This document should

cover details of the personnel responsible for the quality assurance, plans or procedures to be followed for quality control in respect of all the activities envisaged in the construction works. The quality assurance system should indicate organisational approach for quality control and quality assurance of the construction activities, at all stages of work at site.

NHIDCL or their representative shall reserve the right to inspect/witness, review any or all stages of work at site as deemed necessary for quality assurance and / or timely completion of the work.

The Contractor has to ensure the deployment of quality Assurance and Quality Control Engineer(s) depending upon the quantum of work. This QA/QC group shall be fully responsible to carryout the work as per standards and all codes' requirements. In case EIC feels that Contractor's QA/QC Engineer(s) are insufficient, Contractor has to deploy other experienced Engineer(s) as per site requirement and to the full satisfaction of EIC.

26.0 INSURANCE

Without limiting the Contractor's obligations and responsibilities stated elsewhere in the Contract, the Contractor shall at his own cost arrange,secure and maintain insurance in the joint names of NHIDCL and the contractor with any of the subsidiary of the General Insurance Corporation of India in such a manner that NHIDCL and the contractor are covered for all time during the period of contract i.e. the time period allowed for completion of work, extended period and the defect liability period. The insurance shall be effected in accordance with terms approved by NHIDCL and the contractor shall submit the insurance policiestothe Engineer-In-Charge within 15 (Fifteen) days of signing of the agreement along withthe receipt of premium. The contractor shall timely pay and submit the receipts of payment of premiums for extensions of policies, if any. Theinsurance shall coverthe following: -

32.1. Contractor's All Risks Insurance

The contractor shall insure the work for a sum equivalent to the Contract value orsuch additional sums as specified and the interests of NHIDCL against ALL RISKS claims, proceedings, loss or damages, costs, charges and expensesfromwhatsoever cause arising out of or in consequence of the execution and maintenance of the work for which the contractor is responsible under the contract

32.2. Workman Compensation & Employers Liability Insurance.

This insurance shall be effected for all the contractor's employeesengaged in the performance of the contract. NHIDCL shall not be liable in respect of anydamages or compensation payable at law in respect of or in consequence of any accident or injury to any workman or anyother person in the employment of thecontractor and the contractorshall indemnify and keep indemnified NHIDCL against all such damages and compensation and against all claims, demands,proceedings, costs, charges andexpenses, whatsoever in respect or in relation thereof.

32.3. Third Party Insurance.

The contractor shall be responsible for making good to the satisfactionof the Engineer-in-Charge any loss or any damage to all structuresand properties belonging to Employer or being executed or procured or being procured by Employer or of the other agencies within the premises ofall work of NHIDCL if such loss or damage is due to fault and or the negligence or wilful acts or omissions of the contractor, his employees, agents, representatives.

The contractor shall take sufficient care in moving his plants, equipment andmaterials from one place to another so that they do not cause anydamage to anyperson or to the property of Employer or any third party including overhead andunderground cables and in the event of any damage resulting to the property ofthe NHIDCL or to a third partyduring the movement of the aforesaid plant, equipment or materials, the cost of such damages including eventual loss of production, operation or services in any plant or establishment as estimated by the NHIDCL or ascertained or demanded by the third party, shall be borne by the contractor.

32.4. Before commencing the execution of the work, the contractor, shall insure andindemnify and keep NHIDCL harmless of all claims, against thecontractor's liability for any materials or physical damage, loss or injury which may occur to any property, including that of Employer or to any person including any employee of NHIDCL/Employer, or arising out of the execution of the work or in the carrying out of the contract, otherwise than due to the matters referred to in the provision to (a)above. Such insurance shall be effected for an amount sufficient tocover suchrisks. The terms shall include a provision whereby, in the event of any claim being brought or made against NHIDCL the insurer shall indemnify NHIDCL against such claims and anycosts, charges and expenses in respectthereof.

32.5. The contractor shall also at times indemnify NHIDCL against all claims, damages or compensation under the provisions of Payment or Wages Act,1936, Minimum Wages Act, 1948,

Employer's Liability Act, 1938, theWorkman's Compensation Act,1947, Industrial Disputes Act,1947 and Maternity Benefit Act, 1961, or any modification thereof or any other law relating thereof and rules made there under from time to time.

32.6. Contractor shall also at his own cost carry and maintain any andall otherinsurance(s) which he may be required to take out under any law or regulation from time to time. He shall also carry and maintain any other insurance, which may be required by the Engineer-in-Charge.

32.7. The Contractor shall prove to the Engineer-in-charge fromtime to time he has taken out all the insurance policies referred to above andhaspaid the necessary premiums for keeping the policies alivetill expiry of the DefectsLiability Period.

32.8. The aforesaid insurance policies shall provide that they shall not be cancelled till the Engineer-in-charge has agreed for cancellation.

32.9. Remedy on the contractor's failure to insure

If the contractor shall fail to effect and keep in force the insurance referred to above or any other insurance which he/they may be required to effect under the terms of the contract then and in any such case Engineer-in-charge may without being bound to, effect and keep in force any such insurance and pay such premium or premiums, as may be necessary for that purpose and from time to time deduct the amount so paid by the Engineer-in-charge from any moneys due or which may become due to the contractor or recover the same as a debt due from the contractor.

27.0INDEMNITIES

(a)The Contractor shall indemnify and hold harmless the NHIDCL, the NHIDCL's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

(a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable toany negligence, wilful act or breach of the Contract by the NHIDCL, the NHIDCL's personnel, orany of their respective agents, and

(b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, wilful act or breach of the Contract by the NHIDCL, the NHIDCL's personnel, their respective agents, or anyone directly or indirectly employed by any of them.

SPECIAL CONDITIONS OF CONTRACT

(ELECTRICAL AND MECHANICAL (E&M) SERVICES)

GENERAL

27.1 These special conditions shall be read in conjunction with general conditions of contract and amendments / corrections thereto, Special Conditions of Contract for Civil Works.

27.2 TheInternal electrical worksshall be carried out in accordance with theCPWDGeneralSpecificationsforElectricalworks(Part–I– Internal)2013and(Part-IIExternal)1994, HVAC Specifications 2017 other Relevant latest CPWD Specifications(Part-III to Part VII),IndianElectricityRules,RelevantIndianStandardand Additional termsandconditionsandspecificationsattached herewith.

27.3 The contractor must study carefully all the specifications/schedule of work / drawings / additional specifications and site parameters and quote his bid after accounting all works. No extra claim on any account shall be paid/ entertained other than the quoted rates.

27.4 The work shall be carried out in accordance with the drawings approved by the Engineer-in-charge. Before commencement of any item of work, the contractor shall correlate all the relevant architectural and structural drawings approved for the work and satisfy himself that the information available is complete and unambiguous. The discrepancy, if any, shall be brought to the notice of Engineer-in-charge before execution of work. The contractor himself shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information.

27.5 The contractor shall leave such recesses, holes, openings, etc., as may be required for the electric, air-conditioning and other related works. For this purpose any required inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be arranged by the contractor and fix the same at the time of casting of concrete, stone work & brick work, if required, and nothing extra shall be payable on this account.

27.6 The contractor shall give a trial run of the equipment and machinery for establishing its capability to achieve the specifications within laid down tolerances to the satisfaction of the Engineer-in-charge before commencement of work.

27.7 All tools, plant and machinery provided by the contractor shall, when brought at the site, be deemed to be exclusively intended for the construction and completion of this work and the contractor shall not remove the same or any part thereofwithout the consent of the Engineer-in-charge.

27.8 All materials shall be got checked by the Engineer-in-charge on receipt of the same at site before use.

27.9 Samples of all materials, conduits, accessories, switches, wires, control cables fittings and other materials/articles required for execution of the work shall be got approved from the Engineer-in-charge prior to procurement. Materials/articles manufactured by the firms of repute as indicated in tender documents and approved by the Engineer-in-charge shall only be used.

27.10 These shall be submitted for approval and retention by Engineer In-charge/his representative and shall be kept in their site office for reference and verification till the completion of the Project.

27.11 The contractor shall be required to make a sample of each item of work at the earliest opportunity using all approved materials for approval of Engineer in charge before mass scale finishing works are taken up.

27.12 Even ISI marked materials shall be subjected to quality test at the discretion of the Engineer-in-charge besides testing of other materials as per the specifications described for the item/material. Whenever ISI marked materials are brought to the site of work; the contractor shall, if required by the Engineer-in-charge, furnish manufacturers test certificates to establish that the material procured by the contractor for incorporation in the work satisfy the provisions of IS codes relevant to the material and/or the work done.

27.13 The Contractor shall use only chase cutting machine for cutting the chases in the wall for recessed conduit wiring.

27.14 The contractor will have to ensure that the skilled labour i.e. wireman etc., engaged in the execution of the work must possess valid electrical license, otherwise he will not be permitted to execute the work.

27.15 The contractor shall be responsible for removal of all defects in the work during the guarantee/warranty period. If any failure is noticed during this period which is attributable to poor quality of material and bad workmanship, the contractor will be required to rectify the same at his own cost, failure of which the NHIDCL will be at liberty to get the defects rectified at the risk & cost of the contractor. The contractor will also be required to carryout his own inspection/testing during the guarantee/warranty period and attend to any defect taking place during this period.

27.16 Guarantee: **All material shall be guaranteed for a period of Twelve(12) months from the actual date of recorded completion of the overall project**by the Contractor against unsatisfactory performance and/or break down due to defective design, workmanship of material. The material or equipment or any other there of so found defective during guarantee period shall forthwith be repaired or replaced free of cost, to the satisfaction of the Engineer-in-charge. In case it is felt by the NHIDCL/Employer that undue delay is being caused by the contractor in doing this, the same will be got done by the NHIDCL at the risk and cost of the contractor. The decision of Engineer-in-charge in this regard shall be final & binding.

ASSOCIATED CIVIL WORKS

All Major or Minor civil works associated with M&E installation are included in the scope of this contract including all minor civil work like wall chasing by wall chaser, making holes etc. for installation of conduits/cables and making good. These shall be executed in accordance with approved shop drawings.

PERFORMANCE GUARANTEE

The contractor shall carry out the work in accordance with the approved Drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract.

The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.The contractor shall guarantee that the M&E system as installed shall perform to complete satisfaction of the NHIDCL/Employer.

Complete set of tender drawings is available in the NHIDCL's office and reference may be made to same for any details or information.

The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.

BYE-LAWS AND REGULATIONS

The work shall be carried out to the satisfaction of the Engineer-in-charge and in accordance with the Specifications, Regulations of the Electric Supply Authority, Indian Electricity Rules and Regulations, latest Indian Standards and as per the requirements of the Chief Fire Officer etc.,

FEES AND PERMITS

The Contractor shall obtain permits required for the installation of this work. On completion of the work, the contractor shall obtain and deliver to the NHIDCL/Employer, certificate of final inspection and approval by the local electricity authority for DG set, fire fighting and Lift (CFO/ Municipal, UT/Central govt. whichever is applicable).

Thecontractororhisrepresentativeshallattendsuchinspection and extendalltestfacilitiesasareconsiderednecessary,rectifyandcomplywit hallobservationsoftheInspectorswhicharepart of the agreement and arrangefor obtaining necessary clearance certificateinfavourofthedepartment.Incasethecontractorfailstoattendt heinspectionandmakedesiredfacilitiesavailableduringinspection,thed epartmentreservestheright to providethesameattherisk andcost ofthe contractor and impose penalty for the same. The installation will beacceptedbyNHIDCLonlyafterreceivingclearancefromrespective Inspectors,forthework executed bythecontractor undertheagreement.

AnyextraworkforobtainingapprovalfromCFO etc, shallbecarried outwithoutanyextracost totheNHIDCL. However, anyfeespayabletoCFOfortheclearanceshallbemade bytheNHIDCL/Employer.

DRAWINGS

The M&E Tender Drawings issued with tenders, are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Tender Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these TenderDrawings. The architectural / interiors drawings and details shall be examined for exact location of equipment, electrical points & fixtures.

The contractor shall follow the tender drawings in preparation of his bid drawings/shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed.

Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Engineer-in-charge before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and contractor shall rectify the same at his own cost.

The contractor shall examine all architectural, structural, plumbing, HVAC, Electrical and other services drawings and check the as-built works before starting the work and report to the Engineer-in-charge any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer-in-charge without additional cost to the NHIDCL.

SHOP DRAWINGS

7.1 All the shop drawings shall be prepared on computer using Autocad software based on Architectural Drawings, site measurements and Interior Designer's Drawings. Within eight weeks of the award of the contract or as specified in Special Conditions of relevant item of work, the contractor shall furnish, for the approval of the EIC , four sets of detailed shop drawings of all equipment and materials including layouts for all conduit layouts, distribution panels, switch boards, cabinets, special pull boxes, cable trays and any other requirement to be fabricated or purchased by the contractor. Shop drawings shall also be submitted in soft format.

7.2 These shop drawings shall contain all information required to complete the Project as per specifications and as required by the Engineer-in-charge. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/ works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Each item of equipment/material proposed shall be a standard catalogue product of an established manufacturer strictly from the approved makes list.

When the EIC makes any amendments in the above drawings, the contractor shall supply four fresh sets of drawings with the amendments duly incorporated along with check print, for approval.

The contractor shall submit further six or as many sets as required by EIC of shop drawings to the Engineer-in-charge for the exclusive use by the Engineer-in-charge and all other agencies. No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment/installation.

7.3 Shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any material to allow the Engineer-in-charge ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.

7.4 Manufacturers drawings, catalogues, pamphlets and other documents submitted for approval shall be in six sets. Each item in each set shall be properly labelled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

7.6 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

7.7 Where the contractor proposes to use an item or equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, wiring or any other part of the mechanical, electrical or architectural layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the contractor at his own expense and gotten approved by the EIC.

MANUFACTURERS INSTRUCTIONS

Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, manufacturer's instructions shall be followed in that case duly bringing the same to the notice of EIC.

COMPLETION CERTIFICATE

On completion of the electrical installation a certificate shall be furnished by the Contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local, UT/central govt./ municipal / fire authorities concerned.

INSPECTION AND TESTING

Inspection and testing of Heat pumps, Pumps, HT/LT Panels, DG set and other major items at manufacturer's works for this contract is the at discretion of NHIDCL. Inspection team for the same may constituted by NHIDCL. No equipment shall be delivered without prior written confirmation from the Engineer In-charge. All expenses related to testing at their or their sub vendors works shall be to Contractor account.

Tests on site of completed works shall demonstrate the following:

That the equipment installed complies with specification in all respect and is of the correct rating for the duty and site conditions.

That all items operate efficiently and quietly to meet the specified requirements.

That all circuits are fully protected and that protective devices are properly co-ordinated.

That all non-current carrying metal parts are properly and safely grounded in accordance with the specification and appropriate Codes of Practice.

The contractor shall provide all necessary instruments and labour for testing, shall make adequate records of test procedures and readings, shall repeat any tests requested by the Owner and shall provide test certificate signed by a authorised person. Such test shall be conducted on all materials and equipment and tests on completed work as called for by the Owner at contractor's expenses unless otherwise called for.

If it is proved that the installation or part thereof is not satisfactorily carried out then the contractor shall be liable for the rectification of the same. NHIDCL's decision as to what constitutes a satisfactory installation shall be final.

COMPLETION DRAWINGS

Upon completion of the work and before issuance of completion certificate , the contractor shall submit to the NHIDCL four sets of layout drawings in progressive manner for individual systems drawn at approved scale indicating the complete wiring system as installed. Drawings shall be prepared on AUTO-CAD (latest version) . Along with the hard copies, the contractor shall submit copies of all drawings on CD and

one set of all drawings on RTF shall also be submitted. These drawings must provide:

a. All power distribution panel layout.

b. Single line power distribution diagram including control wiring.

c. Cable Trays with number and size of cables installed.

d. Run and size of conduits, inspection, junction and pull boxes.

e. Raceways and Junction Boxes.

f. Number and size of conductors in each conduit with phase identification.

g. Location and rating of sockets and switches controlling the lighting and power outlets.

h. Location and details of distribution boards/panels, mains, switches along with phase balancing details.

i. A complete wiring diagram as installed and single line diagrams showing all connections in the complete electrical system.

j. Location of all earthing stations, route and size of all earthing conductors manhole.

k. Layout and particulars of all HT & LT cables.

l. Instruction, maintenance and operation manuals including maintenance schedule for all equipment. Testing & commissioning reports of all electrical equipment.

And any other drawing/document as required.

OPERATING INSTRUCTION & MAINTENANCE MANUAL

Upon completion and commissioning of part Mechanical & Electrical system **t**he contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten / Printed operating instructions and maintenance manuals; one each for retention by NHIDCL and Employer's representative and two for Employer's Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as

installed, spare parts manual and recommended spares for Four(4) year period of maintenance of each equipment.

ON SITE TRAINING

Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labour and helpers for operating the entire installation for a period of thirty (7) working days of eight (8) hours each, to enable the Employer's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Employer's personnel in the operation, adjustment and maintenance of all equipment installed**.**

MAINTENANCE DURING DEFECTS LIABILITY PERIOD

14.1. Complaints

The contractor shall set up a single point contact (SPO) to receive complaints during the effect liability period. It shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 48 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

14.2. Repairs

All equipment that require repairing shall be immediately serviced and repaired. During the period of the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Employer.

UPTIME GUARANTEE

The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall .

The Contractor shall provide log formats in the form of diskettes and bound printed comprehensive log book containing tables for daily record of all temperatures, pressures, humidity, power consumption, starting and stopping times for various equipment, daily services rendered for the system alarms, maintenance and record of unusual observations etc. Contractor shall also submit preventive maintenance schedule.

DEMONSTRATION TO NHIDCL/EMPLOYER

At completion, devices subject to manual operation shall be operated at least five times in presence of Engineer In-charge/ his representative to demonstrate satisfactory operation.

SITE CONDITIONS

Outside Design Date(Peak)

Loation : Leh, ladakh
Geographical Location : 34.15° N, 77.577° E
Altitude : 3508 MT m above mean sea level
Temparature in Winter (DB/WB): -25 to -30 Degree Celicius
Summer(DBT/WBT): 23.8 to 38 Degree Celisius

Desired Inside Conditions:

A) In Winter : 22+/-1 Degree Celsius
Relative Humidity : 30% Approx.
B) In Summer : 24 +/- 1 Degree Celsius
Relative Humidity : 40% Approx.

SPECIAL CONDITIONS OF CONTRACT FOR EI & FANS

The special conditions shall be read in conjunction with general conditions of contract and amendments / corrections thereto, Special Conditions of Contract for Civil Works. If there are any provisions in these special conditions, which are at variance with the provision in the above-mentioned documents, the provisions in these special conditions shall take precedence.

18.1 DRAWINGS TO BE SUBMITTED FOR APPROVAL:

The firm shall supply the following shop drawings within 30 days after award of the work as detailed below.

- ❖ Drawing showing the position of fittings, including Emergency fittings, switch boards and plug points etc.
- ❖ Detail drawings showing location of DBs with phase balancing details.
- ❖ Schematic diagram showing all connections in the complete electrical system.
- ❖ Location drawings of rising main, cable trays, raceways layouts and junction box with necessary catalogues.
- ❖ Drawings showing the position of Advance Lightning conductor Air terminal, Down conductor, Spike counter and Earth pits.
- ❖ Drawing showing the location of Signage lighting Fire Escape route lighting including common control at Ground floor

18.2 INSPECTION:

NHIDCL reserves the right to carry out inspection and testing at manufacturer's works for any equipment/item prescribed in this contract. Samples of materials like accessories, switches, conduit, wire etc shall be submitted to NHIDCL for approval.

