

Indian Institute of Technology Mandi

Name of work : Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings, providing power supply to proposed buildings (A-6,A-7, A-8), Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

NIT

INDIAN INSTITUTE OF TECHNOLOGY MANDI

O/o Superintending Engineer, IIT Mandi, Kamand campus
Distt. Mandi (H.P.) Pin 175005

INDIAN INSTITUTE OF TECHNOLOGY MANDI

Name of Work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings, providing power supply to proposed buildings (A-6,A-7, A-8), Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

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INDIAN INSTITUTE OF TECHNOLOGY MANDI

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings, providing power supply to proposed buildings (A-6,A-7, A-8), Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

Volume I of Part A

O/o Superintending Engineer, IIT Mandi, Kamand campus

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Certified that this Tender documents volume – I of part A contains total pages from 3 to 13..

**INFORMATION AND INSTRUCTIONS FOR BIDDERS FOR e-TENDERING
FORMING PART OF BID DOCUMENT AND TO BE POSTED ON WEBSITE
(Applicable for inviting open bids)**

The Superintending Engineer, IIT Mandi, Kamand campus, Distt Mandi (HP) on behalf of BoG invites online item rate bids from approved and eligible contractors of appropriate class enlisted with CENTRAL/STATE GOVT. ORGANIZATION/CENTRAL AUTONOMOUS BODY/CENTRAL PUBLIC SECTOR UNDERTAKING for the following work(s):

Sr. No.	NIT No.	Name of work & Location	Estimated cost put to Bid	Cost of tender document	Earnest money	Period of completion	Last date & time of submission of technical & financial bid	Date & time of opening of eligibility/technical bid	Last date & Time for submitting EMD and other documents by lowest bidder	Last date & Time for submitting Tender cost
1	2	3	4	5	6	7	8	9	10	11
1	IIT Mandi(CW)/SE-822/2016-17/3165-67 Dated 29-03-2017	Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.	Rs. 96, 35, 691/-	1000/-	1,92,714/-	120 Days	19-04-2017 up to 03:00 PM	20-04-2017 at 03:30 PM	Within a week of opening of financial bid.	At the time of opening of bid by bidder or their representative.

Note:

A). The bidder should have A-Class license from Chief Electrical Inspector

AE(E)

5

SE

Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

H.P. The bidders from outside H.P. should also be registered with Chief Electrical Inspector anywhere in the country, but they have to register with Chief Electrical Inspector to H.P. within 30 Days of the award letter/L.O.I.

B). Tender cost shall be submitted by the bidder or their representative in the shape of DD in favour of Registrar, IIT Mandi payable at Kamand at the time of opening of bid.

1). Contractors who fulfill the following requirements shall be eligible for bidding. Joint ventures and conditional tender will not be accepted.

Should have satisfactorily completed the works as mentioned below during the last Seven years ending last day of the month Feb 2017

Three similar works each of value not less than 40% of estimated cost or two similar work each of value not less than 60% of estimated cost or one similar work of value not less than 80% of estimated cost for above mentioned work in Govt. departments/PSU/Autonomous institute under MHRD.

2). The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

3). Information and Instructions for bidders posted on web site shall form part of bid document.

4). Plan, specification can also be seen in the office of the SE, IIT Mandi at Kamand campus on working days except on Saturday, Sunday and Public Holidays before last date/time of submission of bid. The bid document consisting of the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from Central Public Procurement Portal website <http://eprocure.gov.in/eprocure/app>

5). The bid can only be submitted after uploading the mandatory scanned documents such as Demand Draft or Pay order or Banker's Cheque or Deposit at call Receipt or Fixed Deposit Receipts of any Scheduled Bank towards EMD in favour of The Registrar, IIT Mandi payable at Kamand and other documents as specified.

6). Those contractors not registered on the website mentioned above, are required to get registered beforehand. If needed they can be imparted training on online bidding process as per details available on the website.

7). The intending bidder must have valid digital signature to submit the bid.

8). Contractor can upload documents in the form of **.xls format and PDF format.**

9). Contractor must ensure to quote rate of each item. If any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO).

10). List of Documents to be scanned and uploaded on due date and time mentioned above:

1. Demand Draft of any scheduled bank against tender cost. Original to be deposited at the time of opening of technical bid.
2. Demand Draft or pay order or Banker's Cheque or Fixed Deposit Receipts or Deposit at

AE(E)

6

SE

Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

- Call Receipt of any Scheduled Bank against EMD.
3. Enlistment Order of the Contractor.
 4. Certificate of Registration for Sales Tax / VAT.
 5. Certificate of Registration for Service Tax, if applicable.
 6. Copy of valid electrical license issued by CEI to HP Govt. or CEI to any other State Govt.
 7. An undertaking that "The physical EMD shall be deposited by me/us with the SE calling the bid in case I/We become the lowest bidder within a week of opening of bid otherwise the department may reject the bid and also take action to withdraw my/our enlistment /debar me/ us from tendering in IIT Mandi."
 8. Certificate from the competent authority having completed similar type of work in Govt. departments/PSU/Autonomous institute under MHRD. as per Sr. No. 1 above.
 9. Income Tax return of last three years.
 10. Financial credential of firm (solvency certificate from the Bank).

Note: If the contractor who fails to upload all the above required documents, his tender is liable to be rejected.

-sd-
Superintending Engineer,
IIT Mandi, Kamand campus,
Distt. Mandi (H.P.) Pin 175005
(For and on behalf of the BoG)

Copy to:

1. Institute website/Notice Board.
2. CPP Portal.

-sd-
Superintending Engineer

CPWD-6 FOR e-TENDERING

1. The Superintending Engineer, IIT Mandi, Kamand campus, Distt Mandi (HP) on behalf of BoG invites online item rate bids from approved and eligible contractors of appropriate class enlisted with CENTRAL/STATE GOVT. ORGANIZATION/CENTRAL AUTONOMOUS BODY/CENTRAL PUBLIC SECTOR UNDERTAKING for Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block including associated Civil work at Gharpa of IIT Mandi. The enlistment of the contractors should be valid on the last date of submission of bids.

In case the last date of submission of bid is extended, the enlistment of contractor should be valid on the original date of submission of bids)

NOTE:-

The bidder should have A-Class license from Chief Electrical Inspector H.P. The bidders from outside H.P. should also be registered with Chief Electrical Inspector anywhere in the country, but they have to register with Chief Electrical Inspector to H.P. within 30 Days of the award letter/L.O.I.

- a. Estimated cost of the work is Rs. 96, 35, 691/-. This estimate, however, is given merely as a rough guide.
2. Agreement shall be drawn with the successful tenderer on prescribed Form No. CPWD 8 which is available as a Govt. of India Publication and also available on website www.cpwd.gov.in. Tenderer shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.

Contractors who fulfill the following requirements shall be eligible for bidding. Joint ventures and conditional tender will not be accepted.

Should have satisfactorily completed the works as mentioned below during the last Seven years ending last day of the month Feb 2017

Three similar works each of value not less than 40% of estimated cost or two similar work each of value not less than 60% of estimated cost or one similar work of value not less than 80% of estimated cost for above mentioned work in Govt. departments/PSU/Autonomous institute under MHRD.

3. The time allowed for carrying out the work will be 120 Days from the date of start as defined in schedule 'F' or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the tender documents.
4. The site for the work is available.
5. Plan, specification can be seen in the office of the SE, IIT Mandi at Kamand campus on working days except on Saturday, Sunday and Public Holidays before last date/time of submission of bid. The tender document consisting of the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents except Standard General Conditions of Contract Form can be seen and downloaded from Central Public Procurement Portal website <http://eprocure.gov.in/eprocure/app>
6. After submission of the tender the contractor can re-submit revised tender any number of times but before last time and date of submission of tender as notified.

7. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of tender as notified.
8. Earnest Money Rs. 1,92,714/- can be paid in the form of Demand Draft/pay order or Banker's Cheque/Deposit at Call Receipt or Fixed Deposit Receipts (drawn in favour of The Registrar, IIT Mandi, payable at Kamand) of any Scheduled Bank which shall be scanned and uploaded to the e-tendering website within the period of tender submission.

The intending bidder has to fill all the details of Demand Draft/ Pay Order/ Banker's Cheque/Deposit at call receipt/ Fixed Deposit Receipts (bankers name, amount, number and date) against EMD etc.

The physical EMD of the scanned copy of EMD uploaded shall be deposited by the lowest tenderer within a week after opening of financial bid failing which the tender shall be rejected and he shall not be debarred from tendering in IIT Mandi.

The following undertaking in this regard shall also be uploaded by the intending bidders: -

"The physical EMD shall be deposited by me/us with the SE calling the tenders in case I/We become the lowest tenderer within a week after the opening the financial bid otherwise the department may reject the tender and also take action to withdraw my/our enlistment/ debar me /us from tendering in IIT Mandi."

1. The bid submitted shall be opened at 03:30 PM on 20-04-2017.
2. The bid submitted shall become invalid if:
 - a. The bidder is found ineligible.
 - b. The bidder does not upload all the documents (including service tax registration/ VAT registration/ Sales Tax registration, Certificate of completed works etc.) as stipulated in the bid document including the undertaking about deposition of physical EMD of the scanned copy of EMD uploaded.
 - c. If any discrepancy is noticed Between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest tenderer in the office of tender opening authority.
 - d. The lowest bidder does not deposit physical EMD within a week of opening of tender.
11. The contractor whose bid is accepted will be required to furnish performance guarantee of 5% (Five Percent) of the tendered amount within the period specified in Schedule F. This guarantee shall be in the form of Deposit at Call receipt /Banker's Cheque/Demand Draft/Pay order or Fixed Deposit Receipts of any Scheduled Bank in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F' including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. The earnest money deposited along tender shall be returned after receiving the aforesaid performance guarantee.
12. Site of construction is located at South campus of IIT Mandi at Kamand, Distt. Mandi (H.P.) Pin 175005.
13. Intending bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the

site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent upon any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

14. The competent authority on behalf of the BoG does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.
15. Canvassing whether directly or indirectly, in connection with tenderer is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.
16. The competent authority on behalf of BoG reserves to himself the right of accepting the whole or any part of the bid and the bidders shall be bound to perform the same at the rate quoted.
17. The contractor shall not be permitted to tender for works in the IIT Mandi responsible for award and execution of contracts, in which his near relative is posted as a Divisional Accountant or as an officer in any capacity Between the grades of Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any Gazetted officer in the IIT Mandi. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.
18. No Engineer of Gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.
19. The bid for the works shall remain open for acceptance for a period of Sixty (60) days from the date of opening of financial bids. If any bidder withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the bid which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy,

be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the bidders shall not be allowed to participate in the re-bidding process of the work.

20. This notice inviting bid shall form a part of the contract document. The successful bidder/contractor, on acceptance of his bid by the Accepting Authority shall within 30 Days from the stipulated date of start of the work, sign contract consisting of: -
 - a. The Notice Inviting bid, all the documents including Special Conditions, General Specifications/ Particular Specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.
 - b. Standard C.P.W.D. Form 8 or other Standard CPWD form as applicable.
21. This notice inviting bid shall form a part of the contract document. The successful bidder/contractor, on acceptance of his bid by the Accepting Authority shall within 30 Days from the stipulated date of start of the work, sign contract consisting of: -
 - a. The Notice Inviting bid, all the documents including Special Conditions, General Specifications/ Particular Specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.
 - b. Standard C.P.W.D. Form 8 or other Standard CPWD form as applicable.
22. For Composite Tenders
 - 22.1 The Engineer in charge of the division of the major component will call bids for the composite work. The cost of bid document and Earnest Money will be fixed with respect to the combined estimated cost put to tender for the composite tender.
 - 22.2 The bid document will include following four components:
 - Part A: CPWD-6, CPWD form - 8 including schedule A to F for the major component of the work, Standard General Conditions of Contract for CPWD 2010 as amended upto O.M. No. DGW/CON/267 dated 14.05.2013.
 - Part B: General / specific conditions, specifications
 - Part C: Schedule A to F for minor component of the work. (Superintending Engineer of major component shall also be competent authority under clause 2 and clause 5 as mentioned in schedule A to F for major components) General/ specific conditions, specifications.
 - Part D: Schedule of quantities applicable to Civil and electrical work.
 - 22.3 The bidders must associate with himself, agencies of the appropriate class registered with CPWD and eligible to bid for each of the minor component individually.
 - 22.4 The eligible bidders shall quote rates for all items of major component as well as for all items of minor components of the bid.
 - 22.5 After acceptance of the bid by competent authority, the Engineer in charge of major component of the work shall issue letter of award on behalf of the BoG. After the work is awarded, the main contractor will have to enter into one agreement with Engineer in charge of major component and has also to sign two or more copies of agreement depending upon number of Engineer in charge of minor components. One such signed set of agreement shall be handed over to Engineer in - charge of minor component. Engineer of major component will operate part A and part B of the agreement. Engineer in - charge of minor component(s) shall operate Part C along with Part A of the agreement.
 - 22.6 Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.
 - 22.7 The main contractor has to associate agency(s) for minor component(s) conforming to eligibility criteria as defined in the tender document and has to submit detail of such agency(s) to Engineer-in-charge of minor component(s) within prescribed time. Name of the agency(s) to be associated shall be approved by Engineer-in-charge of minor component(s).

- 22.8 In case the main contractor intends to change any of the above agency/ agencies during the operation of the contract, he shall obtain prior approval of respective Engineer-in-charge/ DDH of the agreement. The new agency/ agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-charge of respective discipline is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.
- 22.9 The main contractor has to enter into agreement with contractor(s) associated by him for execution of minor component(s). Copy of such agreement shall be submitted to Engineer-in-charge of each minor component as well as to Engineer in charge of major component. In case of change of associate contractor, the main contractor has to enter into agreement with the new contractor associated by him.
- 22.10 Running payment for the major component shall be made by Superintending Engineer of major discipline to the main contractor. Running payment for minor components shall be made by the Engineer-in-charge of the discipline of minor component directly to the main contractor.
- 22.11 The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by Engineer-in-charge of major component after record of completion certificate of all other components.
- 22.12 Final bill of whole work shall be finalized and paid by the Superintending Engineer of major component. Engineer(s) in charge of minor component(s) will prepare and pass the final bill for their component of work and pass on the same to the Superintending Engineer of major component for including in the final bill for composite contract.
- 22.13 It will be obligatory on the part of the tenderer to sign the tender documents for all components before the first payment is released.

Superintending Engineer,
IIT Mandi, Kamand campus,
Distt. Mandi (H.P.) Pin 175005
(For and on behalf of the BoG)

SECTION – I

BRIEF PARTICULARS OF THE WORK

1. Salient details of the work for which bids invited are as under:

Sl. No.	Name of Work	Approx. Cost	Period of completion
	Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.	96,35,691/-	120 Days

2. The work is situated at IIT Mandi South Campus at Kamand, Distt. Mandi (H.P).

3.0 Features:

3.1 General features and major components of the work are as under:

i) As per schedule of quantity.

4. Work shall be executed according to General Conditions of Contract 2010 Form 8 for Central P.W.D. Works as amended/corrected up to date.
5. Work shall be executed according to IS: 1255-1983 and relevant IE rules amended up to date.

Indian Institute of Technology Mandi

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

Volume II Of Part A

O/o Superintending Engineer, IIT Mandi, Kamand campus

Indian Institute of Technology Mandi

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

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t A

FORM NO. 8

Indian Institute of Technology Mandi

STATE: HIMACHALPRADESH

DISTT. : - MANDI

ITEM RATE TENDER & CONTRACT FOR WORKS

(A) Tender for the work of: -

Name of Work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings, providing power supply to proposed buildings (A-6,A-7, A-8), Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

i) To be submitted online by 01:00 PM on 05-04-2017 through website <http://eprocure.gov.in/eprocure/app> to Superintending Engineer, IIT Mandi, Kamand campus, Distt. Mandi (H.P.).

ii) To be downloaded online in presence of qualified tenderer/their authorized representatives who may be present at 03:30 PM on 06-04-2017 in the office of Superintending Engineer, IIT Mandi, Kamand campus, Distt. Mandi (H.P.).

iii) Issued to..... (contractor)

Signature of Officer issuing the document.....

Designation:- Superintending Engineer, IIT Mandi, Kamand campus, Distt. Mandi (H.P.)

TENDER

I/We have read and examined the Notice Inviting Tender, Schedule A, B, C, D, E & F Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, Clauses of Contract, Special Conditions, Schedule of Rate and other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the BoG within the time specified in Schedule 'F', viz. Schedule of Quantities and in accordance in all respects with the Specifications / Special conditions, Designs, Drawings and instructions in writing as referred to in this tender document and with such materials as are provided for, by and in respects in accordance with, such conditions so far as applicable.

CPWD FORM NO.8

We agree to keep the tender open for (60) Sixty days from the date of opening of financial bid and not to make any modifications in its terms and conditions.