18.3 TESTING AT SITE:

Following tests shall be carried out at site as per CPWD specifications and report submitted to the Engineer-in-charge.The installed system shall be tested by the NHIDCL Representatives .

18.4 COMPLETION OF WORK OF EI & FANS:

a) Date of completion of work for the Electrical Installation (Internal Electrical Installation) shall be the last date of successful testing and commissioning of the installations by NHIDCL Representatives.

b) The above date shall be the date of completion of Work only for the purpose of settlement of bills / payments. However the guarantee period shall start from the actual date of completion of overall project. The Security Deposit shall be released after the successful completion of Defects Liability Period.

18.5 COMPLETION DRAWINGS:

The Contractor shall supply five sets of drawings/documents after completion of the work as detailed below :

- ❖ Drawing showing the position of fitting, including Emergency fittings switch boards and plug points etc.
- ❖ Detail drawings showing location of DBs with phase balancing details.
- ❖ Schematic diagram showing all connections in the complete electrical system.
- ❖ Location drawings of rising main, cable trays, raceways layouts and junction box.
- ❖ Drawings showing the position of Advance Lightning conductor air terminal, Down conductor, Spike counter and Earth pits.
- ❖ Drawing showing the location of Signage lighting Fire Escape route lighting including common control at Ground floor

SPECIAL CONDITIONS OF CONTRACT FOR FIRE FIGHTING SYSTEM

19.1 TEST CERTIFICATES:

The Contractor shall submit following test certificates on supply of the material at site.

19.1.1 Manufacturer's test certificates for Pumps, Motors Engine &Control panel.
19.1.2 Air Valves etc.
19.1.3 Sprinklers.
19.1.4 Hose reel, sluice valve, Hosepipe, Non return valve etc.
19.1.5 Fire Extinguishers,
19.1.6 NHIDCL reserves the right to call for inspection of original documents for purchase of any material for verification of Genuineness of the product.

After successful testing of installation, the system shall be offered for inspection/testing by the Fire Officer. It is the responsibility of the contractor to get the installation inspected and passed by Fire Officer as may be required, including payment of necessary inspection fee etc., The Contractor shall be responsible for carrying out modification / rectification as may be required by NHIDCL representative / Fire Officer.

19.2 DATE OF COMPLETION OF FIR-FIGHTING WORK:

19.2.1 Date of successful test and clearance by Fire officer shall be taken as completion date of the fire-fighting work.

19.2.2 The above date shall be the date of completion of Work only for the purpose of settlement of bills / payments. However the guarantee period shall start from the actual date of completion of overall project. The Security Deposit shall be released after the successful completion of guarantee period.

19.3 COMPLETION DRAWINGS:

The firm shall supply five sets of drawings/documents after completion of the work as detailed below.

19.3.1 Installation drawing giving complete details of the entire equipment's i/c foundation.
19.3.2 General Arrangement drawing giving details of switch gear capacity, instrument panel, control wiring etc.
19.3.3 Line diagram of control panel.
19.3.4 Layout of risers, and sprinklers, hydrant, panels, cables hooters etc.
19.3.5 Schematic control wiring diagram giving detailed sequence of operation.
19.3.6 Service manuals of the fire fighting system and salient features of the system.

19.4 TRAINING OF Employer's PERSONNEL:

The Contractor shall arrange training to Employer's staff on following aspects before handing over of the system:

19.4.1 Operation of the system

19.4.2 Adjustment and setting of controls and protective devices
19.4.3 Preventive maintenance
19.4.4 Trouble shooting

SPECIAL CONDITIONS OF CONTRACT FOR LIFT

20.1 DRAWINGS TO BE SUBMITTED FOR APPROVAL:

The following shop drawing shall be submitted by the contractor within a period of 30 days from the date of award of work.

20.1.1 General arrangement including lift well, machine room,if any, and landing entrances.
20.1.2 Control wiring/ power wiring diagram with all technical details
20.1.3 Details of foundation for equipment, load data, location, etc

20.2 TEST CERTIFICATE

Manufacturers' test certificates for lift motors, ropes and ARD etc. shall be produced by the firm at the time of supply.

20.3 INSPECTION & LICENSING

20.3.1 The contractor shall make arrangements to get the third party inspection by approved agency of NHIDCL at factory before dispatch of materials and for final inspection at site after completion of work. Nothing extra shall be paid to the contractor for the same.

20.3.2 Before subjecting the installation to statutory inspection, all test regarding safety shall be performed to the satisfaction of the Engineer – in – Charge

20.3.3 The contractor shall make arrangements to get the lift inspected by the Lift inspector or any competent authority of local Government and for issue of permission to install and license to operate the lift as per the provisions. Nothing extra, except fees for the first statutory inspection/license of the lift installation if any, will be payable by NHIDCL.

20.3.4 If the equipment is rejected in the first statutory inspection by the inspector and if a second payment becomes necessary that will be the responsibility of the contractor. This is applicable for third party inspection also.

20.4 COMPLETION OF WORK OF LIFT

20.4.1 The date of completion for Lift shall be reckoned as the date of successful inspection of the lift by the Lift Inspector of Local Government.

20.4.2 The above date shall be the date of completion of Work only for the purpose of settlement of bills / payments. However the guarantee period shall start from the actual date of completion of overall project. The Security Deposit shall be released after the successful completion of DLP.

20.5 COMPLETION DRAWING:

The Contractor shall supply five sets of drawings/documents after completion of the work as detailed below:

20.5.1 General arrangement including lift well, machine room and landing entrances.
20.5.2 Control wiring/ power wiring diagram with all technical details
20.5.3 Details of foundation for equipment, load data, location, etc
20.5.4 Operation and maintenance manual and maintenance schedules.

21.1 General

The special conditions shall be read in conjunction with general conditions of contract and amendments / corrections thereto, Special Conditions of Contract. If there are any provisions in these special conditions, which are at variance with the provision in the above-mentioned documents, the provisions in these special conditions shall take precedence.

21.2 DRAWING TO BE SUBMITTED FOR APPROVAL:

The following drawings shall be submitted by the contractor within a period of 30 days from the date of award of work.

21.2.1 All general arrangement shop drawing with clearances for EA sets including acoustic enclosure, scrubber, earthing entry points etc.

21.2.2 Details of foundation for equipment, load data etc., of various assembled equipment, acoustic enclosure , chimney, fuel tanks, scrubber etc.

21.2.3 Control wiring diagram including sequence of operation of control circuits and auto synchronising control panel.

21.2.4 Schematic diagram for EA set panel, auto synchronising control panel., bus trunking, indicating the size of busbar, switchgears, circuit breakers, metering and protection equipment, size of cabling etc.

21.2.5 Single line diagram showing the fuel supply and return arrangements including arrangement of fuel tanks i.e., reserve and day tank.

21.3 TEST CERTIFICATES

The Contractor shall submit following test certificates on supply of the materials at site.

21.3.1 Manufacturer's test certificates for Engine, Alternator, Bus trunking ACBs, Synchronising Panel and Scrubber.

21.3.2 NHIDCL reserves the right to test any one of the unit at factory, as per the technical specifications without any extra payment, before dispatch of EA set from factory to site.

21.4 TESTING AT SITE

21.4.1 4.1 The contractor shall submit the test proforma, and approval of the format shall be obtained from NHIDCL. Contractor shall submit the test result as per approved format, for all DG sets to NHIDCL.

21.4.2 4.2 The load test is to be done in the presence of NHIDCL representative as detailed below :

a) Initial testing for half an hour at no load, two hours at full load and half an hour at10% over load shall be carried out.

b) Final Acceptance Testing in presence of representative of NHIDCL as per A/T standards.

21.4.4 Artificial load(s) and fuel for testing shall be supplied by the firm without any extra cost.

21.4.5 The Contractor shall ensure that each set along with acoustic enclosure shall be as perCPCB norms.

21.5 DATE OF COMPLETION OF EA: -

21.5.1 Date of successful final A/T Testing shall be taken as completion date of work of EA. Bill shall be finalized only after successful final A/T.

21.5.2 The above date shall be the date of completion of work only for the purpose of settlement of bills / payments. However the guarantee period shall start from the actual date of completion of overall project. The Security Deposit shall be released after the successful completion of DLP.

21.6 COMPLETION DRAWINGS: -

The firm shall supply five sets of drawings/documents after completion of the work as detailed below:

21.6.1 All general arrangement shop drawing with clearances for EA sets including acoustic enclosure, scrubber, earthing entry points etc.
21.6.2 Details of foundation of various assembled equipment, acoustic enclosure, chimney, fuel tanks, scrubber etc.
21.6.3 Control wiring diagram including sequence of operation of control circuits including auto synchronizing control panel.
21.6.4 Schematic diagram for EA set panel, auto synchronizing control panel., bus trunking indicating the size of busbar, switchgears, circuit breakers, metering and protection equipment, size of cabling etc.
21.6.5 Operation and maintenance manual.
21.6.6 Layout of earthing.
21.6.7 Single line diagram showing the fuel supply and return arrangements including arrangement of fuel tanks i.e., reserve and day tank.

PARTICULAR SPECIFICATIONS

PHE(PLUMBING WORKS)

SECTION I: GENERAL INSTRUCTIONS

1.0 GENERAL REQUIREMENTS

1.1 Scope of Work

1.1.1 The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor.

1.1.2 Work under this contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the Plumbing and other specialized services as described hereinafter and as specified in the Schedule of Quantities and/or shown on the Plumbing Tender Drawings.

1.1.3 Without restricting to the generally of the foregoing, the sanitary installations shall include the following:-

A. Plumbing Works

i) Sanitary Fixtures
ii) Soil, Waste & Vent and Rain Water Pipes and fittings.
iii) Water Supply System (Cold & Hot).
iv) Sewerage & Storm water drainage system
v) Pumping system
vi) Hot water with heat pumps system

1.1.4 Services rendered under this section shall be done without any extra charge.

1.2 Specifications

1.2.1 Work under this contract shall be carried out strictly in accordance with Technical Specifications specified in the tender.

1.2.2 Items not covered under these Specifications due to any ambiguity or misprints, or additional works, the work shall be carried out as per Technical Specifications of latest Central Public Works Department with upto date amendments as applicable in the contract and or as per the requirement of the NHIDCL or its representative.

1.2.3 Works not covered above in para 1.2.1 and 1.2.2 shall be carried out as per relevant Indian Standards and in case of its absence as per British Standard Code of Practice.

1.3. Execution of Work

1.3.2 The work shall be carried out in conformity with the Plumbing drawings and within the requirements of Architectural, Electrical, Structural and Other specialized services drawings.

1.3.3 The Contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule.

1.3.4 On award of the work, Contractor shall submit a schedule of construction in the form of a PERT Chart or BAR Chart for approval of the NHIDCL. All dates and time schedule agreed upon should be strictly adhered to, within the stipulated time of completion/commissioning along with the specified phasing, if any.

1.4 Drawings

1.4.1 Plumbing drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the Architectural and other services drawings.

1.4.2 Architectural drawings shall take precedence over Plumbing or other services drawings as to all dimensions.

1.4.3 Contractor shall verify all dimensions at site and bring to the notice of the Engineer-in-Charge all discrepancies or deviations noticed. Decision of the Engineer-in-Charge shall be final.

1.4.4 Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small scale drawings.

1.4.5 All approved drawings for the work are the property of the NHIDCL and Contractor shall not be lent, reproduced or used on any works other than intended without the written permission of the NHIDCL.

1.5 Inspection and Testing of Materials

1.5.1 Contractor shall be required, if requested, to produce manufacturers Test Certificate for the particular batch of materials supplied to him. The tests carried out shall be as per the relevant Indian Standards.

1.5.2 For examination and testing of materials and works at the site Contractor shall provide all Testing and Gauging Equipment necessary but not limited to the followings:-

a) Theodolite, Steel tapes
b) Dumpy level
c) Weighing machine
d) Plumb bobs, Spirit levels, Hammers
e) Micrometers, Tachometers
f) Thermometers, Stoves

1.5.4 All Testing Equipment shall be preferably located in a special room meant for the purpose.

1.5.5 Samples of all materials shall be got approved before placing order and the approved samples shall be kept at site in the sample room at site. Any materials declared defective by Engineer-in-Charge shall be removed from the site within 48 hours.

1.6 **Metric Conversion**

1.6.1 All dimensions and sizes of materials and equipment given in the tender document are commercial metric sizes.

1.6.2 Any weights, or sizes given in the tender having changed due to metric conversion, the nearest equivalent sizes accepted by Indian Standards shall be acceptable without any additional cost.

1.7 **Reference Points**

1.7.1 Contractor shall provide permanent Bench Marks, Flag Tops and other reference points for the proper execution of work and these shall be preserved till the end of the work.

1.7.2 All such reference points shall be in relation to the levels and locations given in the Architectural and Plumbing drawings.

1.8 **Reference Drawings**

1.8.1 The Contractor shall maintain one set of all approved drawings issued to him as reference drawings. These shall not be used on site. All important drawings shall be mounted on boards and placed in racks indexed. No drawings shall be rolled.

1.8.2 All corrections, deviations and changes made on the site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made shall be initialed by the Engineer-in-Charge.

1.9 **Shop Drawings**

1.9.1 The Contractor shall submit to the Engineer-in-Charge three copies of the shop drawings.

1.9.2 Shop drawings shall be submitted under following conditions:-

(a) Showing any changes in layout in the plumbing drawings.

(b) Equipment layout, piping and wiring diagram.

(c) Manufacturer’s or Contractor’s fabrication drawings for any materials or equipment supplied by him.

1.9.3 The Contractor shall submit two copies of catalogues, manufacturer’s drawings, equipment characteristics data or performance charts as required by the Project Manager.

following information.

a) Run of all piping, diameters on all floors, vertical stacks and location of external services.

b) Ground and invert levels of all drainage pipes together with location of all manholes and connections upto outfall.

c) Run of all water supply lines with diameters, locations of control valves, access panels.

d) Location of all mechanical equipment with layout and piping connections.

No completion certificate shall be issued unless the above drawings are submitted.

1.10.2 Contractor shall provide two sets of catalogues, service manuals manufacturer's drawings, performance data and list of spare parts together with the name and address of the manufacturer for all electrical and mechanical equipment provided by him.

1.10.3 All "Warranty Cards" given by the manufacturers shall be handed over to the Project Manager.

1.11. Contractors Rates

1.11.1 Rates quoted in this tender shall be inclusive of cost of materials, labour, supervision, erection, tools, plant, scaffolding, service connections, transport to site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required to completely do all the items of work and put them in a working condition.

1.11.2 Rates quoted are for all heights and depths and in all positions as may be required for this work.

1.11.3 All rates quoted must be for complete items inclusive of all such accessories, Fixtures and fixing arrangements, nuts, bolts, hangers as are a standard part of the particular item except where specially mentioned otherwise.

1.11.4 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar/concrete/water proofing of appropriate mix and strength as directed by Engineer-in-Charge. Contractor shall provide holes, sleeves and recesses in the concrete and masonry work as the work proceeds.

1.12 Testing

1.12.1 Piping and drainage works shall be tested as specified under the relevant clause(s) of the specifications.

1.12.2 Tests shall be performed in the presence of the Engineer-in-Charge.

1.12.3 All materials and equipment found defective shall be replaced and whole work tested to meet

1.12.5 Contractor shall provide all labour, equipment and materials for the performance of the tests.

1.13 **Site Clearance and Clean-up**

1.13.1 The Contractor shall, from time to time clear away all debris and excess materials accumulated at the site.

1.13.2 After the Fixtures, equipment and appliances have been installed and commissioned, Contractor shall clean-up the same and remove all plaster, paints stains, stickers and other foreign matter of discoloration leaving the same in a ready to use condition.

1.13.3 On completion of all works, Contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done at Contractors risk and cost.

1.14 **License Permits and Authorities**

1.14.1 Contractor must keep constant liaison with the Municipal/statutory authority and obtain all approval of all drainage, water supply and other works carried out by him.

1.14.2 Contractor shall obtain, from the Municipal and other authority's necessary completion certificate(s) with respect to his work as required for occupation of the building. Contractor shall obtain permanent water supply and drainage connections from authorities concerned. NHIDCL/Employer shall pay all fees/deposits as required to be paid to the authorities towards connection charges.

1.15 **Cutting of Water Proofing Membrane**

No walls, terraces shall be cut for making and opening after water proofing has been done without written approval of Engineer-in-Charge. Cutting of water proofing membrane shall be done very carefully to ensure that other portion(s) of water proofing is (are) not damaged. On completion of work at such place the water proofing membrane shall be made good and ensured that the opening/cutting is made fully water proof as per specifications and details of water proofing approved by Engineer-in-Charge.

1.16 **Cutting of Structural Members**

No structural member shall be chased or cut without the written permission of the Engineer-in-Charge.

1.17 **Materials**

1.19.1 Unless otherwise specified and expressly approved in writing by the Engineer-in-Charge, only materials of makes and specifications mentioned in the list of approved makes attached with the Tender shall be used.

SECTION II: SANITARY FIXTURES

Soils, Waste, Vent Pipes & Fittings

1 Scope of work

1.1 Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rain water pipes and fittings as required by the drawings and as given in the Schedule of Quantities.

1.2 Without restricting to the generality of the foregoing, the work shall include the following:-

a) Vertical and horizontal soil, waste, vent, and fittings, joints, clamps and connections to fixtures.
b) Soil & waste pipes to external sewers line.
c) Connection of all pipes to sewer lines as shown on the drawings at the ground floor.
d) Floor and urinal traps, cleanout plugs, inlet fittings.
e) Testing of all pipe lines.

2 General requirements

2.1 All materials shall be new and best quality conforming to Latest IS Code and specifications and subject to the approval of the Project Manager /Architect.

2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps an interval specified.

2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

3 Piping System

3.1 Soil, Waste & Vent Pipes

a) The Soil & Waste pipe system above ground has been planned as a "two pipe system" as defined in IS: 5329, having separate pipes for waste from kitchen sinks, washbasins and floor drains and is approved by the local authority. Waste stacks have been provided with a “P” trap

c) All soil and waste from areas below general ground level will be collected in sumps and pumped into sewer lines.

d) Anti-siphonage pipe (ASP) shall be provided for soil fittings on vertical stacks. It may also be provided for waste lines where shown on the drawings.

3.4.1 Soil & Waste Pipes

3.4.2 All pipes shall be straight and smooth and inside free from cracks and other manufacturing defects. Pipes shall be noise insulated **Polypropylene piping** system as per DIN EN 12056 and DIN1986-100 with 3 layer pipe made of External layer -PP, middle layer-Mineral reinforced PP, Internal layer-PP. push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 10 dBA as per DIN 4109 at a flow rate of 2 l/s and having pipe ring stiffness as per 1S0/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, density of pipe = 1.9 g/cm3, elongation break 50% and tensile strength 20 N/mm2,Coefficient of linear expansion 0.09 mm/mK.

3.5. Fittings

3.5.1 Fittings shall conform to the Indian Standard recommended for the pipes. Pipes and fittings must be of matching as per manufacturer specification. Interchange of pipes of one standard with fittings on the other standard will not be permitted.

3.5.2 Fittings shall be of the required degree of curvature with or without access door.

3.5.3 Connection from a vertical stack or position to a horizontal line shall be made only by a “Y” junction.

3.6 Fixing

3.6.1 All vertical pipes shall be fixed truly vertical to walls with approved type of GI clamp. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard). However shaft where more vertical pipes run, the pipes may be fixed to the slotted angle/channel supports fixed to walls at intervals specified here under:-

3.6.2 Horizontal pipes running on the floor shall be covered with cement concrete grade M-10, 75mm thick in bed and 75mm thick all around soil and waste pipes under floor

3.6.3 Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the Project Manager/Building Contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces at no extra cost.

4.0 Clamps

4.1 Holder bat clamps shall be of standard design and fabricated from **galvanized MS standard flats** 40x3 mm thick and 12 mm dia MS rod and 6 mm nuts and bolts. Holder bat clamps shall be fixed in cement concrete 1: 2 : 4 mix blocks 10x10x10 cms deep.

4.3 For SWR pipes conforming to IS: 13592 shall be clamped to wall with approved type of uPVC saddle clamp/U-clamp or as given in the Bill of quantities.

4.4 Structural clamps shall be fabricated by electro-welding from MS structural members e.g. rods, angles, channels flats as per detailed drawing. Contractor shall provide all nuts & bolts, welding material. All fabricated clamps, nuts, bolts and washers shall be not dipped galvanized.

4.5 Galvanized slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on drawings or specified in schedule of quantities. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. The spacing of support bolts horizontally shall not exceed 1 m.

4.6 Wherever MS clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement and making good with cement concrete 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 mm stone aggregate 20 mm nominal size) as directed by the Project Manager.

4.7 For sleeves, anchor fasteners and clamp spacing chart shall be as follows:

MARKINGS:
All pipes shall carry the following markings: Time and date of manufacture; company name; dimension, application class,barcode and material details.
FITTINGS:
Single- Layered fitting in PP, a reinforced wall and factory fitted lip ring, hot water resistant upto 95 degree c in accordance to EN 1451-PART 1-6EN 12056 PART 1-5.
INSTALLATION: The piping system must be clamped properly as required, pipes passing through walls, beams, slabs, columns should pass through sleeves which are padded with insulation material internally (between pipe and sleeve) covering the pipe to avoid transfer of body and structural borne sounds (refer manufacturer's installation guide lines). The piping must not touch any wall, structure, paneling, false ceiling etc.

5.0 Traps

5.1 Floor traps

Floor traps shall be siphon type full bore P or S type cast iron having a minimum 50 mm deep seal. The trap and waste pipes in sunken area (where required) shall be set in cement concrete blocks firmly supported on the structural floor. The blocks shall be in 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) and extended to 2540 mm below finished floor level. Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30x30 cms of the required depth.

5.2 Floor trap inlet

Bath room traps and connections shall ensure free and silent flow of discharging water. Where specified, Contractor shall provide a special type inlet fitting fabricated from uPVC pipe

project Engineer.

Trap & Seals

All traps shall be self cleaning design and the seal depth shall be as specified below wherever the traps are not integral with the appliances:

Appliance or ware	Material	Trap Type	Seal depth(mm)
Lavatory /wash basin	C.P. cast brass	32 mm dia Bottle	75 mm
Sink	C.P. cast brass	40 mm dia Bottle	75 mm
Kitchen floor drain of fabricated drain boxes	uPVC/C.I.	75/100 mm dia 'P' or 'S'	50 mm
Urinals	uPVC/C.I.	100 mm dia 'P' or 'S'	50 mm

5.3 Floor Gratings

Floor and urinal traps shall be provided with 100-150mm square or round CP/stainless steel grating, with rim of approved design and shape. Minimum thickness shall be 4 mm or as specified in the Schedule of Quantities

5.4 Jointing

Pipe to pipe and pipe to fitting (SWR) joint shall be with 'O' rubber ring as recommended by the manufacturer. Jointing with solvent cement shall be applied to uPVC waste pipes (confirming to I.S. 4985) and fittings or as recommended by the manufacturer's.

6 Cleanout Plugs

6.1 PP Clean out pipe for Soil, Waste pipes laid under floors shall be provided near pipe junctions bends, tees, "Ys" and on straight runs at such intervals as required as per site conditions. Cleanout pipe shall terminate flush with the floor levels.

6.2 Cleanout on Drainage Pipes

a) Cleanout pipe shall be provided on starting point of each drain and in between at locations indicated on plans or directed by the Project Manager. Cleanout pipe shall be of size matching the full bore of the pipe but not exceeding 160 mm OD.

b) Cleanouts at ceiling level pipe shall be provided with a bend terminating at floor level above. The cap of the cleanout pipe shall have a cap flush with floor.

7.0 Waste pipe from appliances

7.1 General

a) Waste pipe from appliances e.g. wash basins, sinks and urinals shall be of noise insulated Polypropylene piping system as per DIN EN 12056 and DIN1986-100 with 3 layer pipe made of

OD as given in the Schedule of Quantities.

b) All pipes shall be fixed in gradient towards the outfalls of drains. Pipes inside a toilet room shall be in chase unless otherwise shown on drawings. Where required pipes may be run at ceiling level in suitable gradient and supported on galvanized structural clamps. Spacing for clamps for such pipes shall be as per the pipe spacing chart given in section 1.

8.0 Encasing pipe in Cement Concrete

uPVC soil and waste pipes and drainage under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1 : 2 : 4 mix (1 cement : 2 coarse sand : 4 stone aggregate 12 mm size) 75 mm in bed and all-round. When pipes are running well above the structural slab, the encased pipes shall be supported with suitable cement concrete pillars of required height at intervals of one meter. Rate for concreted round pipes shall be inclusive of pillars, supports, shuttering and centering.

9.0 Cutting and making good

9.1 Contractor's rate shall include for providing all necessary holes, sleeves, cut outs and chases in structural members as building work proceeds. Wherever holes are cut or left originally, they shall be made good with cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) or cement mortar 1 : 2 (1 cement : 2 coarse sand) and the surface restored as in original condition.

10.0 Testing

10.1 Testing procedure specified below apply to all soil, waste and vent pipes above ground including pipes laid along basement ceiling.

10.2 Entire drainage system shall be tested for water tightness during and after completion of the installation. No portion of the system shall remain untested. Contractor must have adequate number of expandable rubber/bellow plugs, manometers, smoke testing machines, pipe and fitting work test benches and any other equipment necessary and required to conduct the tests. All testing equipment/motors etc. shall be certified for its calibration by an approved laboratory.

10.3 All materials obtained and used on site must have manufacturer's hydraulic test certificate for each batch of materials used on the site.

10.4 Testing soil, waste and rainwater pipes

a) Apart from factory test all pipes and fittings shall be hydraulically tested for a head of 3 m preferably on a specially set up work bench. After applying pressure, strike the pipe with a wooden pallet and inspect for blow holes and cracks. Pressure may be applied for about 2 minutes. Reject and remove all defective pipes.

c) After the installation is fully complete, it should be tested by flushing the toilets, running at least 20% of all taps simultaneously and ensuring that the entire system is self draining, has no leakages, blockages etc. Rectify and replace where required.

10.5 Contractor shall maintain a test register identifying date and time of each area. All tests shall be conducted in presence of Project Manager and signed by both.

11 Measurements

11.1 General

a) Rates for all items quoted shall be inclusive of all work and items given in the specifications and Schedule of Quantities.

b) Rates are applicable for the work in basements, under floors, in shafts at ceiling level area for all heights and depths.

c) Rates are inclusive of cutting holes and chase in RCC and masonry work and making good the same.

d) Rates are inclusive of pre testing, on site testing, of the installations, materials and commissioning of the works.

e) Pipes (unit of measurement. Linear meter to the nearest centimeter)

11.2 Pipes shall measured per running meter correct to a centimeter for the finished work which shall include fittings e.g. bends, tees, crosses, etc. The length shall be taken along centre line of the pipes and fittings. All pipes and fittings shall be classified according to their diameter, method of jointing and fixing substance, quality, and finish. The diameters shall be nominal outer diameter.

11.3 Cement concrete around pipes shall be measured along the center of the pipe line measured per linear meter and include any masonry supports, shuttering and centering cutting complete as described in the relevant specifications.

11.4 Slotted angles/channels shall be measured per linear meter of finished length and shall include support bolts, nuts and clamps embedded in masonry walls with cement concrete blocks and nothing extra will be paid for making good the same.

11.5 Fittings

Unit of measurement shall be the number of pieces. Pipe fittings are included in the rate for pipes. Urinal traps, trap gratings, hoppers, cleanout plugs shall be measured by number per piece and shall include all items described in the relevant specifications and Schedule of

earth for soil and waste pipes laid below ground, in sunken slabs or over basement rafts.

11.7 Project Manager's decision with respect to the correct interpretation regarding mode of measurement shall be final and binding on the contractor.

End of Section III

Soil, Waste Pipes & Fittings

SECTION IV: WATER SUPPLY SYSTEM

4. WATER SUPPLY SYSTEM

4.1 **Scope of Work**

4.1.1 Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.

4.1.2 Without restricting to the generality of the foregoing, the water supply system shall include the following:-

a) Distribution system from main supply headers to all fixtures and appliances for cold/hot water.
b) Cold water supply lines from tube-wells to underground water tanks.
c) Bore-well connections to U.G. water tanks.
d) Garden irrigation system if any
e) Excavation and refilling of pipes trenches.
f) Insulation to hot & cold water pipes.
g) To all the flushing in WC and Urinal should be done by the cold water supply by hydropenumatic system and all the domestic water required for wash basin, health faucet and pantry should be done by the hot water supply.
h) All the concealed by should be insulated by rubber nitrile insulation and all the exposed to wall pipe in the terrace and shaft by the aluminium cladding insulation with rockwool.
i) Pipe protection and painting.
j) Control valves, masonry chambers and other appurtenances.
k) Connections to all plumbing fixtures, tanks, appliances and Municipal mains

4.2 **General Requirements**

4.2.1 All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Project Manager.

4.2.2 Pipes and Fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

4.2.5 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.

4.2.6 Clamps, hangers and supports on RCC walls, columns and slabs shall be fixed only by means of approved made of expandable metal fasteners inserted by use of power drills.

4.2.7 All pipe clamps, supports, nuts, bolts, washers shall be galvanized MS steel throughout the building. Painted MS clamps & MS nuts, bolts and washers shall not be accepted.

4.2.8 Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

4.3 **Water Supply System**

4.3.1 Contractor should study the site plan and water supply system diagram for an overview of the system.

4.3.2 Source

Water supply will be acquired from tube-wells within the site and collected in underground water storage tanks.

4.4.1 **Pipe Supports**

4.4.1.1 All pipes clamps, supports, hangers, rods, pipe supports, nuts and washers shall be factory made galvanized MS steel or alternatively galvanized after fabrication to suit site requirements.

4.4.1.2 PP-R pipes in shafts and other locations shall be supported by galvanized M.S clamps of design approved by pipes in wall chases shall be anchored by G.I hooks, pipes at ceiling level shall be supported on structural clamps fabricated from M.S structural steel. Pipes in typical shafts shall be supported on Galvanised slotted angles/channels as specified elsewhere.

4.4.1.3 Clamps

G.I. pipes in shafts and other locations shall be supported by M.S. clamps of design approved by Project Manager. Pipes in wall chases shall be anchored by iron hooks, Pipes at ceiling level shall be supported on structural clamps fabricated from M.S. structural steel as described above. Pipes in typical shafts shall be supported on slotted angles/channels as specified.

4.5 **Anchor Fasteners**

4.5.1 All pipes supports, hangers and clamps to be fixed on RCC walls, beams, columns, slabs and masonry walls 230mm thick and above by means of galvanised expandable anchor fasteners in drilled holes of correct size and model to carry the weight of pipes. Drilling shall be made only by approved type of power drill as recommend and approved by manufacturer of the anchor fasteners. Failure of any fastening devices shall be the entire responsibility and contractor shall redo or provide additional supports at his own cost. He shall also compensate the owner for any

when required. Unions shall be provided near each gunmetal valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by Project Manager.

4.7 **Flanges**

Flanged connections shall be provided on pipes as required or where shown on the drawings, all equipment connections as necessary and required or as directed by connections shall be made by the correct number and size of GI nuts, bolts & washers with 3 mm thick gasket. Where hot water or steam connections are made insertion gasket shall be of suitable high temperature grade and quality approved by Bolt hole dia for flanges shall conform to match the specification for C.I. sluice valve to I.S.780. and C.I. butterfly valve to IS: 3095.

4.8 **PP-R pipes, fittings & valves**

4.8.1 All pipes inside the buildings and where specified, outside the building shall be 3 layer PP-R (Poly propylene Random copolymer) pipes conforming to IS: 15801, UV stabilized and anti-microbial fusion welded, having thermal stability for hot and cold water supply.

4.8.1 **JOINING PIPE & FITTINGS**

a. Cutting
Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburing/ Beveling
Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fitting during assembly.

c. Fitting Preparation
A clean dry rag/cloth should be used to wipe dirt and moisture on the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 or 2/3 of the way into the fitting socket.

d. Assembly
After applying the solvent cement on both pipe and fitting socket, pipes should be insert into the fitting socket within 30 seconds, and rotating the pipe ¼ to ½ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approx) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continuous, remake the joint to avoid potential leaks.

S.no	Ambient Temperature during Core period	Pipe Size	
		½" to 1"	$1^{.1/4}$" to 2"
1	Above 15 deg C	1 Hr	2 Hrs
2	4 – 15 deg C	2 Hrs	4 Hrs
3	Below 4 deg C	4 Hrs	8 Hrs

e. Once an installation is completed and cored as per above mentioned recommendations, the system should be hydrostatically pressure tested at 150 psi (10 Bar) for minimum 24hrs.During pressure testing the system should be filled with water and if a leak is found, the joint should be cut out and replacing the same with new one by using coupler.

4.8.2 **Transition of PP-R to Metals**

When making a transition connection to metal threads, special brass/plastic transition fitting (Male & Female adopters) should be used. Plastic threaded connection should not be over torque Hard tight pluts one half turn should be adequate.

4.8.3 **Threaded Sealants**

Teflon tapes shall be used to make threaded connection leak proof.

4.8.4 **Hangers & Supports**

For horizontal runs, support should be given at 3 ft (90 cms) intervals for diameter of 1" and below and at 4 ft (1.20 mtr) intervals for larger size.

Hangers should not have throw or sharp edges which come in contact with the tubing and shall be of GI.

Support should be as per the below mentioned table:

S.No	Size of Pipe	21^0C	49^0C	71^0C	82^0 C
	Inch	Ft	Ft	Ft	Ft
1	½"	5.5	4.5	3.0	2.5
2	¾"	5.5	5.0	3.0	2.5
3	1"	6.0	5.5	3.5	3.0
4	$1^{1/4}$"	6.5	6.0	3.5	3.5
5	$1^{1/2}$"	7.0	6.0	3.5	3.5
6	2"	7.0	6.5	4.0	3.5

4.8.5 All special fittings and accessories like internally or externally threaded brass adaptors, ball valves, globe valves, unions, diaphragm valves, butterfly valves; etc shall be made of CPVC by licensee.

All the concealed water supply pipes in the toilet will be insulated by the rubber nitrile insulation and all the exposed to wall pipe shall be done by the rockwool insulation with aluminium cladding.

- Thermal insulation over domestic water supply pipes in shaft & Terrace in accordance with specifications rockwool 144 Kg / Cu-m density with Al cladding of 24 G. in all joints complete as per manufactuer's specifications.Insulation for Exposed on wall pipe (Terrace & Shaft Pipe)

Dia of pipe	OD after insulation
15 mm	65 mm OD with insulation
20 mm	70 mm OD with insulation
25 mm	75 mm OD with insulation
32 mm	82 mm OD with insulation
40 mm	90 mm OD with insulation
50 mm	100 mm OD with insulation
65 mm	145 mm OD with insulation

Thermal insulation over domestic water supply pipes in concealed work Nitrile rubber insulation of 13 mm thick on cold and hot water pipes complete with outer mechanical protection as per specification. in all joints complete as per manufactuer's specifications.

Dia of pipe	OD after insulation
15 mm	28 mm OD with insulation
20 mm	33 mm OD with insulation
25 mm	38 mm OD with insulation
32 mm	45 mm OD with insulation

4.10 **Trenches**

All water supply pipes below ground shall be laid in trenches with a minimum cover of 60 cms. The width and depth of the trenches shall be as follows

Dia of pipe	Width of Trench	Depth of Trench
15mm to 50mm	30 cms	75cms
65mm to 100mm	45 cms	100 cms

4.11 **Sand filling**

Pipes in trenches shall be protected with fine sand 15 cms all round before filling in the trenches.

Painting

4.10.1 All pipes above ground shall be painted with one coat of red lead and two coats of synthetic enamel paint of approved shade and quality. Pipes shall be painted to standard color code given in this document or specified by Project Manager.

4.11.2 G.I. water supply pipes, if buried in ground or sunken slab, shall be protected with multi layer bitumen membrane tape 3mm thick with a final coat of hot or cold applied bitumen. "Pypkote" or equivalent.

4.12 **Valves**

4.12.1 **Ball Valves**

Valves upto 50 mm dia. shall be screwed type Ball Valves with stainless steel balls spindle teflon seating and gland packing tested to a hydraulic pressure of 16 kg , sq.cm., and accompanying couplings and steel handles.(to BS 5351) protected with thermal insulation.

4.13 **Butterfly Valves – Slim Seal Type**

4.13.1 Valves 65 mm dia and above shall be cast iron butterfly valve to be used for isolation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction with accompanying flanges and steel handle.

4.13.2 Butterfly valve shall be of best quality conforming to IS: 13095.

4.14. **Non Return Valve (Dual Slim Type)**

Where specified, non return valve shall be provided through which flow shall occur in one direction only.
Each Butterfly and Slim Type Swing Check (NRV) Valve shall be provided with a pair of flanges screwed or welded to the main line and having the required number of nuts, bolts and washers of correct length.

4.15. **Storage tanks Overhead Tank. (Accessories & Connections)**

4.15.1 Overhead Storage tank for domestic water supply shall be 3000 litre capacity HDPE tank insulated with 25 mm thick XLPE sheet and aluminium sheet.

4.16 Outlets and overflow

All nozzles for puddle flanges in HDPE/RCC tank for inlet, outlet, overflow and scour etc. shall be provided by civil contractor or as given in the Schedule of Quantities, further connections and accessories shall be provided under this contract.

4.17. Testing

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 7 kg / sq.cm whichever is more.
Pressure shall be maintained for a period of at least thirty minutes without any drop. A test

done due to carelessness, open or burst pipes' or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves, which do not effectively operate, shall be replaced by new ones at no extra cost and the same shall be tested as above.

Hot water pipes chased into the walls shall be provided with a 6mm thick insulation with elastic flexible material having hermetic closed cell structure of expanded synthetic material rated for 60ºC hot water supply.

4.18 Measurement

a) Pipes above ground shall be measured per linear meter (to the nearest cm) and shall be inclusive of all fittings e.g. coupling, tees, bends, elbows, unions, flanges and U clamps with nuts, bolts & washers fixed to wall or other standard supports.

b) Jointing with teflon tape, white lead, solvent, crimping and insertion gasket of appropriate temperature grade.

c) Cutting holes, and chases in walls, floors, any pipe support required for pipes below ground & making good the same.

d) Excavation, backfilling, disposal of surplus earth and restoring the ground & floor in original condition.

4.19 Pipe Supports

Fabricated and / or galvanised supports shall be measured by weight. Weight for each type of clamp shall be calculated on basis of the quantity of structurals and MS used from the theoretical weight calculated on basis of the components theoretical weight of the sections.

4.20.1 Rate quoted for supports & hangers shall be inclusive of :

a) Expandable anchor fastens.
b) Galvanising of all supports & hangers.
c) Cutting holes in walls, ceilings on floors and making good where permitted.
d) Nuts, bolts and washers for fixing and assembling.
e) Wooden / PVC pipe saddles for vertical or horizontal runs.

4.20.2 **Valves**

Gunmetal, cast iron, butterfly and non return valves and puddle flanges shall measured by

surface and shall include all valves and fittings for which no deduction shall be made. No extra payment shall be made for fittings, valves or flanges.