A sum of Rs 1,92,714/- is hereby forwarded in Demand Draft or Pay order or Banker's Cheque or Deposit at call Receipt or Fixed Deposit Receipts of any Scheduled Bank as earnest money. If I/we fail to furnish the prescribed Performance Guarantee within prescribed period, I/we agree that the said BoG or his successor in office shall without prejudice to any other right or remedy be at liberty to forfeit the said Earnest Money absolutely. Further, if I/we fail to commence the work as specified, I/we agree that BoG or his successors in office shall, without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the Performance Guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 & 12.3 of the tender form. Further, I/We agree that in case of forfeiture of earnest money or both Earnest Money & Performance guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/We shall be debarred for tendering in IIT MANDI in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.

I/We hereby declare that I/we shall treat the tender documents, drawings and other records connected with the work as Secret / Confidential documents and shall not communicate information / derived there from to any person other than a person to whom I/we/am/are may authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated:	}	Signature of Contractor	}
Witness: -		Postal Address: -	
Address: -			
Occupation: -		Fax: -	
Telephone No.		E-Mail: -	

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of BoG for a sum of Rs. (Rupees)

The letters referred to below shall form part of this contract agreement.

- i)
- ii)

-sd-

Superintending Engineer,
IIT Mandi, Kamand campus,
Distt. Mandi (H.P.) Pin 175005
(For and on behalf of the BoG)

AE(E)

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SE

Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

SCHEDULES

SCHEDULE 'A'

Schedule of quantities (Enclosed) As per Bid enclosed

SCHEDULE 'B'

Schedule of materials to be issued to the contractor.

S. No.	Description of item	Quantity	Rates in figures & words at which the material will be charged to the contractor	Place of Issue
1	2	3	4	5

-----NIL-----

SCHEDULE 'C'

Tools and plants to be hired to the contractor.

Sl. No.	Description	Hire charges per day	Place of Issue
1	2	3	4

_____ NIL _____

SCHEDULE 'D'

Extra schedule for specific requirements/documents for the work, if any.

_____ NIL _____

SCHEDULE 'E'

_____ NIL _____

SCHEDULE 'F'

Reference to General Conditions of contract.

Name of work:

Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

Estimated cost of work:

Total

Rs 96, 35,691/-

Earnest Money Deposit

Rs 1, 92,714/-

Performance Guarantee:

5% of Tendered Value.

Security Deposit :

5% of Tendered Value.

General Rules & Directions:

Officer inviting tender

Superintending Engineer
IIT Mandi, Kamand campus

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3

50%

Definitions:

2(v) Engineer-in-Charge

Superintending Engineer
IIT Mandi, Kamand campus

2(viii) Accepting Authority

Superintending Engineer
IIT Mandi, Kamand campus

2(x) Percentage on cost of materials and labour to cover all overheads and profits

15%

2(xi) Standard schedule of Rates

DSR Electrical
2016/Prevailing labour rates
& market rates.

2(xii) Department

IIT Mandi

9(ii) Standard CPWD contract form

CPWD Form 8 as per
General conditions of
contract for CPWD works
amended up to date

Clause 1

i) Time allowed for Submission of performance guarantee from the date of issue of letter of acceptance

7 Days.

ii) Maximum allowable extension with late fees @0.1% per day of performance Guarantee amount beyond the period provided in (i) above.

4 Days.

Clause 2 Authority for fixing compensation Under clause 2.

Superintending Engineer, IIT
Mandi

Clause 2A Whether clause 2A shall be applicable

N.A.

Clause 5	Number of days from the date of issue of letter of acceptance for reckoning date of start	7 Days
Mile stone (s) as per table given below: -		--
Time allowed for execution of work :		120 Days
Authority to Decide: Extension of time		Superintending Engineer, IIT Mandi
Rescheduling of mile stones		--
Clause 6, 6A	Clause applicable – (6 or 6A)	Clause 6
Clause 7	Gross work to be done together with net payment/ adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment.	N.A.
	List of testing equipment to be Provided by the contractor at site lab	N.A.
Clause10 B(ii)	Whether clause 10-B(ii) shall be applicable	No
Clause 10C		N.A.
Clause 10CA	Whether clause 10CA shall be Applicable.	N.A. for Elect. Component.
CLAUSE 10 CC	:	N.A.
Electrical construction materials-expressed as percent of total value of work.		--

Component of labour-expressed as percent of total value of work.		': --
Component of P.O.L.-expressed as percent of total value of work.		': --
Clause 11 Specifications to be followed		General specification for electrical work part II (External) amended up to date and relevant IS specifications and CPWD specifications 2009 VOL I&II with correction slip issued up to dated.
Clause 12		
12.2 & 12.3	Deviation limit beyond which clauses 12.2 & 12.3 shall apply for electrical work.	30% on individual items
12.5	Deviation limit beyond which clauses 12.2 and 12.3 shall apply for foundation work.	--
12.6	Type of work	'Original'
Clause 16	Competent Authority for deciding reduced rates.	Superintending Engineer
Clause 18	List of mandatory machinery, tools & plants to be deployed by the contractor at site.	As required for timely execution of work

Clause 25

Constitution of Dispute Redressal Committee (DRC)	Competent Authority to appoint DRC
DRC shall constitute one Chairman and two members	Director, IIT Mandi

Clause 36 (i)

Sr. No.	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical representative)	Minimum experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36(i)

1.	Graduate Engineer Or Diploma Engineer	Elect.	Project Manager cum Planning / Quality / Site / Billing Engineer	2 years or 5Years	1 Nos	Rs. 20,000/- Per Month
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Clause 42

- | | |
|---|------|
| i) (a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates 2007 printed by C.P.W.D. | N.A. |
| ii) Variations permissible on theoretical quantities. | |
| a) Cement for works with estimated cost put to tender not more than Rs.5 lakhs for works with estimated cost put to tender more than Rs.5 Lakhs. | N.A. |
| b) Bitumen for all works. | N.A. |
| c) Steel Reinforcement and structural steel Sections for each diameter, section and Category. | N.A. |
| d) All other materials. | N.A. |

Indian Institute of Technology Mandi

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

PART B

INDIAN INSTITUTE OF TECHNOLOGY MANDI
O/o Superintending Engineer, IIT Mandi, Kamand campus

INDIAN INSTITUTE OF TECHNOLOGY MANDI

O/o Superintending Engineer, IIT Mandi, Kamand campus

Name of Work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

INDEX – PART-B

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Certified that this document part B contains page no. 23 to 103.

TERMS AND CONDITIONS FOR EXTERNAL ELECTRICAL WORKS

GENERAL COMMERCIAL & TECHNICAL CONDITIONS

All the works shall be carried out as per CPWD General specification for Electrical Works, Part-I (External)-2013; as amended up to date IS: 1255-1983 and should also comply with relevant provisions of the Indian Electricity Rules and Acts as applicable and as amended up to date.

1.0 The contractor is advised to visit the site of work to have an idea of the execution of the work; failure to do so shall not absolve their responsibility to do the work as specified in agreement.

1.0 RATES, TAXES & DUTIES

The tender is for entering into item rate works contract. The rates shall be inclusive of all taxes, duties, levies, cess, packing, transportation, handling etc. but excluding Service tax.

Statutory deduction of works contract tax/VAT/sale tax/ cess as applicable as per rule shall be made at source from each running /final bill payment. A certificate of TDS shall be issued by the department to the contractor. No form "D" or 31/32 shall be issued by the department. The road permit shall be arranged by the tenderer at his own cost.

2.0 COMPLETENESS OF TENDER:

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

3.0 WORKS TO BE DONE BY THE CONTRACTOR:

Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost: -

- (i) Foundations for equipment's and components where required, including foundations bolts.
- (ii) Cutting and making good all damages caused during installation and restoring the same to their original finish.
- (iii) Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
- (iv) Painting at site of all exposed metal surfaces of the installation other than pre-painted items like fittings, fans, switchgear/distribution gear items, cubicle switchboard etc. Damages to finished surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-Charge.
- (v) Testing and commissioning of completed installation.
- (vi) Storage space for all equipment's, components and materials for the work.

(vii) Cutting of chases shall be done by chase cutting machine and hole through the walls/ slabs if required will be done by core cutting machine.

4.0 STORAGE AND CUSTODY OF MATERIALS:

The contractor has to make his own arrangement for the storage of the material at site & necessary watch and ward of the electrical installation during the execution of work till the same is handed over to the department. No extra payment will be made on this account. The storage space shall however be arranged by the department at site, if available.

The main contractor shall arrange for proper storage of the electrical fans and fittings at site and that double lock system shall be arranged for the fans and fittings after receipt at site until the time they are taken for installation. The contractor shall however be responsible for proper storage and safe custody of the same till their installation and handing over to the department.

5.0 ELECTRIC POWER SUPPLY AND WATER SUPPLY:

Power and water supply will be arranged by the contractor at the site for installation purpose.

However, for testing purpose after complete installation of the electrical items, electricity supply will be made available free of cost to the contractor. Contractor will take due care to ensure safety of electrical installation during execution of work.

6.0 TOOLS FOR HANDLING AND ERECTING:

All tools and tackles required for handling of equipment's and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

7.0 PAYMENT TERMS:

Payment shall be made as per the relevant clauses of form PWD 7/8 forming part of the tender documents.

8.0 CO-ORDINATION WITH OTHER AGENCIES:

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

8.1 CARE OF BUILDINGS:

Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove, at his costs, all unwanted and waste materials arising out of his work, from the site.

9.0 STRUCTURAL ALTERATIONS TO BUILDINGS:

(i) No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.

- (ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these required modifications or fresh provisions are required to be made, such contingent works shall be carried out by the contract at his cost.
- (iii) All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.
- (iv) All chases required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

10.0 ADDITION TO AN INSTALLATION:

Any addition, temporary or permanent, to the existing electrical installation shall not be made without a properly worked out scheme/design by a qualified Electrical Engineer to ensure that such addition does not lead to overloading, safety violation of the existing system.

11.0 WORK IN OCCUPIED BUILDINGS:

- (i) When work is executed in occupied buildings, there would be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after the office hours.
- (ii) The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.
- (ii) The contractor shall not tamper with any of the existing installations including their switching operations or connections there to without specific approval from the Engineer-in-charge.

12.0 DRAWINGS:

- (i) The work shall be carried out in accordance with the drawings and the tender documents and also in accordance with modification thereto from time to time as approved by the Engineer-in-charge.
- (ii) All wiring diagrams shall be deemed to be 'Drawings' within the meaning of the term as used in Clause 11 of the conditions of contract (PWD 7 or PWD 8). They shall indicate the main switch board, the distribution boards (with circuit numbers controlled by them), the runs of various mains and sub mains and the position of all points with their controls.
- (iii) All circuits shall be indicated and numbered in the wiring diagram and the points shall be given the same number as the circuit to which they are electrically connected.
- (iv) After award of the work, the firm will be required to submit the drawings for the proposed work including layout plan, conduit routes etc. Work will be carried out as per the approved drawings.

13.0 CONFORMITY TO IE ACT, IE RULES, AND STANDARDS:

13.1 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 (Date of call of tender unless specified otherwise). List of rules of particular importance to electrical installations under these General Specifications is given in Appendix C for reference.

14.0 GENERAL REQUIREMENTS OF COMPONENTS:

14.1 QUALITY OF MATERIAL: All materials and equipment's 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.

15.0 INSPECTION OF MATERIALS AND EQUIPMENT'S:

15.1 Materials and equipment's to be used in the work shall be inspected by the departmental officers. Such inspection will be of following categories:

- (i) Inspection of materials / equipment's to be witnessed at the Manufacturer's premises in accordance with relevant BIS /Agreement Inspection Procedure.
- (ii) To receive materials at site with Manufacturer's Test Certificate(s)
- (iii) To inspect materials at the authorized dealer's godowns to ensure delivery of genuine materials at site.
- (iv) To receive materials after physical inspection at site.

15.2 Adequate care to ensure that only tested and genuine materials of proper quality are used in work shall be ensured by firm. The firm shall ensure that:

- (i) Material will be ordered & delivered at site only with the prior approval of the department to ensure timely delivery.
- (ii) As and when the order is placed for the fittings/ fixtures, cables, switchgears, poles, rising main, other main items etc., its copy shall be endorsed to the Engineer-in-charge.
- (iii) The contractor will submit makes & brands of electrical fittings & fans, exhaust fans, MCB's & DB's, switches & sockets, wires & cables, conduits and switchgears, rising mains, poles , outdoor fittings etc. out of preferred make list as per tender documents for approval of Engineer-In-Charge whose decision will be final in the matter.
- (iv) The firm will be required to procure material like electrical fittings & fans, exhaust fans, MCB's & DB's, switches & sockets, wires & cables, conduits and switchgears, rising mains, poles , outdoor fittings etc. directly from the manufacturer/ authorized dealers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor if required by the department.
- (v) Inspection at factory or at godown, as required, shall be arranged by the firm for a mutually agreed date.
- (vi) Delivery of material shall be taken up only with the consent of department, after clearance of the material.
- (vii) Department shall reserve the right to waive inspection in lieu of suitable test certificate, at its discretion.

15.3 Similarly, for fabricated equipment's, the contractor will first submit dimensional detailed drawings for approval before fabrication is taken up in the factory. Suitable

stage inspection at factory also will be made to ensure proper use of materials, workmanship and quality control.

16.0 RATINGS OF COMPONENTS:

- 16.1 All components in a wiring installation shall be of appropriate ratings of voltage, current and frequency, as required at the respective sections of the electrical installations in which they are used.
- 16.2 All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current, which will normally flow through them, without their respective ratings being exceeded.

17.0 CONFORMITY TO STANDARDS:

- 17.1 All components shall conform to relevant Indian Standard Specifications wherever existing. Materials with ISI certification mark shall be preferred.
- 17.2 Relevant Indian Standards including amendments or revisions thereof up to the date of tender acceptance shall be applicable in the respective contracts for respective items, firm to ensure its compliance.

18.0 INTERCHANGEABILITY:

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

19.0 WORKMANSHIP:

- 19.1 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.
- 19.2 Proper supervision/skilled workmen: The contractor shall be a licensed electrical contractor of appropriate class suitable for execution of the electrical work. He shall engage suitably skilled/licensed workmen of various categories for execution of work supervised by supervisors / Engineer of appropriate qualification and experience to ensure proper execution of work. They will carry out instruction of Engineer-in-charge and other senior officers of the Department during the progress of work.
- 19.3 Use of quality materials: Only quality materials of reputed make as specified in the tender will be used in work.
- 19.4 Fabrication in reputed workshop: Switch boards and LT panels shall be fabricated in a factory/workshop having modern facilities like quality fabrication, seven tank process, and powder/epoxy paint plant, proper testing facilities, manned by qualified technical personnel. These shall be as per make / item approved.

20.0 TESTING:

All testes prescribed in this General Specification, to be done before, during and after installation, shall be carried out, and the test results shall be submitted to the Engineer-in-charge in prescribed Performa, forming part of the Completion Certificate.

21.0 COMMISSIONING ON COMPLETION:

After the work is completed, it shall be ensured that the installation is tested and commissioned.

22.0 COMPLETION PLAN AND COMPLETION CERTIFICATE:

- 22.1** For all works completion certificate after completion of work as given in Appendix –E of CPWD Specification shall be submitted to the Engineer-in-charge.
- 22.2** Completion plan drawn to a suitable scale in tracing cloth with ink indicating the following, along with three blue print copies of the same shall also be submitted.
- (i) General layout of the building.
 - (ii) Locations of main switchboard and distribution boards, indicating the circuit numbers controlled by them.
 - (iii) Position of all points and their controls.
 - (iv) Types of fittings, viz. fluorescent, pendants, brackets, bulk head, fans, exhaust fans etc.
 - (v) Name of work, job number, tender reference, actual date of completion, names of Division/ Sub-division and name of the firm who executed the work with their signature.

23.0 GUARANTEE

The installation will be handed over to the department after necessary testing and commissioning. The installation will be guaranteed against any defective design/workmanship. Similarly, the materials supplied by the contractor will be guaranteed against any manufacturing defect, inferior quality. The guarantee period will be for a period of 12 months from the date of handing over to the department. Installation/ equipment's or components thereof shall be rectified/ repaired to the satisfaction of the Engineer-in-charge.

24.0 TECHNICAL SPECIFICATION

- 24.1** All repairs & patch work shall be neatly carried out to match with the original finish & all damages caused to the building installation during the execution of work shall have to be made good by the contractor immediately at his own cost to the entire satisfaction of Engineer-in-charge. In case contractor fails to comply with the instructions of the Engineer-in-charge, Engineer-in-charge shall be at liberty to get the work done by any other agency and recover such amount as paid to the other agency from the bill(s) of the contractor. Contractor shall have no claim, whatsoever, on the extent of such amount.
- 24.2** Wherever ceiling roses are not required to be provided in the light/fan/exhaust fan points, due to site conditions, the contractor shall use suitable three pin connectors for which nothing extra shall be paid. Wiring shall be carried out with FR wires.
- 24.3** Contractor shall provide polythene/PVC plastic cover for all MDB's/SDB's/DB's to protect them from rust/damages, during execution of work till the work is actually completed and handed over to the department.
- 24.4** The loose wire boxes/cable end boxes (adaptor boxes) shall be provided on the various electrical boards to facilitate the termination of the wiring in the various mountings. The boxes shall be of the same make as the DB's as far as possible. Wherever the company made cable end boxes are not available they shall be neatly fabricated with 16 SWG CRCA sheet steel, duly powder coated, dust & vermin proof and the front cover of MS sheet shall be with rubber gasket suitably screwed or with 3mm thick phenolic laminated sheet of Hylam/Formica instead of MS sheet, as desired by the Engineer-in-charge. The length of such boxes shall be same/or more as the width of the electrical switchboard. Such loose wire boxes are deemed included in the scope of the work and no extra payment shall be made for them.