END OF SECTION IV

TECHNICAL SPECIFICATIONS FOR

EXTERNAL SEWERAGE WORK

SECTION I

1.0 Scope of Work

1.1 The form of Contract shall be according to the "conditions of Contract". The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor.

1.2 Work under this Contract shall consist of furnishing all labor, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the plumbing and other specialized services as described hereinafter and as specified in the schedule of quantities and/or shown on the plumbing drawings.

2.0 Specifications

2.1 Work under this Contract shall be carried out strictly in accordance with specifications attached with the tender.

2.2 Items not covered under these specifications due to any ambiguity or misprints, or additional work, the work shall be carried out as per specifications of the latest Central Public Works Department with upto date amendments as applicable in the Contract.

2.3 Works not covered under para 2.1 and 2.2 shall be carried out as per relevant Indian Standards and in case of its absence as per British Standard Code of Practice.

3. Execution of work

3.1 The Contractor should visit and examine the site of work and satisfy himself as to the nature of the existing roads and other means of communication and other details pertaining to the work and local conditions and facilities for obtaining his own information on all matters affecting the execution of work. No extra charge made in consequence of any misunderstanding incorrect information on any of these points or on ground of insufficient description will be allowed.

3.2 The work shall be carried out in conformity with the plumbing drawings and within the requirements of architectural, electrical, structural and other specialized services drawings.

3.3 The Contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule.

3.4 On award of the work, contractor shall submit a schedule of construction in the form of a pert chart or bar chart for approval of the Consultant/Owner. All dates and time schedule agreed

4.0 **Drawings**

4.1 Plumbing drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the architectural and other services drawings.

4.2 Architectural drawings shall take precedence over plumbing or other services drawings as to all dimensions.

4.3 Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small-scale drawings.

5.0 **Inspection and testing of materials**

5.1 Contractor shall be required, if requested, to produce manufacturers test certificate for the particular batch of materials supplied to him. The tests carried out shall be as per the relevant Indian Standards.

6.0 **Metric conversion**

6.1 All dimensions and sizes of materials and equipment given in the tender document are commercial metric sizes.

6.2 Any weights or sizes given in the tender having changed due to metric conversion, the nearest equivalent sizes accepted by Indian Standards shall be acceptable without any additional cost.

7.0 **Reference drawings**

7.2 All corrections, deviations and changes made on the site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made shall be initialed by the Consultant/Owner.

8.0 **Shop drawings**

8.1 The Contractor shall submit to the Consultant/Owner four copies of the shop drawings.

8.2 Shop drawings shall be submitted under following conditions:

a. Showing any changes in layout in the plumbing drawings.

b. Layout showing all invert level coordinated with all services dwg.

8.3 The Contractor shall submit four copies of catalogues, manufacturer's drawings, equipment characteristics data or performance chart with the name and address of manufacturer for all electrical and mechanical equipment provided by him after due approval as required by the Consultant/Owner.

9.0 **Completion drawings**

9.1 On completion of work, Contractor shall submit one complete set of original tracings and two prints of "as built" drawings to the Consultant/Owner. These drawings shall have the following information:

a. Run of all piping, diameters of pipes and location of external services.

b. Ground and invert levels of all drainage pipes together with location of all manholes and connections upto outfall.

and mechanical equipment provided by him.

9.3 All "warranty cards" given by the manufacturers shall be handed over to the Consultant/Owner and shall be in the name of the Owner.

10.0 **Contractor's rates**

10.1 Rates quoted in this tender shall be inclusive of cost of materials, labor, supervision, erection, tools, plant, scaffolding, service connections, transport to site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required to completely do all the items of work and put them in a working condition.

10.2 Rates quoted are for all heights and depths and in all positions as may be required for this work.

10.3 All rates quoted must be for complete items inclusive of all such accessories, fixtures and fixing arrangements, nuts, bolts, hangers as are a standard part of the particular item except where specifically mentioned otherwise.

10.4 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar/concrete of appropriate mix and strength as directed by Consultant/Owner. Contractor shall provide holes, sleeves, and recesses in the concrete and masonry work as the work proceeds.

10.5 The Contractor shall furnish the Consultant/Owner with vouchers, on request, to prove that the materials are as specified and to indicate that the rates at which the materials are purchased in order to work out the rate analysis of non tendered items which he may be called upon to carry out.

11.0 **Testing**

11.1 Piping and drainage works shall be tested as specified under the relevant clauses of the specifications.

11.2 All Tests shall be performed in presence of the Consultant/Owner.

11.3 All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the specifications.

11.4 Contractor shall perform all such tests as may be necessary and required by the local authorities to meet Municipal or other byelaws in force.

11.5 Contractor shall provide all labor, equipment and materials for the performance of the tests and shall not be paid any extra on that account.

12.0 **Site clearance and cleanup**

12.1 The Contractor shall, from time to time, clear away all debris and excess materials accumulate at the site.

13.2 Contractor must keep constant liaison with the Municipal/statutory authority and obtain approval of all drainage, water supply and other works carried out by him.

13.3 Contractor shall obtain, from the municipal and other authorities completion certificate with respect to his work as required for occupation of the building and nothing extra shall be paid on this account.

14.0 **Cutting of structural members**

14.1 No structural member shall be chased or cut without the written permission of the Consultant/Owner.

15.0 **Materials**

15.1 Unless otherwise specified and expressly approved in writing by the Consultant/Owner, only materials of makes and specifications as mentioned in the list of approved makes attached with the specifications shall be used.

15.2 The Contractor shall submit samples of materials proposed to be used in the works. Approved samples shall be kept in the office of the Consultant/Owner and returned to the Contractor at the appropriate time.

End of Section

SECTION I: SEWAGE

1. Sewer work

1.1 Scope of work

1.1.1 Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install all the drainage system as required by the drawings and specified hereinafter or given in the Schedule of Quantities.

1.1.2 Without restricting to the generality of the foregoing, the drainage system shall include:-

a) Sewer lines including excavations, pipelines, manholes, drop connections and connections to the existing sewer.

b) Storm water drainage, excavation, pipelines, manholes, catch basins, drain channels and connections to the existing storm water drain.

1.2 General requirements

1.2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of the Project Manager.

1.2.2 Drainage lines and open drains shall be laid to the required gradients and profiles.

1.2.5 Location of all manholes, etc. shall be got confirmed by the Contractor from the Architect / Landscape Architect. As far as possible, no drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings or directed by the Project Manager.

1.2.6 In sewer line pipe DWC HDPE SN8 confirming to 16098 Part II pipe will be used.

1.3 **DWC HDPE Pipes (SN 8): IS 16098 Part II**

1.3.1 DWC pipes shall be of first class quality and free from rough texture inside or outside and straight. All pipes shall have the manufacturers name marked on it and shall comply with IS-16098 Part II and shall be of approved makes.

1.3.2 **Laying and Jointing of DWC HDPE Pipes**

a) Pipes are liable to be damaged in transit and notwithstanding tests that may have been made before dispatch each pipe shall be examined carefully on arrival at site. Each pipe shall be rung with a wooden hammer or mallet and those that do not ring true and clear shall be rejected. Sound pipes shall be carefully stacked to prevent damage. All defective pipes should be segregated, marked in a conspicuous manner and their use in the works prevented.

b) The pipes shall be laid with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe jointer room to work right round the pipe and as short as practicable to admit the socket and allow the joint to be made.

c) Where pipes are not bedded on concrete the trench bottom shall be left slightly high and carefully bottomed up as pipe laying proceeds so that the pipe barrels rest on firm ground. If excavation has been carried too low it shall be made up with cement concrete 1:5:10 mix at the Contractor's cost and charges.

d) If the bottom of the trench consists of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on cement concrete bed of 1:5:10 mix to ensure even bearing.

1.3.5 **Jointing of Pipes**

a) Tarred gaskin shall first be wrapped round the spigot of each pipe and the spigot shall then be placed into the socket of the pipe previously laid, the pipe shall then be adjusted and fixed in its correct position and the gaskin caulked tightly home so as to fill not more than one quarter of the total length of the socket.

b) The remainder of the socket shall be filled with stiff mix of cement mortar (1 cement: 1 clear sharp washed sand). When the socket is filled, a fillet should be formed round the joint with a trowel forming an angle of 45 degrees with the barrel of the pipe. The mortar shall be beaten up and used after it has begun to set.

c) After the joint has been made any extraneous materials shall be removed from inside of the

1.4 Testing

- All lengths of the sewer and drain shall be fully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manhole to manhole. All pipes shall be subjected to a test pressure of at least 1.5 meter head of water. The test pressure shall, however, not exceed 6 meter head at any point. The pipes shall be plugged preferably with standard design plugs with rubber plugs on both ends. The upper end shall, however, be connected to a pipe for filling with water and getting the required head.

- Sewer lines shall be tested for straightness by: (i) inserting a smooth ball 12 mm less than the internal diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end. (ii) means of a mirror at one and a lamp at the other end. If the pipeline is straight the full circle of light will be seen otherwise obstruction of deviation will be apparent.

- The Contractor shall give a smoke test to the drains and sewer at his own expense and charges, if directed by the Project Manager.

  A test register shall be maintained which shall be signed and dated by Contractor.

END OF SECTION I

SECTION II: BIO DIGESTER SYSTEM

SPECIFICATION: DRDO BIODIGESTER (FOR HIGH ALTITUDE AREAS)

DRDO Biodigester tank specification: Required cubic meter tank (L X B X H, inner sizes) designed double walled FRP with outer wall with *minimum* thickness: 10mm, and inner wall minimum thickness 6mm and double wall of 100mm insulation duly filled between the two FRP walls with poly urethane foam of 100mm. The total wall thickness should be 10 + 6 + 100 [total (approx) = 116mm (*with ±3mm*)].
There must be 03 equal partition walls of 5 mm thick in biodigester, resulting in four chambers of approximately 3: 3: 2: 2 ratios. The volume of chamber containing inlet pipe is approximately 40% of total volume (partition wall- partial; 270cm Length x 100cm Height from opposite direction).
Bacteria attachment sites as per the norms should be added in the tank (A PVC immobilization matrix (10mm Thick) is to be provided on both sides of partition wall along with hanging type covering all the compartments with 100 mm distance.

Inlet and outlet: Both should be as per the design norms having 4 inch dia. Further, inlet pipe of the biodigester tank should be connected from nearby toilet block and this connecting pipe and outlet should be double walled PVC with PUF insulation (min 3m or more length required for connecting each block). Entry of inlet should be from top, while exit of outlet should be from side wall, 100 mm below the top cover.

Sensor and thermostat: Two sensors and 2 thermostats are required that will control the water temperature inside the tank. Thermostat should be controlled to regulate constant temperature at 25^0C ± 2^0C with in the tank to have an optimal efficiency of the inoculums bacteria to degrade human faecal material. Necessary electric wires and cables for the system.

A proper stable , low maintenance and durable good quality biodigester shed of required size with 220 GSM galvanized steel structure and double slope roof with 5mm thick FRP roofing sheet covering the whole digester to avoid direct snow fall and pilling up of snow.

Installation of Bio-digester:
i. Assembly of biodigester must be carried out at the site of installation and subsequent connection with the existing toilet must be done to complete the installation.
ii. All pipe, partition walls and cover plate with gasket are to be properly sealed with main tank body. For the sealing of pipes and partition walls to make the leak proof proper general purpose/suitable resin and fiber mat is to be used.
Page of

iii. Proper digging and leveling of soil is to be carried for installation of biodigester. Leveling should be carried out carefully with the water gauge.

Anaerobic microbial inoculums (1600L) is to be provided in the biodigester tank in the first chamber either before cover plate assembly or it can also be poured from the toilet pot. Inoculum should be procured from DRDO approved facility; prior to charging, the quality of the inoculums must be certified by the DRDO laboratories (DRDE Gwalior/DRL Tezpur). DRL, Tezpur reserves the right to check the quality of inoculums at the installation site.

Transportation and installation of one biodigester tank and covering shed is required which will be installed at high altitude low temperature forwarded locations beyond Leh Ladakh. In case of any complain same shall be attended within 15 working days at site.

One year warrantee must be inclusive (for both complete digesters-all components and shed) along with the quote

i) Bio Digester of required size as per manufacturer size is required
ii) Treated water quality should be according to IS 11624.

3.0 **Pumps & Equipment**

3.1 Work under this sub-head consists of furnishing all labour, materials, equipment and accessories necessary and required to completely install pumping system for various water supply services and water treatment as per drawings, specified hereinafter and given in the Bill of Quantities.

3.2 Without restricting to the generality of the foregoing, the work of pumps and water treatment equipment shall include the followings:

a) Hydro-pneumatic pump for domestic water supply
b) Motor control panels, power and control cabling and allied electrical works.
c) Pipes, valves, accessories, hangers, supports, delivery and suction feeders and connection to proposed pipe work.

3.3 **PUMP SET**

3.3.1 **Water Supply Pumps**

(These specifications are applicable for all clear water pumps and as specified in Bill of Quantities)

3.3.2 Water supply pumps shall be suitable for clean water. Pumps shall be single or multistage, monoblock horizontal, vertical, centrifugal pumps with cast iron/stainless steel body and stainless steel/bronze impeller, stainless steel shaft and coupled to a TEFC electric motor by means of a flexible coupling or as specified in bill of quantities. Each pump should operate a curve 10m below specified head.

3.3.3 Pump and motor shall be mounted on a common M.S. structural or C.I. base plate or as required as per site conditions.

3.3.4 Each pump shall be provided with a totally enclosed fan cooled induction motor of required H.P. and RPM specified in the bill of quantities and as per requirement.

3.3.5 Each pumping set shall be provided with a 150mm dia or of suitable size gunmetal "Bourden" type pressure gauge with gunmetal isolation cock and connecting piping.

3.3.6 Provide vibration-eliminating pads appropriate for each pump.

3.3.7 Provide rate of flow measuring meter with bypass arrangement with every set of pumps as shown on the drawings and given in the bill of quantities (to be paid separately).

3.3.8 All water supply pumps shall be provided with mechanical seals, of required specifications.

3.4 **PIPING**

3.4.1 Pipes for suction and delivery shall be galvanized/M.S tube (heavy duty) confirming to I.S:1239 upto 150mm dia and as per I.S:3589 for dia 200mm and above or as specified in bill of quantities. The M.S flanges shall confirm to I.S:6392-1971.

3.4.2 Gate valve and check valve above 65mm dia shall be C.I. double flanged conforming to I.S:780 manufactured by the reputed manufacturers or C.I. double flanged butterfly valves as specified in bill of quantities or elsewhere or as per approval of Engineer-in-charge.

3.4.3 Full way and check valves 65mm dia and below shall be gunmetal tested to 20Kg/cm^2 pressure certified and conforming to I.S:778.

3.4.4 Suction strainer or foot valves shall be C.I. confirming to I.S:4038 – 1979 as

washers etc.

3.4.6 **Testing**

All G.I/M.S pipes (except fire pipe) shall be tested hydrostically for a period of 30 minutes to a pressure of 7 Kg/cm^2 without drop in pressure and all G.I/M.S pipes for fire shall be tested hydrostically for a period of 30 minutes to a pressure of 10 Kg/cm^2 without drop in pressure.

3.5 **MEASUREMENTS**

3.5.1 Raw water, garden pump and other pumps shall be measured by numbers and hydro pumps and sump pumps shall be measured by sets and shall include all items as given in the bill of quantities.

3.5.2 Motor control panel and level controllers shall be measured by numbers.

3.5.3 Pipes for suction and delivery header and mains shall be measured per linear metre along the centre line of the pipe and shall be inclusive of all fittings.

3.5.4 Cable trays and cables shall be measured per linear meter.

3.5.5 Structural clamps including hangers shall be measured by weight calculated from sections used. No separate payment shall be admissible for bolts, anchor bolts, rawl plugs etc.

3.5.6 No separate payment shall be made for making connections of the existing service lines to the pumps. Vibration eliminator pads are included in the scope of this work.

3.6 **GUARANTEE**

3.6.1 The contractor shall submit a warranty for all equipment, materials and accessories supplied by him against manufacturing defects, malfunctioning or under capacity functioning.

3.6.2 The form of warranty shall be as approved by the Engineer-in-charge.

3.6.3 The warranty shall be valid for a period of one year from the date of commissioning and handing over.

3.6.4 The warranty shall expressly include replacement of all defective or under capacity equipment, Engineer-in-charge may allow repair of certain equipment if the same is found to meet the requirement for efficient functioning of the system.

3.6.5 The warranty shall include replacement of any equipment found to have capacity lesser than the rated capacity as accepted in the contract. The replacement equipment shall be approved by the Engineer-in-charge.

1 SCOPE OF WORK

The general character and the scope of work to be carried out under the contract are illustrated in Tender Drawings, Finishes Matrix and Schedule of Quantities. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Engineer In charge. The contractor shall furnish all labour, materials and equipment as listed in specifications and drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. **All the components, materials, accessories & equipment shall be supplied & designed as per -30^{o} C ambient temperature and about 3525 meters MSL. If the specification of items will increase as per the altitude above, the feasible specification shall be followed without cost increase.**

The system includes:

a) Wiring for Normal Electric supply & Emergency supply shall be done in PVC conduit / Cable tray/ Raceway system as per drawings.
b) Switches, plug sockets, cover plates and other wiring accessories.
c) Sub-Mains wires/cables from panel to respective flat DB/Floor.
d) Distribution boards
e) Cables on cable trays including installation, cable trays, hangers, supports, cable terminations and all fixing accessories.
f) Earthing (Grounding) System and Lightning Protection System.
g) Main LT Panels & Distribution Panels. The general construction shall confirm to IEC:61439 -1/2.
h) All cabling from main LT panel at to each respective distribution panels on each floor.
i) Diesel generator set
j) Lighting Fixtures and Fans

2 RELATED DOCUMENTS

These Specifications shall be read in conjunction with the CPWD General specification for Electrical work Part-1 Internal (2013), Part-2 External (1994), Part-4 Substation and Part-7 DG Sets (2013), drawings and other document connected with the work.

3 SUB MAINS AND POINT WIRING

3.1 Scope

The scope of this section comprises the supply, installation, testing and commissioning of

3. Switchboards, power plugs and its accessories like gang box, front plate, switch etc.
4. Wires and its accessories like conduits, Outlet boxes, junction boxes, pull-through boxes etc.
5. Ceiling rose, Connectors etc. for light points, Fan points, small exhaust fan points etc for all internal areas.
6. Conduit/channel as the case may be, accessories for the same and wiring cables between the switch box and the point outlet, loop protective earthing of each fan/ light fixture.
7. All fixing accessories such as clips, screws, raw plug etc. as required.
8. Metal switch boxes (as specified) for control switches, regulators, sockets etc, recessed or surface type, and phenolic laminated sheet covers over the same.
9. Control switch or MCB, as specified in drawings.
10. Connections to ceiling rose, connector, socket outlet, switch etc.
11. Flexible conduits from ceiling junction box to the fittings shall be provided duly coupled at both ends where false ceiling is coming. This shall be included within the scope of point wiring.)
12. Interconnecting wiring between switches within the switch box on the same circuit.

3.2 Codes & Standards

More particularly following documents should be strictly followed.

1. CPWD General Specification for Electrical work Part-1 Internal (2013)
2. CPWD General Specification for Electrical work Part-2 External (1994)
3. CPWD General Specification for Electrical work Part-4 Substation (2013)
4. CPWD General Specification for Electrical work Part-7 D.G sets (2013)
5. National Building Code - 2016
6. National Electrical Code - 2008
7. Indian Electricity Act 2003
8. Indian Electricity Rule 1956

Apart from above the relevant Bureau of Indian Standard codes as more particularly stated herein and broadly to all the codes, status and regulations as applicable shall be strictly enforced and adhered to.