- 24.5** All debris/melba resulting due to electrical work shall be removed on daily basis and completion of the work shall only be accepted after the site has been cleaned of all melba. In case, contractor fails to comply, the same shall be got removed by the other agency and the payment so made shall be recovered from the bill(s) of the contractor.
- 24.6** The contractor shall have to make arrangements, at his own risk and cost, for transportation of materials from the point of issue of stores to site of work, if any.
- 24.7** Makes of all items that are not covered in the schedule of work/additional specifications shall be got approved from the Engineer-in-charge and shall conform to relevant Indian Standard as applicable.
- 24.8** The contractor shall ensure that the staff employed by him for execution of the electrical work, possess the valid electrical license issued by competent authority. Consequences arising due to the default of the contractor in not complying with the above condition shall be the responsibility of the contractor.
- 24.9** Copper lugs shall be provided for terminating copper/aluminium/GI earth wire to all switchboards for which nothing extra shall be paid. All multi-stranded/ stranded wires shall be terminated through copper lugs.
- 24.10** All concealed work and earthing shall be done in the presence of the Engineer-in-charge or his authorized representative.
- 24.11** The schematic diagram/dimensional drawings of the various electrical cubical panels shall be got approved from the Engineer-in-charge before fabrication and shall comply with CPWD specifications and Indian Electricity Rules. The panels shall conform to IS: 8623/1993. All panels shall be powder coated inside out, in shade approved by the Engineer-in-charge, if any.
- 24.12** All floor-mounted panels if any shall be mounted on 75mmX75mmX6mm thick M.S. channel on all the sides. It shall have a continuous earth bus of the same size and material as the main phase running continuously along the length of the panel extending on either side for earth connection.
- 24.13** The doors of all cubicle panels shall be hinged type including those of bus bar chambers and cable alleys. The locking shall be with chrome plated metal key locks. All doors shall be earthed with copper conductor wire as approved by the Engineer-in-charge.
- 24.14** The work shall be carried out according to drawing approved by the Engineer-in-charge. The layout once approved can only be changed by the Engineer-in-charge as per requirement at site. It shall be the responsibility of the contractor to plan the layout and get the approval from the Engineer-in-charge before laying the conduits etc.
- 24.15** The MCB should be of the same make as that of MCB DB's and having a minimum breaking capacity of 10 KA. Contractor shall obtain approval of the Engineer-in-charge before procurement of MCB DB's.
- 24.16** All model of modular accessories required for the work shall be got approved from the Engineer-in-charge from among the approved makes. The base plate shall be preferably in sheet steel or otherwise in unbreakable polycarbonate. The cover plates shall be screw less type in shade approved by the Engineer-in-charge.
- 24.17** Contractor shall have to check the Site Order Book for any instructions of the Engineer-in-charge or his authorized representative and sign the site order book. He shall be bound to ensure compliance with the instructions recorded therein.

- 25.0 The MCCB's shall be compatible for reliable protection and accurate measurement. The rated Service breaking capacity (KAmps) shall be 100% of Ultimate breaking capacity (KAmps). All MCCB's shall be current limiting type with features as per relevant IS codes and CPWD specification. The MCCB shall be of thermal release type."
- 25.1 MCCB's shall be used with terminal spreaders and all terminals shall be shrouded to avoid direct contact.
- 25.2 Mechanical Castle key interlock shall be provided among the incomer MCCB's, wherever, as applicable, two different incomer sources are provided in the panel as per the directions of the Engineer in charge. The same is deemed included in the scope of work.
- 25.3 All measuring and indicating instruments shall be protected through fuses/ MCB's and isolating switches.
- 25.4 General arrangement drawing of the switchboard shall be got approved from the Engineer-in-Charge before commencement of manufacturing.
- 25.5 For the items like LT panels, feeder pillars and accessories, etc., the firm shall arrange for inspection in the factory and provide for all facilities for testing. The cost of the visit of Engineer-in-Charge or his representative shall be borne by department. However, firm will be responsible for arranging the inspections as required.
- 25.6 Conduit layout as per switching arrangement shall be prepared by contractor and got approved from the Engineer-in-Charge before slab casting.
- 25.7 To facilitate drawing of wires 16/18 SWG G.I fish wire shall be provided along with laying of recessed conduit for which no extra payment shall be made to contractor.
- 25.8 Conduit and termination to SDB and main board adapter box i/c connection wires to MCB,s inter connection Between SDB and main board etc. shall be included in the tendered rates and nothing extra shall be paid for the same.
- 25.9 The contractor shall provide junction boxes / looping boxes of required sizes and such boxes shall be measured as part of conduit / batten wiring without any extra payment.
- 25.10 Only brass screws along with brass washers will be used for fixing Phenolic laminated sheet covers and at other places aluminum alloy/ brass / cadmium plated screws will be used.
- 25.11 M.S. dash fastener shall be used for installation of fittings and fixtures in ceiling and for providing suspenders for the angle support, conducting, cable tray etc. for which nothing extra shall be paid
- 25.12 All CI/metal boxes & junction boxes should be cleaned properly and painted from inside before wiring & fixing the accessories.
- 25.13** In wiring items like point wiring / wiring for light and power plug /circuit wiring / sub main wiring, the item includes the cost of conduit also.

SPECIAL CONDITIONSs

1.0 General

1.1 Except for the items, for which Particular Specifications are given or where it is specifically mentioned otherwise in the description of the items in the schedule of quantities, the work shall generally be carried out in accordance with the "CPWD Specifications 2009 Vol. I & II" with upto date correction, additional/Particular Specifications, Architectural /structural drawings and as per instructions of Engineer-in-Charge.

The several documents forming the tender are to be taken as mutually complementary to one another. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scaled dimensions.

Should there be any difference or discrepancy Between the description of items as given in the schedule of quantities, particular specifications for individual items of work (including special conditions) and I.S. Codes etc., the following order of preference shall be observed :

- (i) Description of Schedule of Quantities
- (ii) Particular Specifications and Special Conditions, if any.
- (iii) Drawings
- (iv) CPWD Specifications.
- (v) Indian Standard Specifications of B.I.S.
- (vi) Manufacturers' specifications & as decided by Engineer-in-charge.

"In the event of any variation/ discrepancy in the drawings, specifications and tender documents etc. the decision of the Engineer-in-charge shall be final binding and conclusive on the contractor and in the case the contractor have any doubt and the same should be got clarified immediately from the Engineer-in-charge and no claim of the contractor shall be entertained thereafter. Moreover, the agency is not allowed to take benefit out of any clerical/ grammatical mistake in the standard clauses/Schedule of Quantities/Specifications etc. being used in the agreement".

The works to be governed by this contract shall cover delivery and transportation upto destination, safe custody at site, insurance, erection, testing and commissioning of the entire works.

The works to be undertaken by the contractor shall interlay include the following:

- i. Preparation of detailed SHOP drawings and As Built drawings wherever applicable.
- ii. Obtaining of Statutory permissions where-ever applicable and required.
- iii. Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules wherever required.
- iv. Warranty obligation for the equipment's and/or fittings/fixtures supplied by the contractor.

Contractor shall provide all the shop drawings or layout drawings for all the co-ordinated services before starting any work or placing any order for any of the services etc. These shop drawings/layout drawings shall be got approved from Engineer-in-charge before implementation and this shall be binding on the contractor. The contractor shall submit material submittals along with material sample for approval of Engineer-in-charge prior to delivery of material at site.

1.2 Any reference made to any Indian Standard Specifications, shall imply to the latest version of that standard, including such revisions / amendments as issued by the Bureau of Indian Standards upto last date of receipt of tenders. The Contractor shall keep at his own cost all such publications including relevant Indian Standard Codes applicable to the work at site.

1.3 All the hidden items such as water supply lines, drainage pipes, conduits, sewers etc. are to be properly tested before covering.

1.4 Samples including brand / quality of materials and fittings to be used in the work shall be got approved from the Engineer-in-Charge, well in advance of actual execution and shall be preserved till the completion of the work.

1.5 The contractor, his authorized representative, workmen etc. shall strictly observe orders pertaining to fire precautions prevailing in the area.

1.6 Contractor(s) shall study the soil investigation report for the site, available in the office of the Engineer-in-Charge and satisfy him about complete characteristics of soil and other parameters at site. However, no claim on the alleged inadequacy or incorrectness of the soil data supplied by the department shall be entertained.

1.7 The tenderer shall see the approaches to the site. In case any approach from main road is required at site or existing approach is to be improved and maintained for cartage of materials by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost.

1.8 Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.

1.9 The contractor shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit boards, red flags, red lights and providing barriers. He shall be responsible for all damages and accidents caused to work due to negligence on his part. No hindrances shall be caused to traffic, during the execution of the work.

1.10 The contractor shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, compound wall, services etc. are to be constructed.

1.11 The contractor shall provide at his own cost suitable weighing, surveying and leveling and measuring arrangements as may be necessary at site for checking. All such equipment's shall be got calibrated in advance from laboratory, approved by the Engineer-in-Charge. Nothing extra shall be payable on this account.

1.12 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 work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.

1.13 Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to approved manufacturers specifications where CPWD Specifications are not applicable. The contractor should get the materials (fixtures/fittings) tested from approved labs wherever required at his own cost.

1.14 The work shall be carried out in accordance with the Architectural drawings and Structural drawings, to be issued from time to time, by the Engineer-in-Charge. Before commencement of any item of work, the contractor shall correlate all the relevant architectural and structural drawings issued for the work, nomenclature of items, specifications etc. and satisfy himself that the information available there from is complete and unambiguous. The figures & the written dimensions of the drawing shall supersede the measurement by scale. The discrepancy, if any,

shall be brought to the notice of the Engineer-in-Charge for immediate decision before execution of the work. The contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and/ or incomplete information and no claim, whatsoever shall be entertained on this account.

1.15 The contractor should submit the shop drawing of staging and shuttering for approval of Engineer-in-Charge before actually commencing the execution of work under the item. Nothing extra shall be payable on this account.

1.16 Other agencies may also simultaneously execute and install the works and the contractor shall afford necessary facilities for the same. The contractor shall leave such recesses, holes, openings, trenches etc. as may be required for such related works (for which inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be available as specified elsewhere in the contract) and the contractor shall fix the same at the time of casting of concrete, stone work and brick work, if required, and nothing extra shall be payable on this account.

1.17 All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.

1.18 The contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work.

1.19 Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services encountered in the course of the execution of work shall be protected against the damage by the contractor at his own expense. The contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services. In case temporary supporting of such services is required to facilitate the work, the same shall be done by the contractor at no extra cost.

In case the existing services are to be shifted permanently, then before dismantling the existing services, alternate/diversion of service lines has to be laid by the contractor so that there is no interruption in use of existing services. The contractor has to plan the alternate suitable route for diversion/shifting of service lines and get the same approved from the Engineer-in-Charge before starting shifting of services. Nothing extra shall be paid except the payment of dismantling and laying of new service lines as per conditions of contract.

1.20 The contractor shall be responsible for the watch and ward / guard of the 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 installations and thereafter till the building is physically handed over to the client department. No extra payment shall be made on this account.

1.21 The contractor shall be fully responsible for the safe custody of materials brought by him/ issued to him even though the materials may be under double lock key system.

1.22 For construction works which are likely to generate malba / rubbish, contractor shall dispose of malba, rubbish & other unserviceable materials and wastes at his own cost to the notified specified dumping ground and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises.

1.23 The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark(s), taking spot levels, construction of all safety and protection devices, barriers, preparatory works, working during monsoon, working

at all depths, height, lead, lift and location etc until / unless specified otherwise and any other incidental works required to complete this work. Nothing extra shall be payable on this account.

1.24 For works below ground level the contractor shall keep that area free from water. If dewatering or bailing out of water is required the contractor shall do it and nothing extra shall be paid except otherwise provided in the items of schedule of quantities.

1.25 Results of sub-surface investigations conducted at site are indicated in extracts of the report attached. This information about the soil and sub-soil water conditions is being made available to the Contractor, in good faith, for guidance only and the Contractor is advised to obtain details directly as may be considered necessary by him before quoting rates in the tender. No claim whatsoever on account of any discrepancy Between the sub-surface strata conditions that may be actually encountered at the time of execution of the work and those given in these tender documents, in-accuracy or interpretation thereof shall be entertained from the Contractor under any circumstances. The ground water table is a variable condition and the information given in the report is only indicative and it may vary from time to time.

1.26 Any legal or financial implications resulting out of disposal of earth shall be sole responsibility of the contractor. Nothing extra over the schedule shall be paid on this account.

1.27 The Contractor shall keep himself fully informed of all acts and laws of the Central & State Governments, all orders, decrees of statutory bodies, tribunals having any jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. All the rules & regulations and bye-laws laid down by Collector / MC etc. and any other statutory bodies shall be adhered to, by the contractor, during the execution of work. The Contractor shall also adhere to all traffic restrictions notified by the local authorities. It is clarified that the extra sewerage charges (one time charges for commencement of work) required to be paid to the Municipal Corporation / other statutory bodies shall be paid by the department and need not be considered by the contractor. The water charges (for municipal water connection as well as tanker water) shall be borne by the contractor. Also, if the contractor obtains water connection for the drinking purposes from the municipal authorities or any other statutory body, the consequent sewerage charges shall be borne by the contractor. All statutory taxes, levies, charges (including water and sewerage charges, charges for temporary service connections and / or any other charges) payable to such authorities for carrying out the work, shall be borne by the Contractor. The Contractor shall arrange to give all notices as required by any statutory / regulatory authority and shall pay to such authority all the fees that is required to be paid for the execution of work. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. Nothing extra shall be payable on these accounts. The fee payable to statutory authorities for obtaining the various permanent service connections and Occupancy Certificate for the building shall be borne by the Department.

1.28 Royalty at the prevalent rates shall be paid by the Contractor as per the terms of supply Between them on all materials such as boulders, metals, sand and bajri etc. collected by him for the execution of the work, directly to the revenue authority of the state government concerned. Nothing extra shall be payable on this account.

1.29 No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.

1.30 The Contractor shall conduct his work so as not to interfere with or hinder the progress of the work being performed by other Contractors or by the Engineer-in-Charge. As far as possible, he shall arrange his work and place, so as not to interfere with the operations of other Contractors or shall arrange his work with that of the others, in an acceptable and coordinated manner and shall perform it in proper sequence.

1.31 The Contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the Department from any and all damages and claims that may arise on any account. The Contractor shall indemnify the Department against all claims in respect of patent rights, royalties, design, trademarks of name or other protected rights,

damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever, and shall himself defend all actions arising from such claims and shall indemnify the Department in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.

1.32 The Contractor shall make all necessary arrangements for protecting from rains, the work already executed and for carrying out the further work, during monsoon including providing and fixing temporary shelters, protections etc. Nothing extra shall be payable on this account. Also, no claims for hindrance shall be entertained on this account.

1.33 In case of flooding of site on account of rain or any other cause and any consequent damage, whatsoever, no claim financially or otherwise shall be entertained notwithstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any.

1.34 The Contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupants of the adjacent properties and to the public in general. The Contractor shall take all care, as not to damage any other adjacent property or other services running adjacent to the plot. If any damage is done, the same shall be made good by the Contractor at his own cost and to the entire satisfaction of the Engineer-in-Charge. The Contractor shall use such methodology and equipment's for execution of the work, so as to cause minimum environmental pollution of any kind during construction, to have minimum construction time and minimum inconvenience to road users and to the occupants of the buildings on the adjacent plot and public in general, etc. He shall make good at his own cost and to the entire satisfaction of the Engineer in Charge any damage to roads, paths, cross drainage works or public or private property whatsoever caused, due to the execution of the work or by traffic brought thereon, by the Contractor. Further, the Contractor shall take all precautions to prevent any pollution of streams and waterways. All waste or superfluous materials shall be carted away by the Contractor, entirely to the satisfaction of the Engineer-in-Charge. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of adjoining buildings. No claim what so ever on account of site constraints mentioned above or any other site constraints not specifically stated here, shall be entertained from the Contractor. Therefore, the Contractors are advised to visit site and get first hand information of site constraints. Accordingly, they should quote their tenders. Nothing extra shall be payable on this account.

1.35 All ancillary and incidental facilities required for execution of work like labour camp, stores, fabrication yard, offices for Contractor, watch and ward, temporary ramp required to be made for working at the basement level, temporary structure for plants and machineries, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, barricading, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts.

Before start of the work, the Contractor shall submit to the Engineer-in-Charge, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, etc.

1.36 The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc under various labour laws and other regulations applicable to the works, at his site office.

1.37 No tools and plants including any special T&P etc. shall be supplied by the Department and the Contractor shall have to make his own arrangements at his own cost. No claim of hindrance (or any other claim) shall be entertained on this account.

The Contractor shall cooperate with and provide the facilities to the associate-Contractors and other agencies working at site for smooth execution of the work. The Contractor shall

- (a) Allow use of scaffolding already erected, toilets, sheds etc.
- (b) Properly co-ordinate their work with the work of other Contractors.

- (c) Provide control lines and benchmarks to his associate-Contractors and the other Contractors.
- (d) Provide electricity and water at mutually agreed rates.
- (e) Provide hoist and crane facilities for lifting material at mutually agreed rates.
- (f) Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.
- (g) Adjust work schedule and site activities in consultation with the Engineer-in-Charge and other Contractors to suit the overall schedule completion.
- (h) Resolve the disputes with other Contractor amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator. The contractor shall indemnify the Department against any claim(s) arising out of such disputes.

1.38 On completion of work, the contractor shall submit at his own cost four prints of "as built" drawings of the completed work to the Engineer-in-Charge. These drawings shall have the following information.

- (a) Run off of all piping and their diameters including soil, waste pipes and vertical stacks.
- (b) Ground and invert level of all drainage pipes together with locations of all manholes and connections, upto out fall.
- (c) Run off of all water supply lines with diameters, location of control valves, access panels etc.

In case the contractor fails to supply "as built drawing" aforesaid within 30 days of the date of completion, then the recovery @ Rs.10, 000/- for each such set of drawings shall be made from the contractor's final bill.

2.0 Unless otherwise specified in the schedule of quantities or CPWD specifications, the rates for respective items shall be all inclusive and apply to the following: -

- (i) All lifts & all heights, floors including terrace, leads and depths.
- (ii) All labour, material, tools and plants and other inputs involved in the execution of the item.
- (iii) Any of the conditions and specifications mentioned in the tender documents.
- (iv) Providing sunk flooring in bath-rooms, kitchen, etc.
- (v) Any legal or financial implications resulting out of disposal of earth, if any.
- (vi) Payment of Royalty at the prevailing rates, if any, on the boulders, metal, shingle, sand and bajri etc. or any other material collected by him for the work direct to revenue authorities.
- (vii) Performance test of the entire installation(s) before the work is finally accepted.
 - (viii) Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items.
 - (ix) All incidental charges for cartage, storage and safe custody of materials brought to site.

3.0 QUALITY ASSURANCE/TESTING OF MATERIALS: -

3.1.1 Samples of materials required for testing shall be provided free of charge by the contractor. The cost of tests to be carried out on Steel in approved labs shall be borne by the contractor. The cost of other than steel tests to be carried out in approved labs shall be borne by the contractor / department in the manner indicated below: -

- a) By the contractor, if the results show that the material does not conform to relevant specifications.

b) By the department, if the results show that the material conforms to relevant specifications.

All other expenditure required to be incurred for taking samples; conveyance, packing etc. shall be borne by the contractor himself.

3.1.2 However, if any ultrasonic pulse velocity / load testing or special testing is to be done for concrete whose strength is doubtful, the cost of the same shall be borne by the contractor.

3.1.3 In case there is any discrepancy in frequency of testing as given in list of mandatory tests and that in individual sub-heads of work as per CPWD Specifications higher of the two frequencies of testing shall be followed and nothing extra shall be payable on this account.

3.2 SAMPLE OF MATERIALS: -

3.2.1 All materials and fittings brought by the contractor to the site for use shall conform to the samples approved by the Engineer-in-Charge which shall be preserved till the completion of the work. If a particular brand of material is specified in the item of work in Schedule of Quantity, the same shall be used after getting the same approved from Engineer-in-Charge. Wherever brand / quality of material is not specified in the item of work, the contractor shall submit the samples as per List of Approved Makes as at Sheet No. 53-55 for approval of Engineer-in-Charge. For all other items, ISI Marked materials and fittings shall be used with the approval of Engineer-in-Charge. Wherever ISI Marked material / fittings are not available, the contractor shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant Specifications or IS codes for the approval of Engineer-in-Charge.

3.2.2 To avoid delay, contractor should submit samples as stated above well in advance so as to give timely orders for procurement. If any material, even though approved by Engineer-in-Charge is found defective or not conforming to specifications shall be replaced / removed by the contractor at his own risk & cost.

3.2.3 BIS marked materials except otherwise specified shall also be subjected to quality test besides testing of other materials as per the specifications described for the item/material. Wherever BIS marked materials are brought to the site of work, the contractor shall, furnish manufacturer's test certificate or test certificate from approved testing laboratory to establish that the material procured by the contractor for incorporation in the work satisfies the provisions of specifications relevant to the material and / or the work done.

BIS marked items (except cement & steel for which separate provisions have been made in para 4.0) required on the work shall be got tested, for only important tests, which govern the quality of the product, as decided by the Engineer-in-Charge. The frequency of such tests (except the mandatory test) shall be 5% of the frequency as specified in BIS. For mandatory test, frequency shall be as specified in the CPWD Specifications.

3.2.4 For certain items, if frequency of tests is neither mentioned in the CPWD Specifications & BIS, then tests shall be carried out as per decision of Engineer-in-Charge.

4.0 CEMENT & STEEL REINFORCEMENT (IF NOT STIPULATED TO BE SUPPLIED BY THE CONTRACTOR).

4.1 Contractor has to produce manufacturers test certificate and challan for each lot of Cement & Steel Reinforcement procured at site.

4.2 CEMENT:-

4.2.1 The contractor shall procure 43 grade ordinary Portland Cement conforming to IS: 8112 / Portland Pozzolona Cement conforming to IS: 1489 (Part-1) as required in the work from reputed manufacturers of cement such as ACC, Ultratech, Vikram, Shree Cement, Ambuja, Jaypee Cement, Century Cement and J.K. Cement. The cement of approved make as aforesaid in 50 kg. bags bearing manufacturer's name and ISI marking, along with manufacturers test certificate for each lot shall be procured by the contractor. Portland Pozzolona Cement is to be used for RCC works only subject to fulfillment of conditions of circular No. CDO/SE(RR)/Fly ash (MAN) 02 dated 09.04.09. However, if the contractor uses higher grade of cement or uses OPC only nothing extra shall be paid.

4.2.2 Samples of cement arranged by the contractor shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS Codes. The cement for such testing purpose shall be supplied by the contractor free of charge. In case test results indicate that the cement arranged by the contractor does not conform to the relevant BIS Codes, the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so. The cost of tests shall be borne by the contractor/department in the manner indicated below:

- i) By the contractor, if the results show that the cement does not conform to relevant BIS Codes.
- ii) By the department, if the results show that the cement conforms to relevant BIS Codes.

4.2.3 OPC & PPC bags shall be stored in separate godowns. Separate godowns for tested cement and fresh cement (under testing) to be constructed by the contractor at his own cost as per sketches given in C.P.W.D Specifications having weather-proof roofs and walls. The size of the cement godown is indicated in the sketches for guidance. The actual size of godown shall be as per site requirements and nothing extra shall be paid for the same. Each godown shall be provided with a single door with two locks. The keys of one lock shall remain with Engineer-in-Charge or his authorized representative of the work and that of other lock with the authorized agent of the contractor at the site of work so that the cement is issued from godown according to the daily requirement with the knowledge of both parties. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed proforma and signed daily by the contractor or his authorized agent and Engineer-in-Charge or his authorized representative in token of its correctness. The day to day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard proforma by the contractor or his authorized representative which shall be duly signed by the authorized representative of the Engineer-in-Charge before issue to the work on day to day basis.

4.2.4 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in Clause-42 of the contract and shall be governed by the conditions laid therein.

4.2.5 If the quantity of cement actually used in the work is found to be more than the theoretical quantity of cement including authorized variation, nothing extra shall be payable to the contractor on this account. In the event of it being discovered that after the completion of the work, the quantity of cement used is less than the quantity ascertained as herein before provided (allowing variation on the minus side as stipulated in Clause - 42), the cost of quantity of cement not so used shall be recovered from the contractor as specified in schedule. Decision of the Engineer-in-Charge in regard to theoretical quantity of cement which should have been actually used as per the schedule and recovered at the rate specified, shall be final and binding on the contractor.

For non-scheduled items, the decision of the Superintending Engineer regarding theoretical quantity of the cement, which should have been actually used, shall be final and binding on the contractor.

4.2.6 Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-Charge.

4.2.7 In case the contractor brings surplus quantity of cement the same shall be removed from the site after completion of work by the contractor at his own cost after approval of the Engineer-in-Charge.

4.2.8 Cement, which is not used within 120 Days from its date of manufacture, shall be retested at approved laboratory. Until the results of such tests are found satisfactory, it shall not be used on the work.

4.3 STEEL REINFORCEMENT: -

4.3.1 The contractor shall procure Thermo Mechanical Treated (TMT) Steel Reinforcement bars of Fe 500D grade from Primary Steel producers such as SAIL, Tata Steel Ltd., Rashtriya Ispat Nigam Ltd., Jindal Steel and Power Ltd. and JSW Steel Ltd.

a) The grade of the steel shall be Fe 500 D shall be as per BIS 1786-2008.

b) The TMT bars procured from Primary Producers shall conform to manufacture's specifications.

c) TMT Bars procured from Primary Producers, the specifications shall meet the provision of IS 1786:2008.

4.3.2 The contractor shall have to obtain and furnish test certificates & challan from Manufacturers to Engineer –in- Charge in respect of all the supplies brought by him to the site of work.

The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the contractor.

4.3.3 Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications, as defined under para 4.3.1 (a) above, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the Engineer-in Charge to do so: -

4.3.4 The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent their distortion and corrosion and nothing extra shall be paid on these accounts. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

4.3.5 Unless OTHERWISE specified elsewhere in the contract document, the testing (nominal mass, tensile strength, bend test, rebend test etc.) shall be done as per frequency of samples not less than as given below :

SIZE OF BAR FOR CONSIGNMENT BELOW 100 TONNES	FOR CONSIGNMENT OVER 100 TONNES
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Under 10 mm dia One sample for each 25 tonnes or part thereof. One sample for each 40 tonnes or part thereof
10 mm to 16 mm dia One sample for each 35 tonnes or part thereof. One sample for each 45 tonnes or part thereof
Over 16 mm dia One sample for each 45 tonnes or part thereof One sample for each 50 tonnes or part thereof

4.3.6 The Actual issue and consumption of steel on work shall be regulated and proper account maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in Clause 42 of the contract and shall be governed by conditions laid therein. In case the consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment need to be made.

4.3.7 Steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge

4.3.8 The contractor shall submit original vouchers from the manufacturer for the total quantity of steel supplied under each consignment to be incorporated in the work. All consignment received at the work site shall be inspected by the Site staff along with the relevant documents before acceptance. The contractor shall obtain Original Vouchers and Test Certificates and furnish the same to the Engineer-in-Charge in respect of all the lots of steel brought by him from approved supplier to the site of work. The original vouchers and test certificates shall be defaced by the Site staff and kept on record in the site office.

4.3.9 Reinforcement including authorized spacer bars and lappages shall be measured in length of different diameters as actually (not more than as specified in the drawings) used in the work nearest to a centimeter. Wastage and unauthorized overlaps shall not be measured.

4.3.10 The standard sectional weights referred to as in Table 5.4 in para 5.3.4 in CPWD Specifications will be considered for conversion of length of various sizes of M.S. Bars, Steel Bars and T.M.T. bars into Standard Weight.

5.0 SECRECY

5.1 The contractor shall take all steps necessary that all persons employed on any work in connection with the contract have notice that the Indian Official Secrets Act 1923 applies to them & will continue so to apply even after the execution of such works under the contract.

5.2 The contract is confidential and must be strictly confined to the contractor's own use (except so far as confidential disclosure to sub-contractors or suppliers as necessary) and to the purpose of the contract.

5.3 All documents, copies thereof & extracts there from furnished to the contractor shall be returned to the Engineer-in-Charge on the completion of the work / works or the earlier determination of the contract.

6.0 LABOUR AND SECURITY

6.1 Contractor should provide his plan for labour huts as per his requirement and get it approved from the Engineer-in-Charge. The contractor will be provided space for labour huts etc. inside the campus but the space requirement and location, as assessed by Engineer-in-Charge shall be final and binding.

6.2 Contractor has to follow the security requirement of the campus and obtain necessary entry passes for the labour and vehicles and follow security checks at entry / exit gates, restriction on movement of vehicle, restricted timings of working etc. The Department however shall assist the contractor in obtaining such passes for movement of vehicles and labour. No claim whatsoever shall be entertained on account of delay in entry of vehicles and labour including restrictions in working hours, if there is any.

6.3 The contractor shall employ only Indian Nationals after verifying their antecedents and loyalty. The contractor shall, on demand submit list of his agents, employees and work people concerned & shall satisfy as to the bonafides of such people.

6.4 The contractor & his work people shall observe all relevant rules regarding security promulgated in which work is to be carried out by the Controlling Administrative Authority of the campus/area (hereinafter referred to as "Administrator").

6.5 The contractor, his representative, workman shall be allowed to enter through specified gates & timing as laid down by the controlling authority. They shall be issued an identity card or an individual pass in accordance with the standing rules & regulations & they should possess the same while working. The contractor shall be responsible for the conduct & actions of his workmen, agents / representatives.

6.6 Normally contractor shall be allowed to carryout work Between 7 AM to 6 PM. However, he may also be allowed to carryout the work beyond 6 PM & upto 7 AM if the site conditions / circumstances so demand with prior written permission from the "Administrator". However, if the work is carried out in more than one shift or at night, no claim on this account shall be entertained.

6.7 Normally contractor's material / vehicles etc shall be allowed to move in / go-out Between 7 AM to 7 PM only & no movement of material / vehicles out of site of work shall be allowed during night hours unless specific permission is obtained from the "Administrator".

6.8 In case if a separate entry has been allowed, the contractor has to make all arrangement for making a separate entry gate and barricading of the working area to segregate/separate the same from other areas. All these have to be done by the contractor at his own cost including safeguarding any untoward incident in the restricted area due to separate entry gate and barricading arranged by the contractor. No extra amount on this account shall be payable by the department.

7.0 TRANSPORTATION AND OFFICE INFRASTRUCTURE:

7.1 The contractor shall make arrangement for Helmets and leather shoes (meant of construction work at sites) for all field staff of the department during the entire period of construction for safety reasons. One helmet and two pairs of shoes per staff member (maximum ten members) of the departments per year shall be arranged by the contractor.

8.0 DOCUMENTATION

The Contractor shall render all help and assistance in documenting the total sequences of this project by way of photography, slides, audio / video recording & other records etc. Nothing extra shall be payable to Contractor on this account. However, cost of photographs, slides, audio / video graph etc. shall be borne by the Department. The original films shall be the property of the Department. No copy shall be prepared without the prior approval of the Engineer- in – Charge.

9.0 PROGRAM CHART: -

9.1 The Contractor shall prepare an integrated program chart for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfillment of the program within the stipulated period or earlier and submit the same for approval of the Engineer-in-Charge within 30 Days of the issue of letter of acceptance for the contract. The integrated program chart so submitted should not have any discrepancy with the milestones attached in the Contract Agreement.

9.2 The work has to be completed in stages as indicated in the Milestones under Schedule 'F' and the program should be prepared in such a manner to achieve these Milestones as indicated therein or earlier.

9.3 The program chart should include the following: -

- a) Descriptive note explaining sequence of various activities.
- b) Network (PERT / CPM / BAR CHART) prepared on MS project/ PRIMAVERA which will indicate resources in financial terms, manpower and specialized equipment's for every important stage.
- c) Program for procurement of materials by the contractor.
- d) Program of procurement of machinery / equipment's having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor.

9.4 If at any time, it appears to the Engineer-in-Charge that the actual progress of work does not conform to the approved program referred above, the contractor shall produce a revised program showing the modifications to the approved program by additional inputs to ensure completion of the work within the stipulated time.

9.5 The submission of revised program or approval by the Engineer-in-Charge of such program or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the contract. This is without prejudice to the right of Engineer-in-Charge to take action against the contractor as per terms and conditions of the agreement.

Notwithstanding the fact that the contractor will have to pay to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour regulations and the agreement entered upon and/or extra amounts for any other reason.

10.0 PROGRESS AND MONITORING OF WORK:

10.1 Apart from the above integrated program chart, the contractor shall be required to submit monthly progress report of the work in a computerized form. The progress report shall contain the following, apart from whatever else may be required as specified:

- (i) Construction schedule of the various components of the work through a bar chart for the next three quarters (or as may be specified), showing the milestones, targeted tasks and up to date progress.

(ii) Progress chart of the various components of the work that are planned and achieved, for the month as well as cumulative up to the month, with reason for deviations, if any in a tabular format.

(iii) Plant and machinery statement, indicating those deployed in the work.

(iv) Man-power statement, indicating individually the names of all the staff deployed on the work, along with their designations.

(v) Financial statement, indicating the broad details of all the running account payment received up to date, such as gross value of work done, advances taken, recoveries effected, amount withheld, net payments details of cheque payment received etc.

10.2 For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, notwithstanding the fact that the Contractor may have to pay extra amounts for any reason, to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

10.3 The work should be planned in a systematic manner so that chase cuttings in the walls, ceilings and floors is minimized. Wherever absolutely essential, the chase shall be cut using chase cutting machines. Chases will not be allowed to be cut using hammer / chisel. The electrical boxes should be fixed in walls simultaneously while raising the brick work. The contractor shall ensure proper co-ordination of various disciplines viz. building works, sanitary & water supply & electrical installations etc.