3.3 Specifications

3.3.1 Wires:

The wires shall be PVC Insulated Copper Conductor multi strained FRLS confirming to IS: 694 and amendment up to date.

a. Wires from light/Fan circuit wiring and point wiring (along with internal loop earthing) shall be of 1.5 sq.mm size.

shall be as per drawings.

3.3.2 Thimbles/lugs:

The wires shall be terminated with the help of crimping lugs at both the terminals. The lugs shall be suitable for 1100V and the min temperature rating for these lugs shall be 150 degree Celsius. The lugs shall be pin/Hole type with pin designed in such a fashion to prevent damage to the wire from over tightening and ensure a reliable electrical connection. If Aluminum cable is used, aluminium lugs shall be used, for copper cables, copper lugs shall be used and if cable termination is of Aluminium conductor and main busbar is copper than tinned copper or bi-metallic lugs shall be used.

3.3.3 PVC conduits and accessories:

Wiring for Light/ Fan/Call Bell/Exhaust Fan point and circuit wiring and power wiring shall be done in PVC steel conduit confirming to IS: 2509 (1973) and IS: 3419 (1989) latest as on date for rigid conduit and IS: 9537 (Part-5) (2000) latest as on date for flexible conduit.

3.3.4 Modular GI Box:

The switch box for mounting modular switches and sockets shall be made out from pre galvanized sheet. The modular GI box having wall thickness not less than 1.2mm for boxes up to size of 20 cm X 30 cm and above this size of 1.6 mm thick shall be used.

3.3.5 Modular Base and cover plate:

The front plate shall have smooth surface from both the side and shall be properly matching the fixing alignment. Perfect alignment shall be maintained while fixing of the back boxes. The color shall be as per the engineer in-charge.

3.3.6 Switch - Socket Outlets:

The switch sockets shall be modular type of reputed make mentioned in preferred approved make list.

3.3.7 Blanking Plate:

Spare space in modular switch box shall be covered by blanking plate.

3.3.8 Electronic fan regulator:

Step Type two module Electronic regulators should be used.

4 DISTRIBUTION BOARD

5 CABLES TRAYS

Cable tray system shall comprise of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts& nuts, painting suspenders including bends, Tee joints, Cross member and reducers etc as required. Refer all specification other than material from CPWD Part-I.

6 PROECTION OF BUILDING AGAINST LIGHTNING

This chapter covers the detailed requirements of installation of lightning conductor system for protection of buildings against lighting. For details not covered in these specifications, reference may be made to IS: 2309 -1989.

The principal components of a lightning protective system are:

a) Air Terminations
b) Down Conductors
c) Joint and Bonds
d) Testing Joints
e) Earth Termination and Earth Electrodes

6.1 Materials:

a) The materials of air terminations, down conductors, earth termination etc. of the protective system shall be reliably resistant to corrosion or be adequately protected against corrosion. The material shall be one of the following as specified.

i) **Galvanised Steel:** Steel thoroughly protected against corrosion by a zinc coating shall be used.

b) Aluminium should not be used underground or in direct contact with walls.
c) All air terminations shall be of GI and all down conductors shall be of GI or aluminium except where the atmospheric conditions necessitate the use of copper or copper clad steel for air terminations and down conductors.
d) The recommended shape and minimum sizes of conductors for use above and below ground as per below tables respectively:

Shapes and minimum sizes of conductors for use above ground.

Sl. No	Material and Shape	Minimum Size

5.	Round Aluminium Wire	8mm diameter
6.	Aluminium Strip	25mm x 3mm

Shapes and minimum sizes of conductors for use below ground

Sl. No	Material and Shape	Minimum Size
1.	Round copper wire or copper clad steel wire	8mm diameter
2.	Copper strip	32mm x 6mm
3.	Round Aluminium Wire	10mm x 6mm
4.	Galvanized Iron Strip	32mm x 6mm

6.2 Layout:

The system design and layout shall be done in accordance with IS: 2309-1989 and specified in the tender documents.

6.2.1 Air Terminations:

a) Air termination networks may consist of vertical or horizontal conductors or combinations of both. For the purpose of lightning protection, the vertical and horizontal conductors are considered equivalent and the use of pointed air terminations or vertical final is, therefore, not regarded as essential.

b) A vertical air termination, where provided, need not have more than one point and shall project at least 30cm, above the object, salient point or network on which it is fixed.

c) For a flat roof, horizontal air termination along the outer perimeter of the roof shall be used. For a roof of larger area a network of parallel horizontal conductors shall be installed. No part of the roof should be more than 9m from the nearest horizontal protective conductor.

d) Horizontal air terminations should be carried along the contours such as ridges, parapets and edges of flat roofs and where necessary over flat surfaces in such a way as to join each air termination to the rest and should themselves form a closed network.

e) All metallic projections including reinforcement on or above the main surface of the roof which are connected to the general mass of the earth, should be bonded and form a part of the air termination network.

f) If portions of a structure vary considerably in height, any necessary air terminations or air termination network for the lower portions should be bonded to the down conductors of the taller portions, in addition to their own down conductors.

6.2.3 Routing:

a) A down conductor should follow the most direct path possible between the air terminal network and the earth termination network. Where more than one down conductor is used, the conductors should be arranged as evenly as practicable around the outside walls of the structures.

b) The walls of light wells may be used for fixing down conductor, but lift shafts should not be used for this purpose.

c) Metal pipes leading rainwater from the roof to the ground may be connected to the down conductors, but cannot replace them, such connections should have disconnecting joints.

d) In addition on the routing of the down conductor, its accessibility for inspection, testing and maintenance should be taken them, such connections should have disconnecting joints.

6.3 Installation:

6.3.1 General:

a) The entire lightning protective system should be mechanically strong to withstand the mechanical forces produced in the even of a lightning strike.

b) Conductors shall be securely attached to the building or other object to the protected by fasteners which shall be substantial in construction, not subject to breakage and shall be galvanized steel or other suitable materials, with suitable precautions to avoid corrosion.

c) The lightning conductors shall be secured not more than 1.2m apart for horizontal run and 1m for vertical run.

6.3.2 Air Terminations:

All air terminals shall be effectively secured against overturning either by attachment to the object to be protected or by means of substantial bracings and fixings which shall be permanently and rigidly attached to the building. The method and nature of the fixings should be simple, solid and permanent, due attention given to the climatic conditions and possible corrosion.

6.3.3 Down Conductors:

a) The down conductor system must where practicable be directly routed from the air

permissible), re-entrant loops in a conductor can produce high inductive voltage drops so that the lightning discharge may ump across the open side of a loop. As a rough guide, this risk may arise when the length of the conductor forming the loop exceeds 8 times width of the open side of the loop.

c) When large re-entrant loops as defined above cannot be avoided, such as in the case of some cornices or parapets, the conductors should be arranged in such a way that the distance across the open side of a loop complies with the requirement indicated above. Alternatively, such cornices or parapets should be provided with holes through which the conductor can pass freely.

6.3.4 Joints to prevent side flashing:

Any metal in or forming a part of the structure or any building services having metallic parts which are in contact with the general mass of the earth should be either isolated from or bonded to the down conductor. This also applies to all exposed large metal items having any dimension greater than 2m whether connected to the earth or not.

6.3.5 Joints and Bonds:

6.3.5.1 Joints:

a) A lightning protective system should have as few joints as possible.

b) Joints should be mechanically and electrically effective, for example, clamped, screwed, bolted, crimped, riveted or welded.

c) With overlapping joints, the length of the overlap should not be less than 20mm for all types of conductors.

d) Contact surfaces should first be cleaned and then inhibited from oxidation with a suitable non-corrosive compound.

e) Joints of dissimilar metals should be protected against corrosion or erosion from the elements or the environment and should present an adequate contact area.

6.3.5.2 Bonds:

a) Bonds have to join a variety of metallic parts of different shapes and composition and cannot therefore be of a standard form.

b) There is the constant problem of corrosion and careful attention must be given to the metals involved i.e. the metal from which the bond is made and those of the items being bonded.

c) The bond must be mechanically and electrically effective and protected from corrosion

e) Structures supporting overhead electric supply, telephone and other lines must not be bonded to lightning protective system without the permission of the appropriate authority.

f) Gas pipe in no case shall be bonded to the lightning protective earth termination system.

6.3.6 Tests Joints:

Each down conductor should be provided with a test joint in such a position that while not inviting unauthorized interference, it is convenient for use when testing.

7 MAIN LT PANELS/DISTRIBUTION PANELS & LT SWITCHGEAR

7.1 Main LT Panels/Distribution Panels:

This chapter covers supply/erection/testing and commissioning of TTA Panels:-

a) For each equipment, required IP rating and short circuit rating capacity will be specified. Governing BIS also will be specified.

b) All the equipment will be factory fabricated in an approved factory having modern fabrication and testing process.

c) It shall have Nine tank pretreatment process comprising of Solvent/ Alkaline Degreasing, Water Rinsing, De- Rusting, Water Rinsing, Passivation, Phosphating, Water Rinsing, Activation and Drying.

d) The powder coating shall be as per IS: 13871 (1993) latest as on date having thickness 70-80 micron for Indoor enclosure and 100-120 micron for Outdoor enclosure or as specified in BOQ whichever is high.

e) The powder paint will be subjected to oven-heated process.

f) All panels will be provided with suitable gasket.

7.1.1 Reference Codes & Standards:

The reference codes and standards for Panel Assemblies shall be followed as mentioned below:

S.No.	Description	Reference Standard

4	Internal Arc	IEC 61641

* The TTA Panels are defined under IS: 8623 and IEC 61439, the higher and the latest code of practice shall only be followed.

7.1.2 Material & Construction:

a) Cubicle Panel shall be floor mounted (on a base frame as specified in BOQ) or wall mounted with hooks. The design shall include all provisions for safety of operating and maintenance personnel.
b) The degree of protection for panel assemblies shall be IP: 52 for Indoor Enclosures and IP:55 for Outdoor Enclosures or as specified in BOQ.
c) The Panel shall be compartmentalized form 3b bolted type having space and arrangement for incoming cable/ bus-trunking, incoming switchgear/ switchgears, bus coupler, insulated and properly supported compartmentalized switchgear, bus bar supports, joint shrouds, cable alleys of suitable size for cabling routing, support and terminations, interconnection between bus bars and switchgear with auxiliary bus bars/ insulated conductors/ strips etc.
d) The panel enclosure shall be fabricated out of CRCA sheet steel of 2.0 mm thickness or as specified in BOQ whichever higher and gland plates shall be of 3.0mm thickness.
e) The framework may be angle iron/ channel/ bolted type construction.
f) All rear doors shall be hinged type for all the rear accessible type boards and outdoor panels.
g) Suitable pressure relief devices shall be provided to minimize danger to operator during internal fault conditions.
h) Internal Arc capacity should be 50kA for 0.1 sec for PTTA panels.
i) The ACB used for Incoming or bus-coupler shall be arranged in single tier formation only.
j) All switchboards having incomer equal or greater to 630A and Main LT Panels shall be readily extensible on both sides by addition of vertical/ horizontal section after removal of the end covers.
k) The overall height of the switch boards shall be limited to 2450mm or less as per manufacturer design. The maximum and minimum operational height shall be restricted between 1800mm to 300mm respectively from finished floor level.
l) Before assembling, all joint surfaces shall be filed or finished to remove burrs, dents and oxides and silvered to maintain good continuity of all joints.
m) All screws, bolts, washers shall be zinc plated and suitable grade nuts and bolts shall be used for bus bar connections.
n) Arrangement for Incoming/ Outgoing cable termination/ Terminal Block:

(i) Cable entries shall be provided either from the rear or from the front through cable alleys of suitable size.
(ii) Removable gland plate to be provided for each cable entry.
(iii) Incoming termination shall be suitable for receiving bus trunking / cables as per SLD. Cable terminations in case of bus bar shall be of tinned copper.
(iv) Cable support arrangement to be provided inside cable alley so that cables are neatly

(vi) It is desirable that cables are not terminated directly to switchgear, but terminated through proper terminal blocks usually equal or one rating higher of the rating of the breaker.

7.1.3 Specification of cable Terminal Block:

a) Terminal block of reputed make shall be used. The housing material shall be polyamide having unbreakable and fire retardant characteristic. All the metal parts shall be made up of copper alloy including the screws. Mounting shall be 'Din' or 'G-rail' type. Screws shall be self-captive type. No protection cover is required and the block should be touch proof.

7.1.4 Bus bars/ Supports/ Clearances:

a) Bus bar supports insulators shall be class 'F' insulators made of non-hygroscopic, non-combustible, track resistant and high strength FRP/ SMC/ DMC material and shall be of suitable size and spacing to withstand the dynamic stresses due to short circuit currents.

b) The bus bar system may comprise of a system of main/ auxiliary bus bars run in touch proof bus bar alley.

c) The bus bars shall be made of rectangular cross sections of high conductivity & strength of copper or aluminum as specified in BOQ/ SLD and suitable to withstand with the stresses of fault level as specified or equal to the fault rating of the incomer breaker.

d) The copper bus bars shall be of 99.9% purity and aluminum bus bars shall be of Electrolytic grade E91.

e) The current density of bus bars shall be followed as per below table or as specified in BOQ:

S.No.	Description	Current Density of Bus Bar
1	**For Residential Building**	
i.	Copper Bus Bar	2A/ Sqmm
ii.	Aluminum Bus Bar	1A/ Sqmm
2	**For Non- Residential Building**	
i.	Copper Bus Bar	1.6A/ Sqmm
ii.	Aluminum Bus Bar	0.8A/ Sqmm

f) All bus bars shall be provided with Halogen free heat shrinkable colour coded insulated sleeves with RoHS compliance.

bar of the system shall be used.

h) Bus bar nomenclature shall be as defined in below table:

S.No.	Description	To be read as
1	SP	Single Phase
2	SPN	Single Phase and Neutral (Neutral shall be Half of Phase Capacity)
3	DP	Double Phase (Neutral shall be Equal of Phase Capacity)
4	TP	Three Phase
5	TPN	Three Phase and Neutral (Neutral shall be Half of Phase Capacity)
6	TP+2N	Three Phase and Neutral (Neutral shall be 200% of Phase Capacity)
7	4P	Three Phase and Neutral (Neutral shall be 100% of Phase Capacity)

7.1.5 Earthing:

a) All electrical Panels shall have two nos. common G.I. earth bar of 50X6mm for the panels having incomer fault of 50kA and rest all with 32X6mm or as specified conductor throughout of the panel length as per the fault kA rating of main Incomer, at the rear and for wall mounted panel with 2Nos. earth stud at top one at each side.

b) Dedicated copper bus bar strip of 1x32x6 Sqmm 0.5 meter long with 12-15 holes for termination 4 to 25sqmm copper wires in cable Alley mount on 2Nos. Insulators shall be provided in UPS Output Panel only.

c) All hinged doors and compartment shall be earthed with minimum 2.5sqmm cu wire in spiral form for more flexibility.

d) Space Heater & Ventilation fans:

(i) Anti- condensation heaters shall be fitted in each cubicle together with an On/Off isolating switch suitable for electrical operation at 230V AC 50Hz single phase of sufficient capacity to raise the internal ambient temperature by 40 Deg C or as per site condition.
(ii) All the electrical apparatus so protected shall be designed so that the maximum permitted rise in temperature is not exceeded if the heaters are energized while the switchboard is in operation.
(iii) Space heaters shall be provided in each bus bar alley & Relay Compartment.
(iv) Automatically operated, thermostat controlled panel mounted heavy duty exhaust fans in each vertical or wherever required shall be provided to maintain the humidity inside the panel.

(i) Suitable engraved white on black/ blue name plates and identification labels made of Aluminum for All Panels and Incoming/ Outgoing Feeders shall be provided.
(ii) The labels shall indicate the feeder no., feeder designation and feeder rating.
(iii) The labels shall be provided at the rear doors of the panel compartment for all the panels having back access.

f) Documentation Pocket:

(i) A pocket inside all the panels shall be made to keep the documents such as GA drawing of the panel etc.

7.1.6 Requirements for TTA:

a) Main distribution boards shall be assembled only by a franchisee of the original manufacturer and approved by the consultant. The certificate copy issued by original manufacturer shall be attached with quotation document for review & acceptance. All major components like enclosures, switchgear components and bus bar supports shall be supplied by OEM manufacturer to franchisee assembler.

b) Panel builder / Assembler / Licensee partner shall have a minimum experience of 10years in the field of switchgear assembly.

c) The main distribution boards shall comply and perform satisfactorily at special design conditions as minimum: Ambient Temperature @ 45ºC & Relative Humidity @ 95% (At 55ºC).

d) All TTA panels shall have sheet steel hinged doors for all compartments and provided with duly interlocked with the breaker for “ON” & “OFF” positions.

e) The external covers provided should have been subjected to minimum mechanical impact of IK09 as per IEC to ensure specified degree of protection.

f) Unless specified / approved otherwise, enclosure system, the switching devices and other components used for assembly of the main distribution boards shall be from original manufacturer. Different manufacturer for the main distribution board enclosure and switching devices will not be accepted / approved.

g) Each panel section (cable compartment) shall be provided with thermostatically controlled panel heater.

h) The Enclosure shall be made out of electro galvanized steel sheets conforming to international specification. Zinc coating shall be provided on the sheets, which shall prevent rust formation during storage and handling for processing, in addition to giving corrosion protection to the finished product.

i) The enclosure system shall be Modular in nature with bolted on construction

k) Internal Arc capacity should be 50kA for 0.3 sec or as specified in BOQ whichever higher.

l) The bus bar joints shall be plated or provided with bimetallic washers for dissimilar material. The hardware used at joints shall be as per original manufacturer's recommendation.

7.1.7 Safety Feature and Interlocks:

a) The safety shutter shall be provided in breaker panels, which shall prevent in advertent contact with isolating contacts when breaker is withdrawn from the cradle.

b) Door interlocking shall be provided in each switchgear compartment with a provision of defeat interlock

c) All panel doors shall have provision of padlocking.

d) Insulating barriers shall be provided in all live sections of the panel.

e) There shall be provisions of positive earth connection between fixed and moving portion of the ACB either through connector plug or sliding solid earth mechanism.

f) Earthing bolts shall be provided on the cradle or body of fixed ACB.

g) Arc chute covers shall be provided wherever necessary.

h) In case of draw out type switchgears safety shutters shall be provided to fully cover the live section automatically once the switchgear is being draw out.

i) It shall be possible to bolt the draw out frame not only in connected position but also in TEST and DISCONNECTED position to prevent dislocation due to vibration.

j) There shall be provision for locking the breaker in all three positions.

k) The breaker shall be provided with interlock to prevent the breaker from being withdrawn or replaced except in the fully isolated position.

l) Interlock shall also be provided to prevent the breaker from closing without in service position.

m) Space heater triggered by thermostat shall be provided in cable compartment to avoid moisture.

n) Lamp operated with a door limit switch and a toggle switch shall also be provided in

The auto synchronizing shall be provided as mentioned below and as per BOQ/ SLD/ BOQ.