10.4 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 and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed so as not to interfere with the operations of other contractor or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of Engineer-in-charge.

10.5 The Contractor shall do proper sequencing of the various activities by suitably staggering the activities within various pockets in the plot so as to achieve early completion. The agency may deploy adequate equipment, machinery and labour as required for the completion of the entire work within the stipulated period specified. Also ancillary facilities shall be provided commensurate with requirement to complete the entire work within the stipulated period. Nothing extra shall be payable on this account. Adequate number/sets of equipment in working condition, along with adequate stand-by arrangements, shall be deployed during entire construction period. It shall be ensured by the Contractor that all the equipment, Tools & Plants, machineries etc. provided by him are maintained in proper working conditions at all times during the progress of the work and till the completion of the work. Further, all the constructional tools, plants, equipment and machineries provided by the Contractor, on site of work or his work shop for this work, shall be exclusively intended for use in the construction of this work and they shall not be shifted / removed from site without the permission of the Engineer-in-Charge.

10.6 All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.

11.0 Defect liability:

11.1 The contractor's liability during the defect liability period from the final date of completion as per clause 17 shall be limited to rectification of defects including replacement as follows which in the opinion of Engineer-in-Charge are not manmade.

Sl. No.	Description	Defect Liability
(i)	Concrete	(a).Rectification of structural / superficial / non-structural cracks. (b).Rectification of dampness / seepage in roof slab / junctions & sunken portion.

AE(E)

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Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

(c).Rectification of cracks in beam, shade, column.

- (ii) Brick work/ Concrete Block Masonry (a) Rectification of cracks in panel wall / portion.
(b) Cracks / settlement of dwarf walls.
(c) Rectification of efflorescence/ leaching.
- (iii) Builders Hardware (a) Repairs / Replacement of loosened / pre-mature failure of fittings.
(b) Tightening / Replacement of sag in mosquito proofing.
- (iv) Steel & Iron work (a) Rectification / Replacement of defective part of rolling shutter.
(b) Redoing of defective portion in fabrication / welding including painting.
(c) Steel windows, grills, gates etc. – defects to be rectified.
- (v) Roof treatment (a) Rectification of leakage / seepage of roof slab including covering at junction till guarantee period.
- (vi) Plastering (a) Rectification of structural / superficial cracks if any.
(b) Rectification of protruding / peeling off plaster if any.
(c) Rectification of efflorescence.
- (vii) Flooring (a) Rectification of sinking portion of plinth protection including saucer drain.
(b) Settlement of foundation & floors, hollow sounding, cracks in tiles/stones.
- (viii). Plumbing / Sanitary fittings (a) Making good of leakage through soil / waste pipe joints.
(b) Replacement of looking mirror if found wavy.
(c) Rectification of leakage of over head tanks.
(d) Leakage / seepage of sunken floor, blockage of taps / pipes, non functioning of cistern.
- (ix). Finishes (a) Making good of defective / dissimilar patches of painting to match with remaining surfaces, peeling of paint.
- (x) Internal Water Supply (a) Repairs / Replacement of defective taps / fittings.
(b) Repair to leakage of GI water pipe lines including joints.
(c) Removal of blockage of GI pipe lines.
- (xi). General (a) All manufacturing defects of structures / fixtures / fittings / equipment's other than listed above including any defects of shrinkage or other faults that appear in the work within twelve months after a certificate of its completion is given by the Engineer-in-Charge shall be rectified by the contractor.

12.0 SAFETY MEASURES

12.1 Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.

12.2 Warning / Caution Boards

All temporary warning / caution boards / glow signage display such as "Construction Work in Progress", "Keep Away", "No Parking", Diversions & protective Barricades etc. shall be provided and displayed during day time by the Contractor, wherever required and as directed by the Engineer-in-Charge. These glow signage and red lights shall be suitably illuminated during night also. The Contractor shall be solely responsible for damage and accident caused, if any, due to negligence on his part. Also he shall ensure that no hindrance, as far as possible, is caused to general traffic during execution of the work. This signage shall be dismantled & taken away by the Contractor after the completion of work, only after approval of the Engineer – in – Charge. Nothing extra shall be payable on this account.

12.3.1 Necessary protective and safety equipment's shall be provided to the Site Engineer, Supervisory staff, labour and technical staff of the contractor by the Contractor at his own cost and used at site.

12.3.2 No inflammable materials including P.O.L shall be allowed to be stored in huge quantity at site. Only limited quantity of P.O.L may be allowed to be stored at site subject to the compliance of all rules / instructions issued by the relevant authorities and as per the direction of Engineer - in- Charge in this regard. Also all precautions and safety measures shall be taken by the Contractor for safe handling of the P.O.L products stored at site. All consequences on account of unsafe handling of P.O.L shall be borne by the Contractor.

13.0 Special condition for Hardware and sanitary wares:

13.1 Engineer-in-Charge will take a decision regarding model numbers of equivalent Door/window hardwares/ sanitary wares at the time of execution, in case the material, from the manufacturer whose model number is mentioned, is not available. However, in case, the equivalent model so approved, is cheaper than the model already mentioned in item/approved makes list, the price adjustment will be made based on the difference in market rate. In case, the rate of subsequently approved model is more, no extra payment will be made on this account."

ADDITIONAL CONDITIONS OF CONTRACT SPECIFIC TO GREEN BUILDING PRACTICES

1.0 The contractor shall strictly adhere to the following conditions as part of his contractual obligations:

1.1 SITE

1.1.1 The contractor shall ensure that adequate measures are taken for the prevention of erosion of the topsoil during the construction phase.

1.1.2 The Contractor should follow the construction plan as proposed by the Architect /Engineer in Charge to minimize the site disturbance such as soil pollution due to spilling.

1.1.3 No excavated earth shall be removed from the campus unless suggested otherwise by Engineer in Charge. All subsoil shall be reused in backfilling/landscape, etc. as per the instructions of the Engineer in Charge. The surplus excavated earth shall be disposed of by the contractor at his own cost for reuse.

1.1.4 The contractor shall not change the natural gradient of the ground unless specifically instructed by the Engineer in Charge. This shall cover all natural features like water bodies, drainage gullies, slopes, mounds, depressions, etc. Existing drainage patterns through or into any preservation area shall not be modified unless specifically directed by the Engineer-in-charge.

1.1.5 The contractor shall not carry out any work which results in the blockage of natural drainage.

1.1.6 The contractor shall ensure that existing grades of soil shall be maintained around existing vegetation and lowering or raising the levels around the vegetation is not allowed unless specifically directed by the Engineer-in-charge.

1.1.8 Overloading of trucks is unlawful and creates the erosion and sedimentation problems, especially when loose materials like stone dust, excavated earth, sand etc. are moved. Proper covering must take place. No overloading shall be permitted.

1.2 CONSTRUCTION PHASE AND WORKER FACILITIES

1.2.1 The contractor shall specify and limit construction activity in pre-planned/designated areas and shall start construction work after securing the approval for the same from the Engineer in Charge. This shall include areas of construction, storage of materials, and material and personnel movement.

1.2.2 Preserve and Protect Landscape during Construction

(a) The contractor shall ensure that construction activities should be restricted to the areas outside of the canopy of the tree, or, from a safe distance from the tree/plant by means of barricading. Trees will not be used for support; their trunks shall not be damaged by cutting and carving or by nailing posters, advertisements or other material. Lighting of fires or carrying out heat or gas emitting construction activity within the ground, covered by canopy of the tree is not to be permitted.

(b) The contractor shall take steps to protect trees or saplings identified for preservation within the construction site using tree guards of approved specification.

(c) The contractor shall ensure that maintenance activities during construction period shall be performed as needed to ensure that the vegetation remains healthy.

1.2.3 The contractor shall provide potable water for all workers.

1.2.4 The contractor shall provide the minimum level of sanitation and safety facilities for the workers at site. The contractor shall 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. Adequate toilet facilities shall be provided for the workman within easy access of their place of work. Toilet facilities shall be provided from the start of building operations, connection to a sewer shall be made as soon as practicable. Every toilet shall be so constructed that the occupant is sheltered from view and protected from the weather and falling objects. Toilet facilities shall be maintained in a sanitary condition. A sufficient quantity of disinfectant shall be provided. Natural or artificial illumination shall be provided.

1.2.5 The contractor shall ensure that air pollution due to dust/generators is kept to a minimum, preventing any adverse effects on the workers and other people in and around the site. The contractor shall ensure that the speed of vehicles within the site is limited to 10 km/hr.

- Spills of dirt or dusty materials will be cleaned up promptly so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers.

1.2.6 The contractor shall ensure that no construction leachate (e.g. cement slurry etc.), is allowed to percolate into the ground.

1.2.7 Staging (dividing a construction area into two or more areas to minimize the area of soil that will be exposed at any given time) should be done to separate undisturbed land from land disturbed by construction activity and material storage.

1.2.8 The contractor shall comply with the safety procedures, norms and guidelines (as applicable).

1.2.9 The contractor shall ensure the following activities for construction workers safety, among other measures:

- Guarding all parts of dangerous machinery.
- Precautionary signs for working on machinery
- Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.

1.2.10 The storage of material shall be as per standard good practices to the satisfaction of the Engineer in Charge. Watch and ward of the Contractor's materials shall be his own responsibility.

1.2.11 The contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction

1.2.12 Water Use during Construction

Contractor should spray curing water on concrete structure and shall not allow free flow of water. Concrete structures should be kept covered with thick cloth/gunny bags and water should be sprayed on them. Contractor shall do water poundings on all sunken slabs using cement and sand mortar.

1.2.13 The contractor shall provide O & M Manuals wherever applicable.

PARTICULAR SPECIFICATIONS

1.0 EARTH WORK:-

1.1 Earth work shall be executed as per CPWD specifications. The surplus earth if any shall be disposed of within the campus of IIT Mandi at Kamand as per the directions of Engineer-in-Charge.

2.0 R.C.C. WORK:-

2.1.1 The sources of coarse aggregate, fine aggregate, water, admixture & cement to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specifications & their availability before getting the same approved from the Engineer-In-Charge.

- (a) Coarse Aggregate: - As per CPWD Specifications
- (b) Fine Aggregate: - As per CPWD Specifications
- (c) Water: - It shall conform to requirements laid down in IS: 456-2000 / Para 3.1.1 of CPWD Specifications (Vol I 2009)
- (d) Cement: - Portland Pozzolona Cement (Fly Ash based) conforming to IS: 1489/ OPC of grade 43 shall conform to IS: 8112, required in the work from reputed manufacturers of cement as per the approved make in 50 kg. bags bearing manufacturer's name and ISI marking, along with manufacturers test certificate for each lot. Portland Pozzolona Cement is to be used for RCC works only subject to fulfillment of conditions of circular number CDO / SE (RR) / fly ash (MAN) 02 dated 09.04.09 shall be used for design mix concrete and shall conform to IS-1489 (Part I). However, if the contractor uses higher grade of cement nothing extra shall be paid.
- (e) Admixture/ Plasticizer: - The admixture shall conform to IS: 9103. Whenever required, the admixture of approved quality & approved make only shall be used to attain the

required workability. Nothing extra on account of use of Admixture / Plasticizer shall be payable.

2.1.2 Water Cement Ratio and Slump :-

2.1.2.1 In proportioning a particular mix, the manufacturer/producer/contractor shall give due consideration to the moisture content in the aggregates, and the mix shall be so designed as to restrict the maximum free water cement ratio to less the 0.5.

2.1.2.2 Due consideration shall be given to the workability of the concrete thus produced. Slump shall be controlled on the basis of placement in different situations. For normal methods of placing concrete, maximum slump shall be restricted to 100mm when measured in accordance with IS: 1199.

2.2 SAMPLING AND STRENGTH OF DESIGNED CONCRETE MIX

2.2.1 General

Samples from fresh concrete shall be taken as per IS 1199 and cubes shall be made, cured and tested at 28 days in accordance with IS 516. 15.1.1 In order to get a relatively quicker idea of the quality of concrete, optional tests on beams for modulus of rupture at 72 + 2 h or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength test. For this purpose the values should be arrived at based on actual testing. In all cases, the 28 days compressive strength specified in Table 2 of code of practice, IS: 456 2000 shall alone be the criterion for acceptance or rejection of the concrete.

2.2.2 Frequency of Sampling

2.2.3 Sampling Procedure

A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested that is the sampling should be spread over the entire period of concreting and cover all mixing units.

2.2.4 Frequency

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following:

Quantity of Concrete in the Work, m3	Number of Samples
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	4 plus one additional sample for -each additional 50 m3 or part thereof

NOTE- At least one sample shall be taken from each Shift. Where concrete is produced at continuous production unit, such as batch-mixed concrete plant, frequency of sampling may be decided by Engineer-in-charge in such a manner so as to ensure that each concrete batch shall have a reasonable chance of being tested.

2.2.5 Test Specimen

Three test specimens shall be made for each sample for testing at 28 days. Additional samples may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking the formwork, or to determine the duration of curing, or to check the testing error. Additional samples may also be required for testing samples cured by accelerated methods as described in IS 9103. The specimen shall be tested as described in IS 516.

2.2.6 Test Results of Sample

The test results of the sample shall be the average of the strength of three specimens. The individual variation should not be more than ± 15 percent of the average. If more, the test results of the sample are invalid.

2.2.7 ACCEPTANCE CRITERIA

2.2.8 Compressive Strength

The concrete shall be deemed to comply with the strength requirements when both the following condition are met:

- a) The mean strength determined from any group of four consecutive test results complies with the appropriate limits in col 2 of Table given under para 2.1.4 above.
- b) Any individual test result complies with the appropriate limits in col 3 of Table given under para 2.1.4 above.

2.2.9 Quantity of Concrete Represented by Strength Test Results

The quantity of concrete represented by a group of four consecutive test-results shall include the batches from which the first and last samples were taken together with all intervening batches. Where the mean rate of sampling is not specified the maximum quantity of concrete that four consecutive test results represent shall be limited to 60 m³.

2.2.10 Concrete of each grade shall be assessed separately.

2.2.11 Concrete is liable to be rejected if it is porous or honey-combed, its placing has been interrupted without providing a proper construction joint, the reinforcement has been displaced beyond the tolerances specified, or construction tolerances have not been met. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer-in-Charge.

2.3 MEASUREMENT

(i) As per CPWD Specifications.

2.4 TOLERANCES - As per CPWD Specifications.

2.5 RATES: -

(i) The rate includes the cost of materials, labour and T&P, including mixing, placing, transportation involved in all the operations described above except for the cost of centering, shuttering & reinforcement which will be paid for separately.

(ii) In case of rejection of concrete on account of unacceptable compressive strength, governed by para "Standard of Acceptance" as above, the work for which samples have failed shall be redone at the cost of contractor. However, the Engineer-in-charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure or part of structure, etc) to be carried out at the cost of contractor to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests. The Contractor shall take remedial measures necessary to retain the structure as approved by the Engineer-in-charge without any extra cost. However, for payment, the basis of rate payable to contractor shall be governed by the 28 days cube test results and reduced rates shall be regulated in accordance with CPWD Specifications.

2.6 RCC WORK (ORDINARY)

2.6.1 The work shall be done in accordance with CPWD Specifications.

2.6.2 Water Cement ratio for Ordinary RCC work shall not be more than 0.5. Contractor shall use concrete mixture of proper design having arrangement for measuring water for mixing of concrete.

2.7 FORM WORK

2.7.1 The work shall be done in general as per CPWD Specifications.

2.7.2 Only M.S. centring / shuttering and scaffolding material unless & otherwise specified shall be used for all R.C.C. work to give an even finish of concrete surface. However, marine-ply shuttering in exceptional cases as per site requirement may be used on specific request from contractor to be approved by the Engineer-in-Charge.

2.7.3 Nothing extra shall be paid for the centering and shuttering, circular in shape whenever the formwork is having a mean radius exceeding 6m in plan.

2.7.4 Nothing extra shall be paid for grid beams and the corresponding slabs having clear span more than 1.20 metres.

2.7.5 In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centring, shuttering and casting for which nothing extra shall be paid to the Contractor except the places where different type of flooring is provided in the same room.

As per general engineering practice, level of floors in toilet / bath, balconies, shall be kept 12 to 20mm or as required, lower than general floors shuttering should be adjusted accordingly. Nothing extra is payable on this account.

2.7.6 Steel shuttering as approved by the Engineer-in-Charge shall be used by the contractor. Minimum size of shuttering plates shall be 600mm x 900mm except for the case when closing pieces are required to complete the shuttering panels.

Dented, broken, cracked, twisted or rusted shuttering plates shall not be allowed to be used on the work.

The shuttering plates shall be cleaned properly with electrically driven sanders to remove any cement slurry or cement mortar or rust. Proper shuttering oil or de-bonding compound shall be applied on the surface of the shuttering plates in the requisite quantity before assembly of steel reinforcement.

2.8 REINFORCEMENT:-

2.8.1 The reinforcement shall be done as per CPWD Specifications.

2.8.2 The rate of item of reinforcement of RCC work includes all operations including straightening, cutting, bending, welding, binding with annealed steel or welding and placing in position at all the floors with all leads and lift complete as per CPWD Specifications.

3.0 BRICK WORK:-

3.1 The brickwork shall be carried out with good quality well burnt FPS bricks of class designation 75 as per CPWD Specifications. Exposed brick work for ground level to plinth level shall be executed with selected FPS bricks of class designation 75.

3.2 The rate shall also include for leaving chases / notches for dowels / cramps for all kinds of cladding to come over brick work.

3.3 Brick work provided around shaft or lift walls or around slab cutouts shall be measured in the brick for corresponding floor level. Nothing extra shall be paid on this account.

4.0 MARBLE WORKS

4.1.1 The marble stonework shall, in general, be carried out as per the CPWD Specifications. The specifications for dressing, laying, curing, finishing, measurements, rate etc. for the marble stone flooring shall be same as that of works for the Marble flooring, skirting and risers of steps under Flooring Sub Head of the CPWD Specifications. The wall lining / veneer work with marble stone shall be as per the CPWD Specifications for Marble work Sub Head.

4.1.2 The decision of the Engineer-in-Charge as regards the approval of the samples for the various types of the marble stones shall be final and binding on the Contractor. No claim of any kind whatsoever shall be entertained from the Contractor on this account. The Contractor shall then procure and get the mock up prepared at site of work for approval of quality of workmanship and the marble stone as specified. The mock up shall be prepared in lift lobby, toilet etc. on one of the floors. The size of the stones shall be as per the architectural drawings. If the quality of the workmanship and the material is as per the required standards, the mock up shall be allowed as part of the work and measured for payment and shall not be dismantled. Otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. Nothing extra shall be payable on this account.

5.0 FLOORING

5.1 All work in general shall be carried out as per CPWD Specifications (Volume 1) 2009 with up-to-date correction slips.

5.2 Whenever flooring is to be done in patterns of tiles and stones, the contractor shall get samples of each pattern laid and approved by the Engineer-in-charge before final laying of such flooring. Nothing extra shall be payable on this account.

5.3 Different stones / tiles used in pattern flooring shall be measured separately as defined in the nomenclature of the item and nothing extra for laying pattern flooring shall be paid over and above the quoted rate. No additional wastage, if any, shall be accounted for any extra payment.

5.4 Samples of flooring stones/ Tile (Kota/ Marble/ Ceramic tiles/ Vitrified tiles etc.) shall be deposited well in advance with the Engineer-in-Charge for approval. Approved samples should be kept at site with the Engineer-in-Charge and the same shall not be removed except with the written permission of Engineer-in-Charge. No payment whatsoever shall be made for these samples.

5.5 The Marble/ Kota/ or any other stone shall be fully supported by the details establishing the quarry and its location.

5.6 Full width Marble/ Kota/ stone over kitchen platform shall be provided which shall not be less than 900mm long except to adjust for closing pieces. The marble / stone flooring in treads

and risers of staircase shall not be less than 1500mm long except to adjust the closing pieces. Nothing extra shall be paid on these accounts

5.7 Vitrified Tile Flooring

The tiles shall be of approved make and shall generally conform to Table 12 of IS15622. The full body Vitrified tiles of specified sizes shall be used & sample of tiles shall be got approved from the Engineer-in-Charge. All tiles shall be rectified. The Mandatory tests for vitrified tiles shall be got done as per CPWD Specifications (volume-1)/relevant BIS Code.

5.8 Ceramic Tiles Flooring

The tiles shall be procured from the approved manufactures of the specified shade & colour. The floor & wall tiles shall be conforming to IS: 15622 for floor and wall tiles respectively. Tiles for dado shall be 300mm x 450mm (minimum size) or more (GROUP-III) as approved. Tiles for flooring shall be 300mm x 300mm (minimum size) or more (GROUP-V) as approved. Test shall be conducted to satisfy the quality of material as per CPWD Specifications

5.9 The rate of items of flooring is inclusive of providing sunken flooring in bathrooms, kitchen etc. and nothing extra on this account is admissible. The proper gradient shall be given to flooring for toilets, verandah, kitchen, courtyard, etc. as per the directions of Engineer-in-charge.

6.0 SANITARY INSTALLATIONS /WATER SUPPLY / DRAINAGE:-

6.1 The contractor shall submit schematic drawing of water supply and sanitary installation showing details of layout, including internal water supply and drainage details, showing the detail of water supply lines including fittings diameter wise and fixtures connecting to soil waste through traps and connection of W.C. to main shaft pipe for drainage including its ventilation system for approval of Engineer-in-Charge.

6.2 For the work of water supply and Sanitary Installations, Internal Electrical Installations the contractor shall engage the approved licensed plumbers and submit the name of proposed plumbing agencies with their credentials for approval of the Engineer-in-Charge.

6.3 The work in general shall be carried out as per CPWD Specifications (Volume II) 2009 with up-to-date correction slips.

6.4 The tendered rates shall include the cost of cutting holes in walls, floors, RCC slabs etc. wherever required and making good the same for which nothing extra shall be paid.

6.5 The Centrifugally spun cast iron pipe IS: 3989-1984 wherever necessary shall be fixed to RCC columns, beams etc. with rawl plugs of approved quality and nothing extra shall be paid for on this account.

6.6 The pig lead to be used in the jointing should be as per CPWD specifications.

6.7 Nothing extra for providing & fixing CP Brass caps /extension pieces wherever required for CP Brass fittings shall be paid beyond the rates payable for corresponding CP Brass fittings.

7.0 Aluminium doors, windows, ventilators etc. glazing specifications

7.1 Extent and Intent: - The work shall be carried out in the factory through an approved Special Agency, who shall furnish all material, labour, accessories, equipment, tool and plants and incidentals required for providing and installing anodized/powder coated aluminium doors, windows, claddings, louvers and other items as called for on the drawings. The drawings and specifications cover the major requirements only. The supplying of additional fastenings,

accessories, fixtures and other items not mentioned specifically herein, but which are necessary to make a complete installation shall be a part of this contract. Hinges for openable panel shall be stainless steel friction hinges / stays selected for specified wind load and dead loads or specifically extruded in-built hinges.

7.2 General: - Aluminium doors, windows etc. shall be of sizes, section details as shown on the Architectural drawings. The details shown on the drawings indicate generally the sizes of the component parts and general standards. These may be varied slightly to suit the standard adopted by the manufacturers. Before proceeding with any manufacturing, the contractor shall prepare and submit complete manufacturing and installation drawings for approval of the Engineer-in-Charge and no work shall be performed until the approval of these drawings is obtained.

7.3 Sections: - Aluminium doors and windows shall be fabricated from extruded sections of profiles as detailed on drawings. The sections shall be extruded by the manufacturers approved by the Engineer-in-Charge. The aluminium extruded sections shall conform to BIS designation IIE/IIV 9 WP alloy, with chemical composition technical properties, as per IS: 733 and IS: 1285. The permissible tolerance of the extruded sections shall be such as not to impair the proper and smooth function/ operations and appearance of doors and windows.

7.4 Fabrication: -Doors, windows etc. shall be fabricated to sizes at factory and shall be of section, sizes, combinations and details as shown on the drawings. All doors, windows etc. shall have mechanical joints. The joints shall be designed to withstand a minimum wind load of 150 Kg. per Sqm. The design shall also incur that the maximum deflection of any member shall not exceed 1/175 of the span of the member. All members shall be accurately machined and fitted to form hairline joints prior to assembly. The joints accessories such as cleats, brackets etc. shall be of such material as not to cause any bimetallic action. The design of the joints and accessories shall be such that the accessories are fully concealed. The fabrication of doors, windows, etc. shall be done in suitable sections to facilitate easy transportation, handling and installation. Adequate provision shall be made in the door and window members for anchoring to support and fixing of hardware and other fixture as approved by the Architect.

7.5 Anodizing/ powder coating: - All aluminium sections shall be Powder coated (minimum 50 micron thickness) as per requirement as per IS: 7088 and to required colour as specified in the item as per IS: 1868 grading as specified in item schedule after cutting the member to requisite sizes before the final assembly. Powder coating shall be of minimum 50 micron thickness. Anodizing confirming to specified grade with minimum average thickness of 15 microns when measured as per IS: 612. The anodic coating shall be properly sealed by steams or in boiling water are cold sealing process as per IS: 1868/IS: 6057. Polythene tape protection shall be applied on the anodised section before they are brought to site. All care shall be taken to ensure surface protection during transportation, storage at site and installation. The tape protection shall be removed on installation. The sample will be tested in the approved laboratory and cost of samples; etc. shall be borne by the contractor.

7.6 Protection of finish: - All aluminium members shall be wrapped with approved self-adhesive non-staining. PVC tapes.

7.7 Installation:

7.7.1 Just prior to installation the doors, windows, etc. shall be uncreated and stacked on edge on level bearers and supported evenly. The frame shall be fixed into position true to line and level using adequate number of expansion machine bolts, anchor fasteners, of approved size and manufacture and in an approved manner. The holes in concrete/masonry members for housing anchor bolts shall be drilled with an electric drill.

7.7.2 The door/ windows assembled as shown on drawings shall be placed in correct final position on the opening and marks made on concrete members at jambs, sills and heads against the holes provided in frames for anchoring. The frame shall then be removed from the opening and laid aside. Neat holes with parallel sides of appropriate size shall then be drilled in the concrete members with an electric drill at the marking to house the expansion bolts. The expansion bolts shall then be inserted in the holes, struck with a light hammer till the nut is forced into the anchor shell. The frame shall then be placed in final position in the opening and anchored to the support through cadmium plated machine screws of required size and anchored to the support through cadmium plated machine screws of required size threaded to expansion bolts. The frame shall be set in the opening by using wooden wedges at supports and be plumbed in position. The wedges shall invariably be placed at the meeting at points of glazing bars and frame.

7.8 EPDM Rubber / Neoprene gaskets: The contractor shall provide and install EPDM Rubber / Neoprene gaskets of approved size and profile at all locations as shown and as called for to render the doors, windows etc. absolutely air tight and weather tight. The contractor shall produce samples of the gaskets for approval and shall procure the same after approval only.

7.9 Fittings: Hinges, stays, handles, tower bolts, locks and other fittings shall be of quality and manufacturer as approved by the Engineer-in-Charge.

7.10 Poly-sulphide: The gaps Between frames and supports and also any gaps in the door and windows sections shall be raked out as directed and filled with poly-sulphide of approved colour and make to ensure complete water tightness. The poly-sulphide shall be of such colour and composition that it would not stain the masonry/concrete work, shall receive paint without bleeding, will not sag or run and shall not set hard or dry out under any conditions of weather. The sample of poly-sulphide to be used for this purpose shall be got approved from the Engineer-in-Charge before its actual use.

GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR
FOR REMOVAL OF DEFECTS AFTER COMPLETION
IN RESPECT OF SANITARY INSTALLATIONS / WATER SUPPLY / DRAINAGE WORK.

The agreement made this..... day of 20 Between
.....S/o (hereinafter called the
GUARANTOR of the one part) and the BoG (hereinafter called the Government of the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated and made Between the GUARANTOR OF THE ONE PART AND the Government of the other part, whereby the contractor inter alia, undertook to render the work in the said contract recited leak proof with sound material and workmanship.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, and finishing for five years from the date of completion of work.

NOW THE GUARANTOR hereby guarantee that work executed by him will be free from any leakage, seepage, cracks in pipes and guaranteed against faulty material and workmanship, improper slope, defective galvanizing etc. for Five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-In-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of Engineer-in-charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer-in-charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach thereunder, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator
.....
.....and by
..... for and on behalf of the BoG on the day, month and year first
above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

- 1. 2.
-

SIGNED FOR AND ON BEHALF OF THE BoG BY..... in the presence of: -

- 1. 2.
-

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR
FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF
KOTA/STONE WORK/ TILE WORK.**

The agreement made this..... day of 20 Between
.....S/o(hereinafter called the
GUARANTOR of the one part) and the BoG (hereinafter called the Government of the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated and made Between the GUARANTOR OF THE ONE PART AND the Government of the other part whereby the contractor inter alia undertook to render the work in the said contract recited structurally stable workmanship, finishing and use of sound materials.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable and guaranteed against faulty workmanship, improper slope, finishing and materials.

NOW THE GUARANTOR hereby guarantee that work executed by him will be free from any material defects, structural defects, cracks, hollow pockets, improper slope, faulty joints etc. for five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects to the satisfaction of the Engineer-in-charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all the defects, commits breach thereunder, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and by for and on behalf of the BoG on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

- 1. 2.

SIGNED FOR AND BEHALF OF THE BoG BY in the presence of :-

- 1. 2.

GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF ALUMINIUM/UPVC DOORS, WINDOWS VENTILATOR WORK.

The agreement made this..... day of 20 BetweenS/o(hereinafter called the GUARANTOR of the one part) and the BoG (hereinafter called the Government of the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated and made Between the GUARANTOR OF THE ONE PART AND the Government of the other part, whereby the contractor inter alia, undertook to render the work in the said contract recited structurally stable, workmanship, powder coating, anodizing, colouring and sealing etc.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable and guaranteed against faulty material and workmanship, defective anodizing/ powder coating for five years from the date of completion of work.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable and guaranteed against faulty material and workmanship, defective anodizing/ powder coating for five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-In-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of Engineer-in-charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer-in-charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator
.....
.....and by
..... for and on behalf of the BoG on the day, month and year first
above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of: -

- 1. 2.
-

SIGNED FOR AND ON BEHALF OF THE BoG BY..... in the presence of: -

- 1. 2.

Technical Specifications Electrical Works

Technical Specification

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INTRODUCTION

1.1 Preamble

The technical specification for all the Transformer, Substation equipment, L.T panel, APFC Panel & Allied Works to be provided in IIT Mandi Phase 1 (S) is detailed out in this particular document. These are to be read in conjunction with the Drawing Volumes & Bill of Quantities.

The Technical Specifications, in accordance with which the entire work described hereinafter, shall be constructed and completed by the Contractor, comprises of the following:

1.2 Part-I: Technical Specifications

The Technical Specifications shall be generally as brought out in the "CENTRAL PUBLIC WORK DEPARTMENT (CPWD) SPECIFICATION FOR CIVIL PLUMBING AND ELECTRICAL WORKS" in force as on 2012 with all amendments. Tenderer shall purchase the copy of the same from CPWD.

1.3 Part-II: Additional Technical Specifications

The technical specifications for the items which are not covered in CPWD schedule of rates / Specification are separately given as additional technical specification under respective heads in subsequent Chapters.

INSULATORS

1.4 Porcelain Disc Type Insulators

Scope:

Supplying porcelain disc type insulator, suitable for 33 / 22 / 11 KV and necessary ancillary materials and complete erection on provided cross arm / bracket and connected to the over-head line as per instructions from the site engineer

Material:

Insulator Distribution class Disc type Insulator made from porcelain, suitable for specified voltage level, having ISI mark with necessary hardware.

- Hardware : Nuts, washers etc.
- Binding wire : Bare Copper wire or conductor.
- Clamps : MS clamps.

Method of construction:

Distribution class porcelain disc type insulator, suitable for specified voltage level, erected on provided cross arm or bracket with clamps, ancillary materials, and connected to the over-head line. Connection shall be made with bare copper wire of specified gauge.

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

1.5 Pin Type Insulator

Scope:

Supplying porcelain Pin type Insulator, suitable for 33 / 22 / 11KV and necessary ancillary materials and complete erection on provided cross arm / bracket and connected to the over-head line as per instructions from the site engineer

Material:

Insulator: Distribution class Pin type insulator made from porcelain suitable for specified voltage level, having ISI mark with necessary hardware.

Hardware: Nuts, washers, etc.

Binding wire: Bare Copper wire or conductor. Clamps: MS damp.

Method of Construction

Distribution class porcelain pill type insulator suitable for specified voltage level erected on provided cross arm or bracket with clamps, ancillary materials and connected to the over-head line. Connection shall be made with bare copper wire of specified gauge.

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

' HV XLPE CABLES & TERMINATION

1.6 Scope

Technical specification for supply, erection, testing and commissioning of HV underground cables

1.7 Supply

HV cables shall conform to the following specifications:

- i. The HV cable shall be XLPE conforming IS: 7098 (Part-2) 1985 as amended up to date. HV 3 core, aluminum conductor screened XLPE insulated galvanized flat strip armoured shielded PVC sheathed cables.
- ii. The wooden drums for cable shall conform to IS: 1778/1961 and amended up to date. Cable shall be supplied in single length as far as possible.

1.8 Erection / Laying / Testing and Commissioning

Laying

The HV 3 core, cables shall be laid as per IS code of practice ISS: 1255/1983 amended up to date.

The cable shall be buried directly in the ground in the trenches at a depth of 1200 mm. All the cables running in a trench will be laid in one row, side by side and not one on top of each other. Cable spacing shall conform to IS 1255/ 1967, amended up to date. After the trench is excavated, the bottom of the trench shall be cleared of the protruding stone and other foreign materials and then rammed to present a smooth floor to save the cables from getting damaged. The bed of the trench shall be made of 75 mm sand layer. Another 75mm sand layer shall be filled over the cables. Above this sand, protective RCC covers conform to IS 1255 / 1967 Appendix CI – (I) clause – 9 (3) shall be placed in continuity. The protective cover shall be engraved with 'HT CABLES'. Where the Cables have to run through hume pipes connected each other with collars so the cables are protected from injury by a pick axe or any sharp implement which could be used later on for excavation wherever street crossing is involved. Over the top layer of sand, back filling should be done after removing from the back fill any rock or any other item that may cause undue uneven pressure on the cables. No protective RCC covers are required for the length of the cable laid in Hume pipes.