7.1.8.1 Sequence of operation:

1. Sequence of Operation in Auto Mode

a) Synchronizing panel logic shall be to automatic start Master GENERATOR set (Selected by Microprocessor based generators control and engine management & monitoring package) through cranking relay & close its CB/NIS after verifying frequency and voltage and shall start feeding the essential load.
b) On failure of mains power supply, DG sets shall start (ON) based on demand load available on respective bus before power failure and same shall come on automatically and synchronize on the bus. DG sets shall remain ON depending upon the load monitored on each 11 kV changeover panel and balance DG sets shall stop after their respective cooling cycle. The combined synchronized power should be fed to the incomer bus of 11 kV changeover panel when the generator output reaches 90% of its rated voltage and frequency. As load increases beyond 75% on DG set which is running, other generator will start and synchronize on the same bus. Similarly as load increases further other generators shall start automatically and synchronize on the same bus.
c) As the load increases or decreases accordingly switching ON and OFF of the generator on the synchronizing bus shall continue with the help of microprocessor based generator control package.
d) Auto synchronizing system shall verify the phase angle of all the sets and also compensate for CB closing time by initiating closing of the breaker ahead of the actual predictable synchronism thereby ensuring a phase difference of zero degree. The breaker closing command shall not be given at a phase angle difference of + 4% in any circumstances.
e) The synchronizing system shall operate the generator ISOCHRONOUS mode by setting Droop to Zero. The system shall have a direct analogue interface with the AVR & Governor for direct bias control. No motorized potentiometers shall be acceptable.
f) Failure of any synchronizing module shall not disturb the synchronizing of other generator.
g) Failure of generator control package shall not affect the synchronizing system which shall be independent of each other.
h) System shall also monitor the slip frequency and the Beat Voltage of the machine or system.
i) NIS of master generator shall remain in circuit. In the event of shutting OFF of First Set, NIS of any other generator shall close first before tripping NIS of first set. It shall be possible to alter sequence of generator starting through, manual selection or through generator control package.
j) Active and reactive power shall be made equal on all the machines automatically with the help of ACTIVE LOAD BALANCING System through Governor Control.

overloading, cascading effect of tripping and unnecessary FUEL WASTAGE.

m) On the removal of load, generator circuit breaker & Bus Coupler CB's shall be switched OFF in preset sequence with time delays to cover DIPS. Generator shall continue to run for 3 Minutes or predefined after generator CB has been switched OFF.
n) It shall be possible to alter crucial setting / time delays through MAN MACHINE INTERFACE (HMI).
o) All auxiliaries to operate system shall be come ON automatically.
p) Engine start stop control system shall be mounted on the generator panel.

Note:-1000VA on-line single phase input / single phase output (230 V) UPS with 30 minutes battery backup to be provided along with the synchronizing panel.

2. Sequence of Operation in Manual Mode

a) In the manual mode master generator set shall be started by pressing 'Engine Start' Push Button (PB)
b) When Engine starting push button is pressed cranking relay shall be energized and give starting signal to the engine.
c) After full voltage is build up, breaker of the Master generator shall close manually with the help of breaker control switch.
d) When breaker Control switch is turned to 'CLOSE' position, breaker as per following sequence:

(i) PLC/Main Selector Switch shall be in Manual Mode.
(ii) Solo/Parallel Selector Switch being in 'Solo' mode.
(iii) With the conditions mentioned above fulfilled and breaker control switch in 'Close' position, Neutral contactor shall be energized.
(iv) Closing command to the generator breaker shall be given.

e) In manual mode care shall be taken, to synchronize the follower generator sets with the 'Master' before closing its breaker.
f) For synchronizing the guarantee in manual mode, voltage/frequency raise/low commands shall be given to Alternator/Engine with the help of 'Joy sticks' provided in the Relay/Synchronizing Panel or internally through genset digital controller
g) While synchronizing the generator, manually, all the parameters viz. voltage, frequency and phase rotation shall be monitored with the help of Double voltmeter, Double Frequency Meter and Synchronoscope provided in the Relay/Synchronizing Panel and breaker shall be closed only when all the three parameters are matched properly or internally through genset digital controller.

(i) Active/Reactive load sharing between all the running sets in manual mode shall be managed by raising/lowering voltage/frequency with the help of joy sticks or internally through genset digital controller.
(ii) During the parallel operation of Power Generating sets in 'Manual Mode', Neutral contactor of only master generator shall close. This shall be assured by inter locking the neutral contactors of all the generator.

synchronizing unit or PC to equalize run time of DG all DG sets.

7.1.8.3 Control System:

a) All the electrical parameters are monitored centrally through intelligent processing. All the electrical data is brought to the PLC & then PLC controls the complete Synchronizing, Load Control & Management system. Control, monitoring and data functions shall be provided by.
b) There are two options provided for control, monitoring & data logging functions graphic display terminal along with laser printer.
c) The minimum PC requirements shall be Windows 10 OS, Intel Core i7, 6th Gen, 2GB Graphics,52 X CD ROM, MM Speakers, LAN (Ethernet Port), 2 x USB ports, 2 x COM ports, 1 x Parallel port. SMPS with other standard accessories, 1 No. 32 inch colour PC (latest version), A-4 size Laser Colour Printer and all License version software.

7.1.9 Site Visit and Documentation:

The manufacturer shall visit the site to review the site conditions and shall submit a report complying following points:

a) Possible Height & Width for the Panel.
b) Back access is possible or not.
c) Cable entry will be possible from bottom or from top.
d) If cable entry from bottom, stand will be required or not.
e) If panel is going to be wall mounted, the wall is available or not.
f) Path for movement of transportation of panel is possible or not i.e length, width etc. and the transportation sections shall be designed according.
g) Sufficient space available at front & back after door opening.
h) Sufficient height available above panel for cable drop.

7.1.10 Minimum Documentation for GA submission:

The manufacturer shall provide following documentation along with the GA drawings:

a) General Note and considerations for Construction of the Panels having sheets thickness, IP, bus bar clearance, bus bar size, rating & density with material, base frame, control wiring details etc.
b) Schematic Diagram of the panels
c) BOM with selected make with all component’s model no.
d) Bus bar orientation
e) Top/ Bottom and front/ Back/ Side views as applicable.
f) Detail of interconnection bus bar/ cable between the incoming breaker and main bus bar and main bus bar and outgoing breakers.
g) Discrimination chart for all networks

(iii) Certificate for Bus Bar purity, density and RoHS Compliance.
(iv) Certificate for No de-rating up to ambient temp. 50ºC for all breakers and selected components.

7.1.11 Factory Tests:

When all the panels are ready as per the approved GA drawings, the panel manufacturer invites the consultant for panel inspection. The following tests shall be performed at the manufacturer's factory unit.

a) Visual check which covers measurement of dimension, location, number and type of devices etc.
b) Checking as per Bill of Material and Approved GA drawings
c) Functional Check which covers operation of various feeders as per approved GA drawings
d) Operation check for every control function
e) Insulation resistance test and value measurement on power and control circuits before and after high voltage withstand test.
f) High voltage test on power and control circuit as per IS 8623.
g) MV Megger test.

7.1.12 Type Tests for TTA Panels:

The main distribution board and the components as applicable shall be type tested in accordance with the IEC standards to verify the specified fault level withstand capacity from a reputed and approved ty

pe testing laboratory and certified by an competent authority.

The following type tests as specified in IEC 61439-1standards shall be carried out on assembly at recognized test laboratories and certificates shall be provided for each type test:

a) Verification of temperature-rise limits (IEC cl.10.10)
b) Verification of Dielectric properties (IEC cl. 10.9)
c) Verification of short- circuit withstand strength (IEC cl. 10.11)
d) Verification of the effectiveness of the protective circuit (IEC cl. 10.5)
e) Verification of clearances and creep age distances (IEC cl. 10.4)
f) Verification of mechan
g) ical operation (IEC cl. 10.13)
h) Verification of the degree of protection (IEC cl. 10.3)
i) Verification of mechanical impact (IEC cl. 10.2)

7.1.13 Packing:

7.1.14 Installation:

a) The installation work shall cover assembly of various sections of the panels lining up, grouting the units etc. In case of multiple panel switch boards after connecting up the bus bars etc. all joints shall be insulated with necessary insulation tape or approved insulation compound. A common earth bar shall be of appropriate rating as per fault or as specified shall run inside at the back of switch panel connecting all the sections for connecting to frame earth system. All protection and other small wirings for indication etc. shall be completed before calibration and commissioning checks are commenced. All relays, meters etc. shall be mounted and connected with appropriate wiring.
b) The Rising Mains, bus trunking or wall mounted panels shall be supported such that its weight does not come to the power cable or earthing terminals.
c) All rising mains/ bus trunking enclosures hanged from slab shall be suspended at a uniform height of minimum 2400mm above finished floor level. The layout got approved from the Engineer-in-Charge before erection.
d) If rising mains/ bus trunking is hanged from slab, each section of the enclosure shall be suspended from the ceiling slab with suitable MS suspenders or GI threaded rods and support angles/ channels. The runs shall be neat and route shall be as per the design or as directed by Engineer-in-Charge.
e) A connector assembly for plug in box shall be supplied loose with each section of the rising mains/ bus trunking enclosures for coupling two sections and it shall comprises a rubber locating ring. Bus bar insulating tube and a connector insulating tube.

7.1.15 Testing and Commissioning:

Commissioning checks and tests shall include all wiring checks and checking up of all connections. Following shall be performed at site:

a) Relay/ meters adjustment/ setting shall be done before commissioning.
b) Tightening of all nuts and bolts.
c) Closing of any left out holes to ensure the panel is insect proof and IP compliances.
d) Operational check of all breakers, Contactors, protection devices and instruments
e) Lubrication of all moving parts.
f) Interlock function check
g) Insulation test: when measured with 500V Megger the insulation resistance shall not be less than 100 Mega Ohm.
h) Trip tests and protection gear test.
i) Earth Test

7.1.16 Handing Over Document:

The contractor shall submit a handing over document consisting of following:

a) Operational & maintenance manual

7.2.1 Standards and Codes:

The latest amended up to date Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the Indian Electricity Act 2003 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

7.2.2 Air Circuit Breaker:

The ACB shall conform to the requirements of IS/IEC 60947-2 and shall be type tested & certified for compliance to standards from–CPRI, ERDA/ any accredited international lab. The circuit breaker shall be suitable for 433 V, 3 phase, 50 Hz supply system. Air Circuit Breakers shall be with moulded housing flush front, draw out type and shall be provided with a trip free manual operating mechanism or as indicated in drawings and bill of quantities with mechanical "ON" "OFF" “TRIP” “CIRCUIT HEALTHY” “SPRINK CHARGE “indications.

ACB should be able to carry Rated current as required in the SLD at the yearly maximum ambient temperature applicable for 50 degree centigrade and as per site condition whichever is higher.

ACB should have an operational designed voltage of 690 V for Ics=100% Icu for Icw=1 Sec.

The ACB shall be 3/4 pole with modular construction, draw out, manually or electrically operated version as specified in SLD. The circuit breakers shall be for continuous rating and service short Circuit Breaking capacity (Ics) shall be as specified on the single line diagram and should be equal to the Ultimate breaking capacity(Icu) and short circuit withstand values(Icw).

Circuit breakers shall be designed to ‘close’ and `trip' without opening the circuit breaker compartment door. The operating handle and the mechanical trip push button shall be at the front of the breakers panel. Mechanical Contact wear indicator shall be mounted directly on the moving contacts to indicate the degree of erosion of the contacts. The ACB shall be provided with a door interlock i.e. door should not be open when circuit breaker is closed and breaker should not be closed when door is open.

All current carrying parts shall be silver plated and suitable arcing contacts with proper arc chutes shall be provided to protect the main contacts. The ACB shall have double insulation (Class-II) with moving and fixed contacts totally enclosed for enhanced safety and in accessibility to live parts. All electrical closing breakers shall be with electrical motor wound stored energy spring closing mechanism with mechanical indicator to provide ON/OFF status of the ACB.

7.2.2.1 Cradle:

The cradle shall be so designed and constructed as to permit smooth withdrawal and insertion of the breaker into it. The movements shall be free from jerks, easy to operate and shall be on Pin & Cam type/steel balls/rollers and not on flat surfaces.

There shall be 3 distinct and separate position of the circuit breaker on the cradle. Racking Interlock in Connected/Test/Disconnected Position.

- Connected Position: Main isolating contacts & control contacts of the breaker are Engaged
- Test Position: Main isolating contacts are isolated but control contacts are still engaged
- Isolated Position: Both main isolating & control contacts of the breaker are isolated
- There shall be provision for locking the breaker in any or all of the first three positions.
- The following safety features shall be incorporated:-

a) Withdrawal or engagement of Circuit breaker shall not be possible unless it is in open condition.
b) Operation of Circuit breaker shall not be possible unless it is fully in service, test or drawn out position.
c) All modules shall be provided with safety shutters operated automatically by movement of the carriage to cover exposed live parts when the module is withdrawn.
d) All Switchgear module front covers shall have provision for locking.
e) Switchgear operating handles shall be provided with arrangement for locking in 'OFF' position.
f) Actual Contact Inspection should be possible by removing Breaker from the panel – with mechanism connected to moving contacts of ACB.

7.2.2.2 Protections:

The breaker should be equipped within built battery backup microprocessor LCD display based release to offer accurate and versatile protection with complete flexibility and shall offer complete over current protection to the electrical system in the following five zones:

- Long time protection.
- Short time protection with intentional delay.
- Instantaneous protection.
- Ground fault protection.
- Neutral protection for 4 pole ACBs.

The protection release shall have following features and settings:

a. True RMS Sensing:

b. Thermal Memory:

When the breaker shall reclose after tripping on overload, then the thermal stresses caused by the overload if not dissipated completely, shall get stored in the memory of the release and this thermal memory shall ensure reduced tripping time in case of subsequent overloads. Realistic Hot/Cold curves shall take into account the integrated heating effects to offer closer protection to the system.

c. Defined time-current characteristics:
A variety of pick-up and time delay settings shall be available to define the current thresholds and the delays to be set independently for different protection zones thereby achieving a close-to-ideal protection curve.

d. Trip Indication:

Individual fault indication for each type of fault should be provided by LEDs for faster fault diagnosis. ACB should display last 20 trip history with date time stamping.

e. The release shall meet the EMI / EMC requirements.

f. The setting range of release shall confirm to IEC- 60947 and its applicable sub-parts. All ACBs shall have over temperature protection of release.

All Incomer ACBs shall have temperature rise monitoring at cradle terminals and display thru protection release, LED/LCD display showing all Power & Energy Parameters (Currents, %loading, Voltages, Frequency, PF, Power & Energy (active, reactive & apparent) etc. All incomerACBs shall have following additional protections other than mentioned above:-

- Under and over voltage
- Under and over frequency
- Restricted Earth Fault protection
- Trip Circuit supervision with PS class CT's.
- Undercurrent, (for DG set only)
- Reverse power (for DG set only)
- Phase sequence reversal
- Load shedding and reconnection thru programmable contacts.

Release should have LCD display for Power parameters.

- Release should be able to capture short circuit current on which ACB has tripped. The trip and alarm shall be stored in memory with the date & time stamping along with type of fault and alarm.

7.2.2.3 Safety Features:

- The safety shutter shall prevent inadvertent contact with isolating contacts when breaker is withdrawn from the Cradle.
- The incoming panel accommodating ACB shall be provided with indicating lamps for ON-OFF positions, digital voltmeter and ammeter of size not less than 96 mm x 96 mm, selector switches, MCB for protection circuit and measuring instrument circuits.
- Draw out breakers should not close unless in distinctservice/Test/Isolated positions.
- The insulation material used shall conform to Glow wire test as per
- IEC60695.
- The ACB shall provide in built electrical and mechanical anti-pumping.

7.2.3 Moulded Case Circuit Breaker (MCCB):

7.2.3.1 General:

- Moulded-Case Circuit Breakers (MCCB) shall comply with IEC 60947-1&2 standards.
- Earth Leakage Relay (30-3000mA) with CBCT shall be used for all outgoings MCCB.
- Earth Fault shall be provided for all incoming MCCB.
- MCCB shall be of category A with a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu) on all the ratings.
- MCCB shall have designed operational voltage upto690 V AC (50/60 Hz).
- MCCB shall have a rated insulation voltage of 690 V AC (50/60 Hz)
- Indication lamp ON, OFF, TRIP shall be provided incomer MCCBs and ACB.
- MCCB must be available in Microprocessor (250A and above) / Thermal Magnetic (Up to 200 Amp.) type release.
- All MCCB should be fully rated up to 50 Deg C.
- All thermal magnetic MCCBs up to 160A shall be adjustable thermal and fixed magnetic type and 200A shall be adjustable thermal and adjustable magnetic type (Ir = 0.8 x In to 1.0).
- For microprocessor shall have following characteristics:-
- LI : (Ir=0.4 to 1xln, Ii=1.5to 8xln)
- LSI : (Ir=0.4 to 1xln, Isd=1.5to 8xln)
- MCCBs shall be permissible for mounting in all 3 axes (Vertical Wall, Laterally Rotated Walland Ceiling& Floor mounting) without any adverse effect on electrical performance. It shall have line load reversibility.

7.2.3.2 Construction & Operation:

- For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries.
- MCCBs shall be actuated by a toggle or handle that clearly indicates the three positions:

- MCCBs shall be equipped with a “push to trip” button in front to test operation and the opening of the poles.
- The MCCB should be have a trip-free mechanism that ensures the trip process is not prevented even if the operating mechanism is blocked or manually held in the "ON” position.
- The Microprocessor Release MCCBs should be equipped with non-saturable type CTs for reliable & accurate protection.
- All microprocessor based MCCBs should have display with battery back-up.
- All microprocessor based MCCBs should have precise current setting in one step.

7.2.3.3 Current Limit & Selectivity:

- MCCBs shall be Current Limiting type.
- MCCBs, the current ratings of which are identical with the ratings of their trip units, shall ensure selectivity in rated current interval 1:1.6
- -MCCBs shall be equipped with a test facility of the Release by a hand-held device.

7.2.3.4 Accessories:

- MCCBs shall have uniform Internal Accessories platform across the range
- MCCBs Door Mounted Extendible Rotary Handle shall have an option of Illumination Kit to indicate three stable mechanism positions (ON, OFF and TRIPPED).
- MCCBs with TMTU Release should have provision for separate Short Circuit Signal facility.
- MCCBs shall be snap fit type to enable safe on-site installation of auxiliaries, voltage releases, signal contacts etc.
- MCCBs should have symbols engraved in the lid of the accessories compartment to indicate possible mounting position of internal accessories.
- The addition of a motor module or manual rotary handle etc. shall not block device settings.
- MCCB shall be equipped with Phase barrier, tinned copper spreaders.

7.2.3.5 Communications:

- All incomers ACBs & MCCBs in main LT panel and distribution panel shall be BMS compatible in open protocol.

7.2.4 Moulded Case Circuit Breaker (MCB):

Miniature Circuit Breaker shall comply with IS/IEC 60898-1:2002& EN 60947-2 or IEC-60947-2. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (C, D ref. IS standard) as per their Tripping Characteristic curves defined by the

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

7.2.5 Meter:

The digital meters shall conform in all respects to International standards –IEC 62053-21-22 or the relevant Indian standards, RoHs compliance with latest amendments thereof.

- All voltmeters and indicating lamps shall be through Control MCB's.
- Meters and indicating instruments shall be flush type.
- All CT's connection for meters shall be through Test Terminal Block (TTB).
- CT ratio and burdens shall be according to connected instrument and load.

Digital Multi-Function meter shall be provided in all incomers in main LT panels and distribution panels as shown in SLD, having following characteristics:-

- Digital Electronic multi-function meter with RS-485 port with THD with individual harmonics up-to 31st order and THDi to measure and display the following electrical parameters:-
- Total active energy(KWH/MWH),
- Maximum demand(KVA/MVA)(KW/MW),
- Maximum demand reset count,
- Instantaneous power factor,
- High/Low recording of VLL, VNL, A, Hz, PF, Var, with time stamp.
- K factor V & A to keep check on the losses due to harmonic load current and their effects of transformer heating.
- Load Manager with Demand monitoring and RTC based demand manager.
- Export/Import Net monitoring of Wh, VAH, VArh, inductive/capacitive load hours.
- Auto Scaling Capability in variance of Kilo, Mega, Giga.
- Positive energy accumulation even with CT polarity reversal with reverse lock programmable.
- Byte order option-Field Programmable float/Little Endian/Big Endian data formats.