1.9 Cable Trench

Wherever the cables are to be laid in the ground the trench of required depth & width shall be excavated using all equipment's, labor, material. The item of trench given in the BOQ includes excavation, supply & laying of sand cushions above and below the cables, protective brick covers, back filling, etc. The work also includes supplying & providing of cable markers placed at least 600 mm depth. The marker should protrude 400 mm above ground level and the spacing Between two markers should be 20 m displaying on it "HT cables". At each bend in the route, an extra marker has to be provided with the word 'BEND' inscribed on the marker.

1.10 Spacing

The spacing Between the cables shall be as per ISS/1255/1967 amended up to date.

1.11 Protective Covers

When cables are across the roadways or carriageway, crossing shall be done by 300 mm. Dia RCC Hume pipe or else specified in drawing. The Hume pipes shall be connected to each other by space collars. The collars thereafter shall be fitted with materials.

1.12 Jointing and Termination

The jointing and termination of cables shall be of heat shrink type/ push on type, as per the requirement of local supply authority and in accordance with relevant IS amended up to date. Crimping of lugs shall be made with proper size of crimping tool. Brass glands of suitable sizes shall be provided on the ends with proper earthing continuity.

1.13 Certificates

Test certificates shall be furnished for all the routine and type tests as per relevant I.S. before equipment's are installed.

1.14 Commissioning

All the pre-commissioning test result shall be furnished before commissioning of the circuit. Complete cable laying, jointing, termination testing before and after jointing shall be carried out as per IS 1255 – 1983 code of practice for installation and maintenance of power cable up to and including HV rating.

Cable installation shall be carried out by the contractor having valid supervisor's license issued by respective Licensing Board

1.15 Earthing and Bonding

The metal sheath, metal screen and armour of the cable should be effectively earthed at both ends. Earthing and bonding shall be done in accordance with IS 3043 – 1966 latest amendment code of practice for earthing. All main earthing grids shall be joined by full welding having overlapped joints and shall be protected with bitumen compound. Connections to the equipment shall be of hot dip galvanized materials. Terminal joints shall be bolted type & total.

Following testing of cable installation shall be done before jointing and after jointing as per IS 1255-1983 in the presence of the representative of the department and test result shall be furnished.

- i. Insulation resistance test on newly installed cable before jointing
- ii. Insulation resistance test of completed cable installation
- iii. Capacitance
- iv. Conductor resistance (dc)
- v. HV test

On completion of work cable installation plan as per IS-1255 shall be furnished.

LOW VOLTAGE PANELS / APFC PANEL

1.16 Scope

Scope of these specifications covers the design, material selection, manufacture, testing at manufacturer's works, insurance, packing, transportation, loading/unloading, supply at site, installation, testing and commissioning of the low voltage panels/ boards covered in the BOQ, for indoor / outdoor installation. Single line diagrams are shown on relevant tender drawings enclosed with the tender documents.

The all LV & APFC Panel shall be designed, fabricated, supplied, installed, tested & commissioned as per general specification for electrical works given in CPWD latest publications.

1.17 Codes and Standards

Some of the important applicable codes/ standards issued by the Bureau of Indian Standards are listed below for the guidance of the Tenderers. Latest issues of the standards/codes shall be applicable:

IS: 13947	:	L.V. switchgear and control gear Part-I – 1993 General rules
IS: 5578	:	Guide for marking of insulated conductors
IS: 11353	:	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS: 2147	:	Degree of protection provided by enclosures for low voltage switchgear and control gears
IS: 2675	:	Enclosed distribution fuse boards and cut-outs for Voltages not exceeding 1000 V
IS: 255	:	Danger notice plates
IEC60947	:	Circuit Breakers (Part- II)
IEC60947	:	Circuit breakers (Part-II)
IS: 13947	:	Switches, Disconnectors, switch disconnecter (Part - III) and fuse combination units.
IS: 1818	:	Alternating current isolators (disconnectors) and earthing switches.
IS: 8623	:	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC & 1200 V DC.
IS: 8828	:	Miniature air break circuit breakers for voltages not exceeding 1000 V
IS: 9926	:	Fuse wires used in rewirable type Electric fuses upto 1100 Volts
IS: 2208	:	HRC fuse links
IS: 2705	:	Current Transformers (Part- I, II & III)
IS: 3156	:	Voltage Transformers (Part- I, II & III)
IS: 1248	:	Indicating Instruments
IS: 722	:	Integrating Instruments
IEC 60947 /		
IS: 13947	:	Control devices and switching elements (Part - 5) Section-1
IEC60947/		
IS: 13947	:	Contactors and motor starter section 1 (Part - 4)
Electromechanical.		
Section - 1		
IS: 3231	:	Relays
IS: 375	:	Marking and arrangement of busbars Indian Electricity Act and Rules

1.18 System Rating

All the Main Panels/Motor control centre Distribution boards, Sub-Main Distribution boards, shall be suitable for operation on three phase/ single phase, 415/230 volts, 50 Hz neutral solidly grounded at transformer and short circuit level not less than 415 Volts at 25 -50KA.

All the Main Panels/Motor control centre Distribution boards, Sub-Main Distribution boards, shall be designed to withstand heaviest condition at site, with maximum expected ambient temperature of 55°C, 90-95 percent humidity and dusty weather.

LT CABLE

1.19 General

The scope of this specification covers manufacture, supply, inspection, testing at works, packing and forwarding of 1100V grade LT XLPE Power cables & installation including commissioning at site.

Cables shall be aluminum, XLPE insulated, PVC sheathed and round armoured of 3 / 3-½ core and 4 core of sizes specified and suitable for 230 / 415 volts, 1 / 3 phase 50 Hz power supply.

The cables shall be suitable for the rated voltage 1100 volts conforming to IS 7098 with latest amendments.

Cables shall be of approved make only. Each drum or coil of cable shall be accompanied by a certificate stating the manufacturer's name, rating of cable, result, and date of tests.

All cables shall be delivered with cable ends effectively sealed. When a cable is cut from a drum both ends shall be immediately sealed to prevent ingress of moisture. Cables shall not be transported to site in loose coils but a number of short lengths of cable may be transported on the same drum. The Contractor shall be wholly responsible for the purchase and/or hire costs of all cable drums and for the removal of these drums from site after use.

Cables shall be adequately rated for current carrying capacity under normal and short time fault conditions at the specified voltage.

The voltage drop for any circuit from origin of the installation (i.e. supply authority's terminals) and the load under steady state conditions shall not exceed $\pm 6\%$ of the nominal voltage.

The Contractor shall submit cable schedules for approval detailing ratings, sizes, lengths, method of installation and function of all individual cables. Cables shall be laid in uncut / single lengths from one termination to the other.

All cables will be identified close to their termination point by cable numbers as per cable schedule. Cable numbers will be punched on aluminum straps (2 mm thick) securely fastened to the cable and wrapped around it. Alternatively cable tags shall be circular in construction to which cable numbers can be conveniently punched. Each underground cable shall be provided with identity tags of lead securely fastened every 30 M of its underground length with at least one tag at each end before the cable enters the ground. Unpaved area, cable trenches shall be identified by means of markers as per standards.

The all cables shall be supplied, installed/laid, tested & commissioned as per general specification for electrical works given in CPWD latest publications.

1.20 Standards

The cables offered shall conform to the latest revision of relevant Indian Standard Specifications Some of these standard are list below

Sr.

No.	Indian Standard	Title
1	7098	XLPE insulated electrical cables for working voltages up to 1100V
2	8130	Conductors for insulated electric cables and flexible cords.
3	5831	PVC insulation & Sheath of electric cables.
4	3975	Mild steel wires, strips and tapes for armoring of cables.
5	2633	Methods of testing weight, uniformity of coating, thickness on hot dip galvanized articles.
6	3961	Recommended current ratings for cables- PVC insulated and PVC sheathed.
7	1753	Aluminum conductors for insulators cables.

1.21 Principal Parameter

- The LT XLPE power cables shall be used outdoors/indoor, directly buried, through pipes/duct, or laid over the tray / wall etc.
- The cable shall meet the requirement of IS specifications listed above and the general technical requirement detailed below.

1.22 General Technical Requirement

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Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

- a. The cables shall be brand new. It shall be suitable for laying in provided trenches or in provided DWC/RCC/HDPE pipes or laid over the tray / wall etc.
- b. All LT XLPE power cables shall be 1100 V grade with aluminum Conductor, XLPE insulated, inner sheathed, armored & over all PVC sheathed.
- c. The construction of the conductors shall be stranded for aluminum cables. Conductors of nominal area of 25sq.mm shall be circular. Those above may be circular or oval shaped.
- d. The core insulation shall be with XLPE compound applied over the conductor by extrusion duly & shall conform to the type A compound of IS –5831.
- e. The inner sheath shall be applied over the laid up cores by extrusion and shall be of XLPE conforming to the requirements of type ST1 PVC compound. The extruded inner sheath shall be of uniform thickness of 0.5 mm upto 16 sq.mm 0.8mm up to 120sq.mm & 1.0mm above 120sq.mm conductor size.
- f. The armoring shall be by single round galvanized steel wires for cable diameter up to 13 mm and galvanized round steel for cables diameters above 13mm.
- g. The outer sheath of the cables shall be applied by extrusion and shall be of PVC compound. Suitable chemicals shall be added to the PVC compound of the outer sheath to protect the cable against rodent and termite attack.
- h. The dimensions of the insulation armour and outer sheath materials shall be governed by IS specification.

1.23 Cable Laying

Cables should be reeled / released out from their drums in such a way that no kinks are formed; and damage, twists, excess band of the cables is not allowed. The drums should be mounted on a rollers / jack, which is supported on two ends in such a way, that the drum is lifted off the ground and is free to rotate.

Standard cable grips and reel shall be used for cable pulling. Care shall be taken to avoid damage to the cable / insulation or stressing the cable beyond manufacturers recommendations.

Where groups of power and control cables are to be laid along the same route, suitable barriers to segregate them physically shall be employed.

Cables should be laid in single layer wherever possible. In each cable run, some extra length shall be kept at pole location & as directed by Engineer Incharge.

Where lengths of more than 10 m are being rolled off a drum, cable runners (roller assemblies) should be used to prevent abrasion damage to the cables.

Cables shall be laid in provided Trench / DWC / RCC Pipe or laid over the tray / wall etc.

In Ground

Once the excavation of trench is completed, then sand bedding of thickness not less than 75 mm shall be laid uniformly all along the width of the trench. The cable/s is/are laid on the bedding of sand by maintaining requisite space in Between. To maintain the spacing Between cables, RCC spacers as shown shall be used at an interval of 10mtr. On completion of laying of first layer of cables, another layer of sand bedding of thickness not less than 75 mm shall be laid uniformly over the cable so that the cable is covered properly. RCC tiles or RCC half round cover with embossing of HT/LT cable, month and year of laying shall be placed in continues length over the cable .For laying of second and third layer cable, procedure followed for first need to be repeated completely. Once all the cables are laid and covered with RCC tiles or Half round RCC pipe then remaining portion of the trench shall be filled with excavated soil and then the surface is to be compacted, levelled by using water and ramming.

Along with above procedure, it is also necessary to follow and comply with other requirement laid down in IS code of practice IS: 1255/1983 amended up to date. For laying HT/LT cable using good engineering practices.

At road crossing, Cables shall run through hume pipes connected each other with cemented collars so the cables are protected from injury by a pick axe or any sharp implement which could be used later on for excavation wherever road crossing is involved.

Excavation:

This part of specification deals with preparation of trenches in soft soil, hard murum, BT road, any laying of cables inside the trench, etc as per IS: 1255.

Scope

Specification no

Excavating in all types of soil strata and making trench for laying cable/cables, providing sand bed for laying the cable, covering cable with specified material as per requirement, and finishing the same by making the surface proper with crown on top of the trench

The following list shown Indian Standards, which are acceptable as good practice, and accepted standards.

SP 30: 1984	:	Nation Electrical Code
SP 7 (Group 4):2005	:	National Building Code
Is 1255: 1967	:	Code of practice of Installation & maintenance of armoured cables up to 33 kV.

Material

Bricks: Solid clay bricks of minimum size 225 x 110 x 62.5 mm (L x B x H), burnt in the kiln, of good quality.

Send: Screened sand of good quality.

Method of construction

Trench in soft soil/Hard Murum /Tar road: Single run of cable.

Before excavating the soil for preparing trench, route of cable laying shall be got finalized from the site In charge. Trench of minimum 300 mm width shall be excavated up to minimum depth below the ground surface as per table no 17.1/1 Bottom of the trench should be carefully leveled and freed from stones. Cable duly straightened shall be laid flat and embedded in the 200 mm layer of screened sand at the bottom of the trench. Bricks shall be laid all over the run of cables as specified below.

Lengthwise for cable up to and including 10 sq. mm. of all cores.

Widthwise for cable above 10 sq. mm of all cores.

Remaining portion of trench shall be back filled with the excavated material after removing stones and sharp/ hard material, and making the surface proper. Crown of 150 mm shall be provided over the trench. The remaining excavated material shall be removed from site and dumped in scrap yard of local authorities or at suitable place.

Trench in soft soil/Hard Murum /Tar road: Two or more cables run of cable.

Before excavating the soil for preparing trench, route of cable laying shall be got finalized from the site in- charge. Trench of minimum required width more than 300 mm. shall be excavated up to minimum depth as per table No 5 below the ground surface. Bottom of the trench should be carefully leveled and freed from stones. Cables duly straightened shall be laid flat and embedded in the 200 mm layer of screened sand. The inter ----- distance Between two cables shall be Between 200 and 400 mm at the bottom of the trench. Bricks shall be laid all over the run of cable as specified below.

Lengthwise for cable up to and including 10 Sq.mm of all cores.

Width wise for cable above 10 Sq.mm of all cores.

Remaining portion of the trench shall be back filled with the excavated material after removing stones and sharp / hard material, and making the surface proper. Grown of 150 mm shall be provided over the trench. The remaining excavated material shall be removed from site and dumped in scrap yard of Local authorities or at suitable place.

Mode of Measurement

Executed quantity shall be measured on the basis of running meter per run of cable

Minimum laying Depth of cable

Sr.

No	Voltage level of cables	Minimum depth from top of the cable
1.	Up to 1.1 kV	750 mm
2.	3.3 kV to 11kV	900 mm
3.	22kV to 33kV	1050 mm
4.	At road crossing	1000 mm
5.	At railway crossing	
	(from Bottom of sleepers to top of pipe)	1000 mm

On Trays / on Wall

Where ever the cable is to be laid on tray or on wall, the cable shall be laid in an approved manner with all clamps, ties labeling & other allied accessories.

1.24 Testing

All routine, type, acceptance tests & special test such as, oxygen, temperature index & Non-flammability test shall be carried out as specified in IS. The tenderer shall furnish copy of result of successful Type test as carried over the cable of same design, size and type mentioned in BOQ to prove that the design has successfully passed through required tests. These tests should be carried out in CPRI. The Type Test Certificate should not be more than five years old from the date of opening of tender. The tenderer shall confirm that the material supplied would be exactly inline with the design for which type tests have been conducted.

Following type tests, acceptance tests and routine tests are to be carried out in accordance with IS 7098 (Pt-I)/1988, with its latest amendments as indicated below: -

1.24.1 The following shall constitute type tests

Sr.

No.	Tests	For requirement Ref. to	For Test method Ref. to part No. of IS: 10810
A)	Test on Conductor		
	Conductor Resistance Test	IS: 8130 – 1984	5

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Correction.. Nil Deletion.. Nil Insertion.. Nil Overwriting.. Nil

- B) Test for thickness of insulation and Sheath: 9 & 146
- C) Physical Test for Insulation :
 - a. Tensile Strength and elongation at break IS : 7098 Table – 1 7
 - b. Ageing in Air Oven --do-- 11
 - c. Hot Test --do-- 30
 - d. Shrinkage Test --do-- 12
 - e. Water absorption (gravimetric) --do-- 33
- D) Physical Test for Outer Sheath :
 - a. Tensile Strength and elongation at break IS: 5831/1984 7
 - b. Ageing in Air Oven --do-- 11
 - c. Loss of mass in air oven --do-- 10
 - d. Shrinkage Test --do-- 12
 - e. Hot deformation --do-- 15
 - f. Thermal stability --do-- 14
- E) Insulation Resistance (Volume Resistivity Test) IS: 7098 Table - 1 43
- F) High Voltage Test IS: 7098 clause 16.2 45
- G) Flammability Test IS: 7098 clause 16.3 53

1.24.2 The following shall constitute acceptance tests: -

1. Conductor resistance test,
2. Test for thickness of insulation and sheath,
3. Hot set test for insulation,
4. Tensile strength and elongation at break of insulation and sheath,
5. High voltage test,
6. Insulation resistance (volume resistivity) test.