7.2.5.1 General Requirements:

- CT polarity correction should be possible through Energy Meter for each phase.
- Import/ Export measurement for KWH/ KVARH is required.
- The current inputs shall be configurable at site for measuring x/5/1 A current transformers
- The meters shall be suitable for operation with AC auxiliary power and shall have wide tolerance band of 70V to 300V, 40-70Hz

60 amps. All phase shall be provided with current transformers of suitable VA burden with 5/ 1 amps secondary for operation of associated metering. The CTs shall confirm to relevant Indian Standards. The design and construction shall be dry type, epoxy resin cast robust to withstand thermal and dynamic stresses during short circuits. Secondary terminals of CTs shall be brought out suitable to a terminal block which shall be easily accessible for testing and terminal connections. The protection CTs shall be of accuracy class 5P10 and measurement CTs shall be of accuracy class as per SLD.

7.2.7 Residual Current Circuit Breaker (RCCB):

7.2.7.1 System of Operation:

Residual Current Circuit Breaker shall confirm to IEC 61008.RCCB shall work on the principle of core balance transformer. The incoming shall pass through the torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. RCCB shall be current operated independent of the line voltage; current sensitivity shall be of 30 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.
RCCBs should have a rated conditional short-circuit current of 10 kA.

7.2.7.2 Mechanical Operation:

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

7.2.7.3 Neutral Advance Feature:

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact first before the phases; and at the time of opening, the neutral shall breaks last after allowing the phases to open first. This is an important safety feature, which is also required by regulations.

7.2.7.4 Testing Provision:

A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB / RCCB.

7.2.7.5 Switchgear & Protection:

Busbars shall be suitably colour coded and must be mounted on appropriate insulator supports. Power cables used shall have superior mechanical, electrical and thermal properties, and shall have the capability to continuously operate at very high temperatures up to 125 degC.

Internal wiring between main bus-bars, breaker, contactor and capacitors shall be made with 1100 V grade, PVC insulated, copper conductor cable of appropriate size, by using suitable copper crimping terminal ends etc.

Suitable bus links for input supply cable termination shall be provided.

7.2.7.6 Control Circuit & General Protection:

The control circuit shall be duly protected by using suitable rating MCB.

An emergency stop push button shall be provided to trip the entire system (22.5 mm dia, mushroom type, press to stop and turn to reset).

Wiring of the control circuit shall be done by using 1.5 sq.mm, 1100 V grade, PVC insulated, multi-stranded copper control wire.

Inspection terminal strip, number ferruling, labeling etc. shall be provided.

440 V caution board on the panel shall be provided.

8 LIGHT FIXTURES AND FAN

Note: - All the components, materials, accessories of Light Fixtures shall be supplied & designed as per -30o C ambient temperature and 3525 meters MSL. If the specification of items will increase as per the altitude above, the feasible specification shall be followed without cost increase.

The contractor shall submit LM 79 report of the LED Luminaries& LM 80 report from LED manufacture before fixture supplied at site. Driver of the LED fitting should by Potted. The make of LED used shall be Osram/Cree/Nichia/Philips/Lumiled.

All lighting fixtures shall comply the following specifications to meet out the requirement according to relevant CPWD specification/IS code/NBC-2016/ECBC-2017 whichever is high.

- Lumens >certain value as specified in drawings
- Efficacy >100 for indoor lighting fixtures and >120 for highway and outdoor luminaries.
- CRI >80 for indoor lighting and 70 for external lighting
- Power Factor >0.95

9 EARTHING

This chapter covers the essential requirements of earthing system components and their installation. For details not covered in these specifications IS Code of Practice on Earthing (IS: 3043-1987) shall be referred to.

9.1 Application:

a) The electrical distribution system in the Department is with earthed neutral (i.e. neutral earthed at the transformer/generator end). In addition to the neutral earthing, provision is made of earthing the metallic body of equipment and non-current carrying metallic components in the sub-station as well as in the internal/external electrical installations.

b) Earthing system is also required for lightning protection, computer installations and hospital operation theaters etc. for functional reasons.

c) Earthing requirements are laid done in Indian Electricity Rules, 1956, as amended from time to time and in the Regulations of the Electricity Supply Authority concerned. These shall be complied with.

d) Application for Internal E.I:

(i) The Every sub-main will have earth continuity conductor to run along with sub-main wiring. In case of 3-phase sub-main wiring two earth continuity conductors shall be provided.
(ii) Every circuit will have its earth continuity conductor to run along with circuit wiring. N case of 3-phase circuit two earth continuity conductors shall be provided.
(iii) Looping of earth is allowed only in case of point wiring.
(iv) When 2/3 power outlets are looped to one circuit, earth looping of these outlets is permissible.

9.2 Types of Electrodes & Material:

9.2.1 Earth Electrodes:

The type of earth electrode shall be any of the following as specified: Plate Earth Electrode

9.2.2 Electrodes Materials and dimensions:

a) Pipe electrodes shall be cut tapered at the bottom and provided with holes of 12mm dia, drilled not less than 7.5 cm from each other upto 2m of length from the bottom.

b) The length of the buried strip or conductor earth electrode shall be not less than 15m. This length shall suitably be increased if necessary, on the basis of the information

9.2.3 Earthing Conductor & Sizes:

a) The earthing conductor (protective conductor from earth electrode up to the main earthing terminal/earth bus as the case may be) shall be of the same material as the electrode viz. GI or copper and in the form of wire or strip as specified.

b) The size of earthing conductor shall be as specified in Drawing/ SLD/ BOQ but this shall not be less than the following:

(i) 4mm dia (8SWG) copper wire.
(ii) 8SWG GI wire
(iii) 25mm x 3mm in case of GI strip
(iv) 20mm x 3mm in case of Cu Strip

c) Earthing conductor larger than the following sectional areas need not be used unless otherwise specified:

(i) 150 sq. mm in case of GI
(ii) 100 sq. mm in case of Cu

d) The sizes and cross sections of conductors shall be followed as per table below:

S.No.	Type of Electrode	Material	Size
1	Plate	GI	600mm x 600mm x 6mm thick
		Copper	600mm x 600mm x 3mm thick

Note: Galvanized of GI items shall conform to Class – IV of IS: 4736-1986.

9.2.4 Earth Continuity/ Loop Earthing Conductor & Sizes:

The material and size of protective conductors shall be as per below table or as specified in Drawing/ SLD/ BOQ whichever higher:

S.No.	Size of Phase Conductor	Size of Earth Conductor
1	Upto 6 sqmm	6 sqmm
2	Above 6 sqmm upto 16 sqmm	6 sqmm
3	Above 16 sqmm	Half of the phase conductor

9.2.5 Location for Earth Electrodes:

b) The location of the earth electrode will be such that the soil has a reasonable chance of remaining moist as far as possible. Entrances, pavements and roadways should be avoided for locating earth electrodes.

9.3 Installation:

9.3.1 Electrodes:

a) Artificial Treatment of Soil:

(i) When artificial treatment of soil is to be resorted to, the same shall be specified in the schedule of work. The electrode shall be surrounded by charcoal/coke and salt.

b) Watering Arrangement:

(i) In the case of plate earth electrodes, a watering pipe 20mm dia. Medium class pipe shall be provided and attached to the electrodes. A funnel with mesh shall be provided on the top of this pipe for watering the earth.

(ii) In the case of pipe electrodes, a 40mm x 20mm reducer shall be used for fixing the funnel with mesh.

(iii) The watering funnel attachment shall be housed in a masonry enclosure of the size not less than 30cm x 30cm x 30cm.

(iv) A cast iron/MS from with MS cover, 6mm thick and having locking arrangement shall be suitably embedded in the masonry enclosure.

9.3.2 Earthing Conductor (Main Earthing Lead):

a) In the case of plate earth electrode, the earthing conductor shall be securely terminated on to the plate with two bolts, nuts, check nuts and washers.

b) In the case of pipe earth electrode, wire type earthing conductor shall be secured using a through bolt, nuts and washers and terminating socket.

c) A double C-clamp arrangement shall be provided for terminating tape type earthing conductor with GI watering pipe coupled to the pipe earth electrode. Galvanized “C” shaped strips, bolts, washers, nuts and check nuts of adequate size shall be used for the purpose.

d) The earthing conductor from the electrode up to the building shall be protected from mechanical injury by a medium class, 15mm dia. GI pipe in the case of wire and by 40mm dia, medium class GI pipe in the case of strip. The protection pipe in ground shall be buried at least 30cm deep (to be increased to 60cm in case of road crossing and pavements). The portion within the building shall be recessed in walls and floors to adequate depth in due co-ordination with the building work.

e) The earthing conductor shall be securely connected at the other end to the earth

In the case of substations or alternators, the termination shall be made on the earthing terminal of the neutral point on the equipment and/or the earth bus, as the case may be.

9.3.3 Loop Earthing/ Earth Continuity Conductor:

a) Earth terminal of every switchboard in the distribution system shall be bonded to the earth bar/ terminal of the upstream switch board by protective conductors.

b) Two protective conductors shall be provided for a switchboard carrying a 3-phase switchgear thereon.

c) Loop earthing of individual units will not be however necessary in the case of cubicle type switchboards.

d) The earth connector in every distribution board (DB) shall be securely connected to the earth stud/earth bar of the corresponding switch board by a protective conductor.

e) The earth pin of socket outlets as well as metallic body of fan regulators shall be connected to the earth stud in switch boxes by protected conductor. Where the switch boxes by protective conductor. Where the switch boxes are of non-metallic type, these shall be looped at the socket earth terminals or at an independent screwed connector inside the switch box. Twisted earth connections shall not be accepted in any case.

9.3.4 Prohibited Connection:

Neutral conductor, sprinkler pipes, or pipes conveying gas, water, or inflammable liquid, structural steel work, metallic enclosures, metallic conduits and lighting protection system conductors shall not be used as a earthing conductor.

9.4 Earth Resistance:

a) The earth resistance at each electrode shall be measured. No earth electrode shall have a greater ohmic resistance than 5 ohms as measured by an approve earth testing apparatus. In rocky soil the resistance may be up to 8 ohms.

b) Where the above stated earth resistance is not achieved, necessary improvement shall be made by additional provisions, such as additional electrode (s), different type of electrode or artificial chemical treatment of soil etc. as may be directed by the Engineer-in-Charge.

9.5 Marking:

a) Earth bars/ Terminals at all switch boards shall be marked permanently, either as “E” or as specified in Drawing/ SLD/ BOQ.

commissioning of 11kV THREE HT PANEL BOARD (OUTDOOR TYPE) SF6 VCB Panel.

10.1 Reference Codes and Standard:

The design of the switchgear shall be exclusive and specific responsibility of supplier and shall comply with current good engineering practice, the relevant codes and recommendation, the project specific requirement.
The electrical switchgear and the relevant equipment shall be designed, manufactured and tested according to the latest version of standards as listed below:

IEC 62271-1	Common Specifications for Switchgear & Control gear
IS 13118:1991 / IEC 62271-100	Vacuum Circuit Breakers
IS 3427 / 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 Code herein referred
IEC 60129	Alternating current Disconnector (isolators)
IS 2705	Current transformers
IS 3156	Voltage transformers
IEC 60255	Electrical relays
IEC 60529	Classification of degrees of protection provided by enclosures

10.2 Rating:

All panels assembled to form a board shall be suitable for the nominal operation voltage and rupturing capacity as specified and suitable for operation on 11kV 3Phase 50Hz system.

10.3 Material:

a) The HV Panel Board shall be made of CRCA sheet steel.
b) The HV panel shall be floor mounting and free standing type.
c) The sheet thickness shall be of 2mm and gland plate shall be 3mm thick or as mentioned BOQ.

10.4 General Construction Features:

a) Separately door earthed compartments shall be provided for circuit breakers, bus bars, relay & instruments, CT&PT and cable boxes, fully and effectively segregating these from one another so that fault in any one compartment do not cause damage to equipment(s) in other compartment(s).

b) The observation window on the Circuit Breaker compartment door shall be made of

d) Each HV compartment should have individual exhaust channel/ pressure relief flaps to let out over-pressurized hot gases at the top of the switch board in case of an internal fault.

e) Suitable factory fitted arc duct arrangement shall be provided for vending out the arc out of the switchgear room.

f) Front access doors with single action operator will be provided to the HV circuit breaker compartment.

g) The housing shall be of bolted construction to ensure compact and rigid structure, presenting a neat and pleasing appearance.

h) The Degree of enclosure protection shall be IP-4X for Indoor and IP-5X for outdoor.

i) The panels shall be bolted together to form a continuous flush front switch gear suitable for front operation of board and for extension at both ends.

10.5 General Design Aspects:

The HV panel board shall be designed such that the switchgear, instruments, relays, bus bars, small wiring etc. are arranged and mounted with due consideration for the following:

a) Facility for inspection, maintenance and repairs of testing terminals and terminal boards for ease of external connection.
b) Minimum noise and vibrations.
c) Risk of accidental short circuits and open circuits.
d) Secured and vibration proof connections for power and control circuits.
e) Risk of accidental contact and danger to personnel due to live connections.
f) Mountings at approachable height min. 300mm max. 1800mm from finish floor level.

10.6 Circuit Breaker:

10.6.1 General Arrangement:

The circuit breaker panels shall be complete with the following:

a) Racking in/ racking out mechanism.
b) Isolating plugs and sockets.
c) Mechanical On/Off indicator.
d) Minimum of 4NO and 4NC auxiliary contacts directly operated by the circuit breaker. Additional NO & NC contacts can be provided with auxiliary contractors.
e) Anti- condensation space heaters suitable for operation on 240V 1Phase 50Hz AC for each panel wherever specified.
f) Suitable tripping arrangement.

The circuit breaker shall be of horizontal/ vertical isolation, horizontal draw out pattern.

10.6.2.1 Breaker Truck:

a) The breaker carriage shall be fabricated from steel, providing a sturdy vehicle for the circuit breaker and its operating and tripping mechanism.
b) The carriage shall be mounted on wheels, moving on guides, designed to align correctly and allow easy movement of the circuit breaker and for removing the carriage for inspection and maintenance purpose.
c) Vacuum interrupters shall be hermetically sealed and shall be designed for minimum contact erosion, fast recoveries of dielectric strength, maintenance free vacuum interrupter, suitable for auto-reclosing.
d) The drive mechanism shall preferably be provided with facility for pad locking at any position namely, “Service”, “Test” and “Fully Isolated”.
e) It should be possible for testing the circuit breaker for its operation without energizing the power circuit in the “Testing” position.
f) The contacts shall be made only after the breaker is inserted into service position.
g) Interlocking should prevent contacts from being disconnected if circuit breaker is tried to be moved from service position.

10.6.2.2 General Features:

Single break contacts are provided in sealed vacuum interrupter.

10.6.2.3 Rating:

The circuit breakers shall be continuously rated as specified with a minimum rated current as specified in BOQ with voltage rating and breaking capacity as specified.

10.6.2.4 Operating Mechanism:

The operating mechanism shall be one of the following as specified:

a) Manually operated spring charged

b) Motor wound spring charged with both mechanical and electrical release for closing.

The operating mechanism shall be trip free.

10.6.2.5 Auxiliary Supply:

External Auxiliary supply shall be made available for charging motors and heaters operation.

10.6.3 Bus bar Section:

10.6.3.2 Material:

The bus bars shall be of high conductivity electrolytic copper rated as specified in SLD and BOQ whichever higher.
The bus bars shall be sized for carrying the rated and short circuit current without over-heating.
Maximum bus bar temperature shall not exceed 95 degree C.
The switchgear and control gear shall be suitable for continuous operation under the basic service conditions indicated below or as per site conditions whichever high:

S.No.	Conditions	Specification
1.	Ambient Temperature	(-5) to (50) Deg C
2.	Relative Humidity	Up to 95%
3.	Altitude of Installation	Up to 1000m above MSL

10.6.4 Circuit Breaker Compartment:

Comprising the with-drawable Vacuum Circuit breaker for 12kV voltage level and all accessories required for its operation. To ensure the integrity of the arc fault containment requirement, the operations must be carried out with the switchgear doors closed i.e. circuit breaker for opening and closing, racking of circuit breaker (or withdraw-able voltage transformer) between service and test position.

Circuit breaker compartment door must be pad lockable.

Access between the circuit breaker (or withdraw-able voltage transformer) and bus bar/ cable compartments shall be made through epoxy encapsulated spout bushings of uniform shape and dimension. Spouts are covered by automatic metal shutters, covering all three phases unless the circuit breaker is in service position.

10.6.4.1 Circuit Breakers:

a) Circuit breaker shall be withdraw-able Vacuum type of floor rolling design. The complete assembly of interrupters, contact pressure springs and HV terminals (top and bottom) shall be type tested for compatibility of design.
b) Vacuum interrupters sourced from China shall not be acceptable even if it is from manufacturer of the CB.
c) The circuit breaker shall be suitable for E2, M2 & C2 (Single Capacitor Bank) class duty. The offered circuit breaker should have valid type tests to support the afore-mentioned duty cycle.
d) The circuit breaker shall be isolated by horizontal racking and positively fixing the unit into any one of the following positions:

g) Withdrawn Position: Main circuits and auxiliary circuits disconnected. Circuit breaker is removed out of the cubicle.
h) Locking of circuit breaker compartment door shall be possible by means of padlocking.
i) A position indicator switch or viewing window must be provided for visual indication of the circuit breaker position.
j) The circuit breaker control auxiliaries shall be of the plug and socket type.
k) The circuit breaker truck shall ensure earthing in both connected and disconnected positions.
l) An electro mechanical device shall be provided to ensure the auxiliary circuit have been securely connected between the fixed and moving portions of the switchgear, before allowing closing operation of the circuit breaker. The voltage rating of the device shall be same as the voltage used for the closing circuit.
m) Tripping and/ or release coils shall be continuous rated to ensure longer life.
n) The switchgear shall be provided with facilities for full operation from a remote point.
o) Circuit breakers shall be equipped with a motor wound spring stored energy operating mechanism with opening and closing operations independent of the operator, electric close and trip releases, manual on/ off buttons and manual spring charging facilities.
p) It shall be possible to manually charge the circuit breaker operating spring in case of auxiliary supply failure.
q) Mechanical indication of the spring charged condition shall be provided.
r) Circuit breakers shall be provided with a mechanically operated visual indicating device to display the circuit breaker switching state and a mechanical operation counter.
s) The circuit breaker operations of closing and opening shall be possible with the circuit breaker compartment door closed.
t) It shall be possible to trip the circuit breaker locally by mechanical means.
u) Circuit breakers will be provided with at least one spare normally open and one spare normally closed contact, even wired out to terminals for the connection of external wiring.
v) Circuit breakers shall be mechanical latching and electrical and mechanical tripping. The operating mechanism shall be trip-free and shall include an anti-pumping device.

10.6.5 Shutters:

a) Circuit breaker compartment should have automatic shutters, which shall be opened and closed by the mechanical drive of the circuit breaker.

b) The bus bar and circuit spout covers shall be operated independently of each other.

c) Padlock facilities can be provided on the metal shutters.

10.6.6 Current Transformer:

10.6.6.1 General Requirement:

Accommodation shall be provide in the circuit breaker panel to mount one set of three

10.6.6.2 Rating:

a) Dual core & dual ratio CTs of suitable burden (but not less than 15 VA) shall be preferred with 1 Amps secondary. CT ratio shall be compatible with the loading pattern on HV side.
b) The CTs shall confirm to relevant Indian Standards. The design and construction shall be robust to withstand thermal and dynamic stresses during short circuit. Secondary terminals of CTs shall be brought out suitably to a terminal block which will be easily accessible for testing and terminal connections. The protection CTs shall be of accuracy class 5P10 of IS 2705- Part III 1992.
c) The metering CTs shall conform to the metering ratio and accuracy class 0.5 for 11kV panel and class 0.2 for 33kV panel of IS 2705-1992.

10.6.7 Voltage Transformer:

10.6.7.1 General Requirement:

A voltage transformer of burden not less than 100VA and of proper ratio as per total system requirement. All voltage transformers shall comply with IS 3156.

The accuracy class for the VT shall be class 0.5 for 11kV and 0.2 for 33kV as per IS 3156 Parts I to III.

The transformer shall be of cast epoxy resin construction. It shall be fixed/ withdraw-able type. Control SP HRC fuses/ MCBs shall be provided on both HV and LV sides.

10.6.7.2 Protection and Tripping Arrangement:

Protection:

a) The relays shall be microprocessor based numerical relays with O/L, E/F and S/C protection. Tripping relay shall be used for tripping signal to the shunt trip coil of circuit breaker operating on 24V/ 30V DC supply/ Power Pack/ 110 Volt VT supply.

b) Alternatively, Power Pack converters fed could be provided. In cases where tripping is fed through PT, VA burden of PT shall be suitably increased depending upon the number of panels and connected controls/ Load etc.

c) 12V/ 24V/ 48V DC output shall be provided through power pack capacity as per system requirement for both protection as well as indications.

Input	:	90-130V
Battery	:	7 AH/ 18 AH/ 22 AH SMF type
Indicator	:	Mains on charger ON fails & DC ON

flush mounting design. The relay should be designed for selective protection of feeders in utility and industrial power systems in primary as well as secondary distribution network.

b) The offered relay shall have minimum 5 fault records and 100 event records with date and time stamp. It should have an universal auxiliary supply.

c) The relay shall be communicable on standard Modbus open protocol with at least one communication port. The relay shall offer multi-level password protection to guard against unauthorized access.

d) The relay should have a 2 x 16 character LCD display and support on-line current measurement and display in primary values. The relay should have 3 dedicated LEDs for ready, start & trip and 3 separate LEDs for fault indications.

e) Inrush protection should be a built in feature for stability during transformer energizing. Offered relay should also have built in trip circuit supervision feature.

f) Relay should have minimum of 4 nos of galvanically isolated and freely configurable binary inputs. It should also have 6 nos of binary outputs, out of which a minimum of 2 nos should be of sufficient rating to trip the circuit breaker.

g) Relay should offer 51, 51N, 50-1, 50-2 & 50N.

Control Wiring:

Control wiring shall be carried out with 1100V grade FRLS PVC insulated copper flexible wire and following colour standard.

S.No.	Control Circuits	Size and Colour
1.	AC Voltage Circuit	2.5Sqmm Red, Yellow, Blue and Black
2.	Current Circuit	2.5Sqmm Red, Yellow, Blue and Black
3.	AC Current Circuit	
i.	Phase	2.5Sqmm Red
ii.	Neutral	2.5Sqmm Black
4.	DC Voltage Circuit	
i.	(+)	2.5Sqmm Red
ii.	(-)	2.5Sqmm Black
5.	Grounding	2.5Sqmm Green

Note: The wiring shall be securely fixed and neatly arranged to enable easy tracing of wires. Identification tags shall be fitted at both ends to all power and control wire terminals to render identification easy and to facilitate checking in accordance with IS 375. Necessary terminal blocks and cable entries shall be provided for RTD relay wiring, power

The digital meters shall conform in all respects to international standards –IEC 62305-21-22 or the relevant Indian Standards, RoHS compliance with latest amendments thereof. MFM shall be provided in all incomers and outgoings as shown in SLD/ BOQ, having following characteristics:

a) Bright LED display with more than 25 Parameters: VLL, VLN, A, Hz, W, PF, VA, Wh.
b) Load hours, run hours, old Wh, Old load hour.
c) Auto scaling capability in variance of kilo, Mega, Giga.
d) High accuracy with class 0.5 for 11kV/ Class 0.2 for 33kV.
e) Positive energy accumulation even with CT polarity reversal with reversal with reverse lock programmable.
f) Password protection for tamer proofing.
g) Site selectable CT/ PT ration.
h) Site selectable CT secondary 1A/ 5A.
i) Input Voltage- 80-300V AC/ DC, 40-70Hz.
j) Seamless integration into any Modbus compatible SCADA Energy Management System (EMS).

10.6.9 Voltage Selection Scheme:

Where a bus coupler is incorporated and only one incomer feeder (out of two available) is intended to be operated at a time, a VT Transfer Relay shall be incorporated to provide necessary potential for metering. This will be necessary when energy metering is done on individual feeders or where VT supply is used for trip circuits. Alternatively PTs shall be provided on both the bus sections (incomers) with individual metering on each incomer.

10.6.10 Instrument Panels:

The instrument panel shall form part of the housing. They shall be preferably of flush mounting type at a maximum height of 1800mm.

Instrumentation:

The panel assembly shall also take care of the following requirements:

a) Lamp indication shall be provided to indicate ON/ OFF (by red green respectively) of switch gear.
b) Panel illumination lamp.
c) Mechanical indicating lamp for spring charged status.
d) Lamp indicating tripping at fault status.
e) Healthy trip supply shall be indicated by clear lamp.
f) Separate fuses/ MCBs shall be provided for lamps, heaters, voltmeters and other instrumentation etc. on each panel.

10.6.11 Cable Boxes:

Cable boxes shall be situated in a compartment at the rear/ side of the housing as specified.

10.6.12 Cable Entry:

Provision for top (bus ducts preferred for top entry only)/ bottom or such other side entry shall be made as per requirement with sufficient head room for cable termination.

10.6.13 Earthing:

The earthing of the breaker body and moving portion shall be so arranged that the earthing of the non-current carrying structure to the frame earth bar is completed well before the main circuit breaker plugs enter the fixed house sockets.

The entire panel board shall have a common tinned copper earth bar of suitable section with 2 earth terminals for effectively earthing metallic portion of the panels. The frame earthing of panel shall be provided 50x6mm hot dipped GI strip.

10.6.14 Installation:

The installation work shall cover assembly of panels lining up, grouting the units etc. In the case of multi panels switch boards after connecting up the bus bar all joint shall be insulated with HV insulation tape or with approved insulation compound.
Where trip supply battery is installed the unit shall be commissioned, completing initial charging of batteries. All relay instruments and meters shall be mounted and connected with appropriate wiring. Calibration checks of units as necessary and required by the licensee like CTs, VTs Energy Meters etc. shall be completed before pre-commission checks are undertaken.

10.6.15 Testing and Commissioning:

Procedure for testing and commissioning of relay shall be in general accordance with good practice.
Commissioning checks and tests shall include in addition to checking of all small wiring connections, relays calibration and setting tests by secondary injection method and primary injection method. Primary injection test will be preferred for operation of relay through CTs.
Before panel board is commissioned, provision for the safety namely fire extinguishers, rubber mats and danger board shall be ensured. In addition all routine megger tests shall be performed. Checks and test shall include following:

a) Operation checks and lubrication of all moving parts.

conducted using 500V megger.

g) Any other tests as may be required by the Licensee/ Inspector shall be conducted.
h) Where specified, the entire switch board shall withstand high voltage test after installation.
i) Any other test required by the consignee/ inspecting officer.
j) Withstand voltage at power frequency and on auxiliary circuits.
k) Visual inspection, operation of functional locks, interlocks, signaling devices and auxiliary devices.
l) Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism.
m) Measurement of the resistance of the main circuit.

10.6.16 Quality Control:

The bidder shall submit with the offer, assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and after finishing, bought out items and fully assembled component and equipment including drives. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's or its nominated representative engineer shall have free access to the manufacturer/sub-supplier's works to carry out inspections.

10.6.17 Testing Facilities:

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

10.6.17.1 Manufacturing Activities:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage with quantity. This bar chart shall be in line with the Quality Assurance Plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

10.6.17.2 Drawings & Documents:

Following drawings and documents shall be prepared based on PURCHASER specifications and statutory requirements and shall be submitted with the bid:

a) Completely filled in Technical Particulars
b) General description of the equipment and all components including brochures.
c) Power flow diagram
d) Foundation plan
e) Bill of material
f) Experience List
g) Type test certificates

Sets, their testing and/or inspection as may be necessary before their dispatch from their respective works, their delivery at site, all preparatory works, assembling, installation and adjustments, commissioning, final testing, putting into operation and handing over of the complete system.

For Detailed Specification of D.G. Set of Electrical works (Based on DSR 2018) mentioned in SOQ shall be as per CPWD General specification for electrical works Part VII (D.G SET) 2013. (corrected up to the last date of submission/uploading of bid).

FINISHES MATRIX

The indicative Finishes Matrix for shopping complex building shall be as follows:

1. Passages/Staircase/ Terrace DiningArea Flooring:-

With18 mm thick gang saw cut, mirror polished, pre-moulded and pre- polished, machine cut Granite of required size, laid in approved pattern,approved shade, colour , and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels.

2. Central Atrium Flooring at Ground Floor:-

38mm thick wood block flooring of **first class teak wood**in approved pattern laid over 25mm thick levelling layer of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 10mm nominal size) , with a thin layer of hot bitumen (blown type) @ 2.45 kg per sqm, including fixing blocks in position after dipping in hot bitumen (blown type) upto half depth, planed, levelled smooth and finished complete. The flooring shall be polished with suitable polish which can withstand wear and tear due to footfall.

3. Retail Shops Flooring:-

Providing and laying Double charged Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS: 15622, of approved brand and manufacturer, in all colours and shades, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS: 15477, in average 6 mm thickness, including grouting of joints
Size of tile 600x600 mm. Skirting shall be of 100 mm height with similar tile as that of floor.

The flooring in the electrical panel room shall be with 52 mm thick cement concrete flooring with top 12 mm provided with hardener. Skirting shall with cement plaster of 100 mm height.

4. Toilets:-

a. Toilet Floor: - Anti skid Ceramic Tiles flooring

b. Toilet Walls: - Ceramic Tile dado upto lintel level in toilet walls,

c. False ceiling: - Calcium silicate false ceiling.

5. Terrace and Pantry flooring: - 600 mm platform with Granite slab along with a kitchen sink Flooring shall be with pre-polished granite slab. Ceramic tile wall dado upto 600 mm

6. Around the building: The flooring around the building within the boundary wall shall be with 25 mm thick pre-cast cement concrete tiles of approved design and pattern laid over 20 mm cement mortar base.PCC of 150 mm thick shall be laid below the flooring.

7. Walls:-

AAC blocks as per thickness mentioned in drawings along with 12mm cement plaster for internal surfaces and 18mm mm cement plaster in two coats for exterior surfaces.

a. Exterior wall Finishing with premium acrylic smooth exterior paint with silicone additives of required shade on New work (two or more coats applied @ 1.43 liter/10sqm over and including priming coat of water exterior paint applied @ 2.20kg/10sqm) over cement based wall putty.

b. Interior Wall finishing with Finishing with Deluxe multi surface paint system for interiors and exteriors using primer as per manufacturers' specifications: Two or more coats applied @ 1.25 liter/10sqm over and including one coat of special primer applied @ 0.75liter /10sqm over cement based wall putty.

8. Ceiling finishes:-

a. All ceilings shall be plastered with 6 mm thick cement plaster 1:4 .Providing and applying Plaster of Paris putty of 2mm thickness over plastered surface to prepare the surface even and smooth complete and shall be painted with two or more coats of acrylic distemper over a coat of primer (Wherever false ceiling is not mentioned).

b. All passages in all floors shall be provided with false ceiling with wood as per approved design and pattern. The double height ceiling of atrium shall be provided with decorative wooden false ceiling. All toilets shall be provided with calcium silicate false ceiling.

9. Doors and Windows:-

a. Rooms(Toilet main door, Electrical room, Pantry,DG ,mumty etc)

i. Frames: All frames of doors shall be with well seasoned ,defect-free Second class kail wood(minimum 100x75 mm cross section of wood) finished with approved polish/varnish in required shade.

ii. Shutters:All door shutters shall be of 35 mm thick made of first class kail wood with panels made of of 12 mm thick kail wood planks and the shutters finished with polish/varnish of approved shade .The doors shall be provided with required hardware of SS 304 grade along with mortice lever lock and handles with locking arrangement

b. **WC:**The doors of the WC in toilets shall be PVC as per CPWD specification. The

Providing and fixing of 12 mm toughened glass door/fixed partition using patch fittings such as top, bottom patch, floor spring, connectors, lock patch ,300 mm long H-handle, small/big L patch, over panel patch etc of make Ozone/Geze/Stanum as per drawings, joints sealed with transparent weather proof silicone complete in all respects as approved by Engineer-in-Charge. All shops shall be provided with rolling shutters with full depth grill such that the entire interiors of the shops are visible even if the shop is closed. The dome of the rolling shutter shall be concealed in with appropriated wooden box .

d. <u>Elevation Windows</u>

The glazed windows of elevation shall have wooden frame made of Kail wood of minimum cross section 100x75 mm . The glazing in the window shall be with Double Glazed Unites (DGU) comprising 6 mm thick clear toughened glass+10 mm air gap+6 mm thick clear toughened glass). The wooden frame shall be finished with polish/varnish to required shade.

10. Staircase Railing :-

Providing and fixing of wooden railing with 2nd class Kail wood consisting of balustrades of 75 mm dia (in approved design) and handrail of 100 x 100 mm size moulded on edges including the application of special polish to give desired finishing .The railing shall be embedded in steps using 8 mm solid MS rod at bottom up to full height of balustrade and at least 100 mm embedded rigidly in to floor/slab and anchored with fasteners etc complete in all aspects as per drawing and as per directions of Engineer-in-Charge.

11. Passage Railing :-

Providing and fixing of designer wooden railing in 2nd class kail wood consisting of top(carved to required shape) and bottom horizontal rails of 100x100 mm with vertical member of size 100x100 mm carved to required design at the interval of 1000 mm centre to centre and machine cut mesh of 2nd class kail wood battens (battens minimum size 30x40 mm)as per approved drawing and design fitted with suitable MS screws, fasteners etc as required. (Ref image enclosed). The railing shall be provided with polish/varnish to required shade.

12. <u>False Ceiling in corridors:-</u>

Providing and fixing 20mm thick wooden planks ceiling with frame work for base with M.S. screws in Budloo/fir wood on framework as per specification and finished with polish/varnish to required shade.

13. <u>Re-retractable Ceiling at terrace:-</u>

Providing , fabrication and fixing of motorized re-retractable roofing consisting of 10mm

reversible break motors , allied gear boxes, electric panel with changeover, limit switches, wiring and all incidental items required to complete the job in all respects. The whole MS structure including plates to be epoxy painted with minimum 50 micron coating. The work is to be carried out as per directions of Engineer-in-Charge. The Contractor shall submit shop drawing of fabrication of work for approval of Engineer-in-charge before procurement.

14. The wet cladding to lift wall in all floors shall be with 18 mm thick polished granite slab (from floor level upto ceiling) in approved design and pattern.(Ref. Art work tender drawing for reference)

15. **Front elevation:Ladakhi Traditional wooden Pentsag /Shingstag at Lintel level and in bay window in elevation**:-
The elevation of the building is specially designed to to achieve Ladakhi Architectural style and to gel with adjacent Leh Palace. The scope of contractor includes realizing all elements indicated in the front elevation of tender drawings . Providing and fixing of traditional Ladakhi Pentsag and double sided Shingstag of height 600 mm in poplar bar/willow wood as per drawing complete in all respects including application of durable polish/varnish, cement concrete coping , fasteners etc as per directions of Engineer- in-charge. The details mentioned here are indicative and the contractor scope includes complete job of all elements included in front elevation.

16. The scope of the contractor includes complete artistic features to the beams and columns along the passage railings in all floors including painiting with vibrant shade paints as approved to achieve local ladakhi flavor. Further, the scope also includes artistic painting on the wall in the central courtyard in ground floor(atrium) as per approved design .

17. Underground fire and domestic water tank : RCC tank as per approved drawings

18. Boundary wall: The boundary wall on all sides of the plot shall be as per approved design comprising 300 mm thick masonry wall made of PCC blocks and MS grill above the wall of approved design. MS sliding gate of clear opening of 6.00 m (in one or two leaves) shall be provided duly painted with two or more coats of synthetic enamel paint of approved shade.

Note:

1. The details furnished above are indicative only and the contractor should thoroughly go

SAMPLEGUARANTEEBOND

Thisagreementmadethis..........dayof...........twothousand..............................between M/s...(here-inaftercalledtheGuarantoroftheonepart)andthe **Executive Director(P), National Highways and Infrastructure Development Corporation Limited, Regional Office, Ladakh** here-inaftercalledtheGovernmentoftheotherpart).

Whereasthisagreementissupplementarytothecontract(here-inaftercalledtheContract)dated ....madebetweentheGuarantoroftheonepartandGovernmentoftheotherpart,where-bythe Contractor, inter alia, undertook to render the buildings and structures in the said Contract recited, completely .... *[write item of guarantee like termite-proof/ waterandleak-proof.]*

AndwhereastheGuarantoragreedtogiveaguaranteetotheeffectthatthesaidstructurewillremain termite-proof/water-proof for **ten(10)years** to be reckoned from the date after the defect liability period prescribed in the contractexpires.

During this period of guarantee the Guarantor shall make good all defects and for that matter, shall replace at his risk and cost .... *[write the component : such as such wooden members as may be damaged by termites,]* and in case of any other defect being found he shall render the building .... *[write the component : such termite-proof]* at his cost to the satisfaction of the Engineer-in-charge, and shall commence the works of such rectification within seven days from date of issuing notice from the Engineer-in-charge calling upon him to rectify the defects, failing which the work shallbegotdonebythe NHIDCL bysomeotherContractorattheGuarantor'scostandrisk,andinthe later case the decision of the Engineer-in-charge as to the cost recoverable form the Guarantor shall be finalandbinding.

ThatiftheGuarantorfailstoexecutethe .... *[write the component : such anti-termitetreatment] waterproofing*orcommitsbreacheshere-underthen the Guarantor will indemnify NHIDCL/Employer and his successors against all loss, damage, cost, expense or otherwisewhichmaybeincurredbyhimbyreasonofanydefaultonthepartoftheGuarantorinperformance and observance of this supplemental agreement. As to the amount of loss and/or damage and/or cost incurredbytheNHIDCL/Employer,thedecisionoftheEngineer-in-chargewillbefinalandbindingontheparties.

Inwitnesswhere-ofthesepresentshavebeenexecutedbytheObligor..................andby................................forandonbehalfofthe NHIDCL ontheday,monthandyearfirstabove written.

Signed,sealedanddeliveredby**OBLIGOR**inthepresenceof–

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Signedforandonbehalfof**NHIDCL** by..............................inthepresenceof.

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Volume - II

Bill of Quantities

EPC CONTRACT

Tender Inviting Authority: Executive Director (P),National Highways & Infrastructure Development Corporation Limited , RO-Ladakh

Name of Work: Construction of shopping complex building near Polo ground,Leh in UT of Ladakh

RFP No: 09/RO-Ladakh/2021-22

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

Sl. No.	Item Description	Quantity	Units	Estimated Rate excluding GST in Rs. P	TotalBid Amount excluding GST in Rs. P	Total Bid Amount excluding GST In Words
1	Construction of shopping complex building near Polo ground,Leh in UT of Ladakhincluding all types of Civil work, Architectural work, Interiors work,Electrical work, PHE works, Fire Fighting work etc. complete in all respects as per the scope of work,tender drawings, finishes matrix, Schedule of Quantities, special conditions of contract and as per the approved design, drawings and specifications complete work.	1	Nos	4,54,66,000		INR ---------- ---- Only
Total in Figures						
Quoted Rate in Figures			**Selec**			