All the above acceptance tests will be carried out by in the presence of Engineer In charge as per relevant IS at the time of material inspection.

1.24.3 The following shall constitute routine test: -

1. Conductor Resistance test,
2. High voltage test,
3. Partial discharge test.

1.25 Termination

All XLPE cables up to 1.1KV grade shall be terminated at the equipment's by means of cable glands. They shall have a screwed nipple with conduit electrical threads and check nut.

Cable leads shall be terminated at the equipment terminals, by means of crimped type lugs. When crimping the lug to the cable, proper crimping tool to suit the size of lug / cable is to be used.

EARTHING

1.26 General

All the non-current carrying metal parts of the electrical installation and mechanical equipment shall be earthed properly. The metal conduits, trunking, cables armour and sheath, electric panels boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified Earthing system.

An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards, to the conduit system, earth stud of the switch box, lighting fixture, earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the Earthing system.

The all earthing shall be designed, fabricated, supplied, installed, tested & commissioned as per general specification for electrical works given in CPWD latest publications.

1.27 Scope of Work

The scope of work shall cover supply, laying, installation, connecting, testing and commissioning of:

1. Earthing station.
2. Earthing G.I./ Copper strips from Earthing station to Equipotential bar.
3. Earthing GI/ Copper strips/ wires from Equipotential bar to lay feeder mains and circuit to connect power panels, DB's, switchboards etc.
4. Bonding of Non-current carrying parts, and metallic parts of the electrical installation

1.28 Standards

The following standards and rules shall be applicable:

IS: 3043 - 1966 Code of practice for Earthing.

Indian Electricity Act and Rules.

1.29 Equipment and Structure Earthing

Earthing pads shall be provided for the apparatus/equipment at accessible position. The connection Between earthing pads and the earthing grid shall be made by two short earthing leads (one direct and another through the support structure) free from kinks and splices. In case earthing pads are not provided on the item to be earthed, same shall be provided in consultation with Owner.

Whether specifically shown in drawings or not, steel/RCC columns, metallic stairs etc. shall be connected to the nearby earthing grid conductor by two earthing leads. Electrical continuity shall be ensured by bonding different sections of hand-rails and metallic stairs.

Metallic pipes, conduits and cable tray sections for cable installation shall be bonded to ensure electrical continuity and connected to earthing conductors at regular interval. Apart from intermediate connections, beginning points shall also be connected to earthing system.

Metallic conduits shall not be used as earth continuity conductor.

Wherever earthing conductor crosses or runs along metallic structures such as gas, water, steam conduits, etc. and steel reinforcement in concrete it shall be bonded to the same.

INSTALLATION, TESTING AND COMMISSIONING

1.30 General

1.30.1 Scope

The Scope Includes Supply installation, test and commissioning of entire electrical work from the point of 33/22 KV power supply point to all points of power upto light and earthing utilizations, etc. The scope includes civil work for all electrical Works under this package. The scope also includes the liaison work for requirement of approval from licensee, statutory authorities.

The all required material supply, except for free supply items (if any) from client shall be included in the scope of work of bidder, even if not mentioned, but required to complete the electrification work under this scope. No separate claim for such item shall be claimed by contractor. If such items are identified by contractor for any clarifications, ambiguity, the same shall be clarified prior to placement of order. Contractor shall not claim on any extra item than after.

1.30.2 Equipment Erection Details

For equipment interconnection, the surfaces of equipment terminal pads, copper tube, conductor & terminal clamps and connectors shall be properly cleaned. After cleaning, contact grease shall be applied on the contact surfaces of equipment terminal pad, copper tube /conductor and terminal clamps to avoid any air gap in Between. Subsequently bolts of the terminal

pad/terminal connectors shall be tightened and the surfaces shall be cleaned properly after equipment interconnection.

Cutting of the pipes wherever required shall be such as to avoid flaring of the ends. Hence only a proper pipe cutting tool shall be used. Hack saw shall not be used.

Handling of equipment shall be done strictly as per manufacturer's/supplier's instructions/ instruction manual.

Handling equipment, sling ropes etc. should be tested periodically before erection for strength.

The slings shall be of sufficient length to avoid any damage to insulator due to excessive swing, scratching by sling ropes etc.

1.30.3 Storage

The Contractor shall provide and construct adequate storage shed for proper storage of equipment's, where sensitive equipment's shall be stored indoors. All equipment's during storage shall be protected against damage due to acts of nature or accidents. The storage instructions of the equipment manufacturer/Owner shall be strictly adhered to.

1.31 Earthing

1.31.1 Scope

The scope includes supply, install, test and commissioning with all items required for earthing.

The earthing shall be done in accordance with requirements given here under and drawings. Measurement of soil resistivity and earth mat design calculations for switchyard area shall be submitted by contractor for review by client. The main earth mat shall be laid in the switchyard area in accordance with the approved design requirements.

Neutral points of systems of different voltages, metallic enclosures and frame works associated with all current carrying equipment's and extraneous metal works associated with electric system shall be connected to a single earthing system unless stipulated otherwise.

Earthing and lightning protection system installation shall be in strict accordance with the latest editions of Indian Electricity Rules, relevant Indian Standards and Codes of practice and Regulations existing in the locality where the system is installed.

a) Code of practice for Earthing IS: 3043

b) Code of practice for the protection of Building and an allied structure against lightning IS: 2309.

c) Indian Electricity Rules 1956 with latest amendments.

d) National Electricity Safety code IEEE publication.

1.31.2 Earthing Conductor Layout

Earthing conductors in outdoor areas shall be buried at least 900 mm below finished ground level unless stated otherwise.

Tap-connections from the earthing grid to the equipment/structure to be earthed shall be terminated on the earthing terminals of the equipment/structure as per "Earthing Details".

Earthing conductors or leads along their run on cable trench, ladder, walls etc. shall be supported by suitable welding/cleating at intervals of 750 mm. Wherever it passes through walls, floors

etc., galvanized iron sleeves shall be provided for the passage of the conductor and both ends of the sleeve shall be sealed to prevent the passage of water through the sleeves.

Earthing conductor around the building shall be buried in earth at a minimum distance of 1000 mm from the outer boundary of the building. In case high temperature is encountered at some location, the earthing conductor shall be laid minimum 1500 mm away from such location.

Earthing conductors crossing the road shall be laid 300 mm below road or at greater depth to suit the site conditions.

Earthing conductors embedded in the concrete shall have approximately 50 mm concrete cover.

1.31.3 Equipment and Structure Earthing

Earthing pads shall be provided for the apparatus/equipment at accessible position. The connection Between earthing pads and the earthing grid shall be made by two short earthing leads (one direct and another through the support structure) free from kinks and splices. In case earthing pads are not provided on the item to be earthed, same shall be provided in consultation with Owner.

Whether specifically shown in drawings or not, steel/RCC columns, metallic stairs etc. shall be connected to the nearby earthing grid conductor by two earthing leads. Electrical continuity shall be ensured by bonding different sections of hand-rails and metallic stairs.

Metallic pipes, conduits and cable tray sections for cable installation shall be bonded to ensure electrical continuity and connected to earthing conductors at regular interval. Apart from intermediate connections, beginning points shall also be connected to earthing system.

Metallic conduits shall not be used as earth continuity conductor.

Wherever earthing conductor crosses or runs along metallic structures such as gas, water, steam conduits, etc. and steel reinforcement in concrete it shall be bonded to the same.

1.31.4 Jointing

Earthing connections with equipment earthing pads shall be bolted type. Contact surfaces shall be free from scale, paint, enamel, grease, rust or dirt. Two bolts shall be provided for making each connection. Equipment bolted connections, after being checked and tested, shall be painted with anti-corrosive paint/compound.

Connection Between equipment earthing lead and main earthing conductors and Between main earthing conductors shall be welded type. For rust protections, the welds should be treated with red lead and afterwards coated with two layers bitumen compound to prevent Corrosion.

Steel to copper connections shall be brazed type and shall be treated to prevent moisture ingress.

Resistance of the joint shall not be more than the resistance of the equivalent length of the conductor.

All ground connections shall be made by electric arc welding. All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on it. Artificial cooling shall not be allowed.

Bending of earthing rod shall be done preferably by gas heating.

All arc welding with large dia. conductors shall be done with low hydrogen content electrodes.

The 50x6mm G.I flat shall be clamped with the equipment support structures at 1000mm interval.

1.31.5 Power Cable Earthing

Metallic sheaths and armour of all multi core power cables shall be earthed at both equipment and switchgear end. Sheath and armour of single core power cables shall be earthed at switchgear end only.

1.31.6 Earthing Conductors

1.31.6.1 General

All conductors buried in earth and concrete shall be of galvanized steel/ Copper. All conductors above ground level and earthing leads shall be of galvanized steel, except for cable trench earthing.

1.31.6.2 Constructional Features of Galvanized Steel

a) Steel conductors above ground level shall be galvanized according to IS: 2629.

b) The minimum weight of the zinc coating shall be 610 gm/sq. m. and minimum thickness shall be 85 microns.

a) The galvanized surfaces shall consist of a continuous and uniformly thick coating of zinc, firmly adhering to the surfaces of steel. The finished surface shall be clean and smooth and shall be free from defects like discolored patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surfaces, flaking or peeling off etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.

1.31.6.3 Tests

In accordance with stipulations of the specifications galvanized steel shall be subjected to four one minute dips in copper sulphate solution as per IS: 2633.

Procedure for Soil Resistivity Measurement

Soil resistivity measurement should be carried out with the earth tester. Please check the calibration report before performing the measurement. Also check

The measurement should be strictly followed as per procedure given in IS

1.31.7 Some Guidelines

- The depth of burial of electrode 1/20th of electrode separation
- Electrodes to be in straight line & co-planar
- Minimum spacing 0.5 m to 1.0 m
- Preferred electrode spacing;
- 0.5, 1, 2, 4, 8, 16, 20, 32 (Small station) or
- 0.5, 1, 2, 5, 10, 20, 50 (Large station) etc
- Resistivity should be measured in all 8 directions
- For good contact stand electrode in tamped mud or pour a little water around it
- If resistivity reading is inconsistent repeat it by varying 's'
- Ensure current and potential circuits do not have excessive resistance due to poor connection or excessive resistance near electrodes
- Lay wires to electrodes to minimize mutual inductance
- Avoid recently filled area

- Resistivity measured for electrode spacing 'a' is a measure of resistivity up to depth 'a'
- Prepare graph of resistivity versus electrode spacing, which reflects variation of soil resistivity with respect to depth

1.32 Transformer

1.32.1 Erection

Transformer complete with radiators, bushings, conservator and miscellaneous accessories shall be thoroughly inspected and any damage noticed shall be reported to the Engineer-in-charge.

Before charging of Transformer, the level of rails on foundation shall be checked and minor corrections if necessary shall be carried out. After the completion of erection, necessary stoppers shall be provided at the wheels. All loosely supplied fittings / accessories shall be cleaned and mounted on the Transformer and connections made. All cover bolts shall be checked for proper tightness. (The foundation of transformer, providing and fixing of rail shall be included in the scope of contractor.)

1.32.2 Testing

Winding insulation resistance shall be measured from primary and secondary to ground and Between primary and secondary.

Check the polarity of terminals and the phase sequence.

- i. Proforma for transformer tests :
- ii. Transformer name plate.
- iii. Insulation resistance test with 1000 V/2500 V / 5000 V megger.
 - Between primary to earth.
 - Between secondary to earth.
 - Between primary and secondary.
- iv. Operation of Buchholz relay as per manufacturer's instructions.
- v. Operation of the tap changer.
 - Operation of the tap at tap No. 1
 - Operation of the tap at tap No. 2
 - Operation of the tap at tap No. 3
 - Operation of the tap at tap No. 4
 - Operation of the tap at tap No. 5
- vi. Polarity marking and phase sequence.
- vii. Conditions of silica gel crystals.
- viii. Earth resistance: Neutral Tank.
 - This Performa shall be jointly signed by the Engineer-in-charge and the contractor in duplicate

1.33 LT Panels, Distribution Boards, Control Panels

1.33.1 Erection

Electrical panels shall be delivered in convenient shipping section. The contractor shall make his own arrangement for safe transportation of all the items to the erection site and also carry out complete loading/unloading during transportation. The contractor shall be responsible for final assembly and inter connection of bus bar / wiring. Foundation channel shall be grouted in the

flooring by the contractor. Switchgear shall be aligned and leveled on their base channels and bolted or tack welded to them as per the instructions of the Engineer-in-charge. The earth bus shall be made continuous throughout the length. Loosely supplied relays and instruments shall be mounted and connected on the Switchgear. The contacts of the draw-out circuit breakers shall be checked for proper alignment and interchangeability.

After erection the switch board shall be inspected for dust and vermin proof. Any hole which might allow dust or vermin etc. to enter the panel shall be plugged suitably at no extra cost.

If the instrument transformers are supplied separately they shall be erected as per the direction of the Engineer-in-charge. The contractor shall fix the cable glands after drilling the bottom/ top plates of all switch boards with suitable holes at no extra cost.

Range of overload relays/timers etc. shall be checked with requirement of motor actually to be connected at site and shall be provided accordingly.

The opening in the wall where the Cables enters the switchgear room shall be sealed to avoid rain water entry.

1.33.2 Testing:

Before electrical panel is energized, the insulation resistance of each bus shall be measured from phase to ground. Measurement shall be repeated with circuit breakers in operating positions and contacts open.

Before switchgear is energized, the insulation resistance of all control circuits shall be measured from line to ground.

The following tests shall be performed on all circuit breakers during erection.

- i. Contact alignment and wipe shall be checked and adjusted where necessary in accordance with the breaker manufacturer's instructions.
- ii. Each circuit breaker shall be drawn out of its cubicles, closed manually and its insulation resistance measured from phase to phase and phase to ground.
- iii. All adjustable direct acting trip devices shall be set using values given by the Engineer-in-charge / manufacturer.
- iv. Close and trip the circuit breaker from its local control switch push button or operating handle. Switch gear control bus may be energized to permit test operation of circuit breaker with AC closing with prior permission of the Engineer-in-charge.
- v. Test tripping of the electrically operated circuit breaker by operating mechanical trip device.
- vi. Test proper operation of circuit breakers latch, check carriage limit switch if provided.
- vii. Test proper operation of lock-out device in the closing circuit. Wherever provided by simulating conditions which would cause a lock-out to occur.
- viii. Trip breaker either manually or by applying current or voltage to each of its associated protective relays.
- ix. Before switchgear is energized, the tests covered above shall be repeated with each breaker in its normal operating position.

- x. Capacitor banks shall be tested as per manufacturer's instructions. In addition, test for output and /or capacitance, Insulation resistance test and test for efficiency of discharge device shall be carried out.
- xi. All electrical equipment alarms shall be tested for proper operation by causing alarms to sound under simulated abnormal conditions.

1.33.3 Proforma For LT Panels, Distribution Board, And Control Panel Test.

- i. Insulation resistance test (contacts open, Breaker racked in position).
 - Between each phase of bus : Mega ohm
 - Between each phase & earth : Mega ohm
 - DC and AC control & auxiliary circuits. : Mega ohm
 - Between each phase of CT/PT and : Mega ohm
- ii. Between CT & PT circuit if any
 - CT ratio.
 - CT secondary resistance.
 - CT polarity check.
- iii. Check for contact alignment and wipe.
- iv. Check / Test all releases / relays.
- v. Check mechanical interlocks.
- vi. Check electrical interlocks.
- vii. Check switchgear / control panel wiring.
- viii. Check breaker / contractor circuit for
 - Closing-local and remote (wherever applicable)
 - Tripping-local and remote (wherever applicable)
 - Opening time of breaker/ contractor
 - Closing time of breaker/ contractor

This Performa shall be jointly signed by the Engineer-in-charge and the contractor in duplicate.

1.34 Cabling Along With Accessories

1.34.1 Cabling

The Distribution Cable shall be L.T XLPE Aluminium conductor 1.1 KV Grade and shall be as per IS 7098.

1.34.2 Trenching for Laying of Cables (Underground System):

The cable trench work involves earth excavation in all types of soil, murum, hard rock and asphalted road surface back filling and removal of excess earth from site. The work site shall be left as clean as possible.

Cables shall be so laid in trench in such away, that it shall not interfere with other underground structure. Like water pipes, sewage lines or other structures. The services which become exposed by excavation shall be properly supported and protected from injury until the filling has been rammed solidly in places under and around them. Any telephone or other cables coming in the way are to be properly shielded / diverted as directed by the engineer in charge
Cable shall be laid at minimum depth as specified. for L.T cable from ground level. The width of trench shall be sufficient for laying of required no. of cables.

Sand bedding 75 mm. thick shall be made below and above the cables. Layer of precast RCC tiles shall be laid above sand bedding to cover cable completely. More than one cable can be laid in the same trench by providing adequate clearance Between two cables. However, the relative location of cables in trench shall be maintained till termination. The surface of the ground

after back filling the earth shall be made good so as to conform in all respects to the surrounded ground and to the entire satisfaction of the engineer in charge / consultant.

For all underground cables, route markers should be used:

- a) Separate route markers should be used for LT and telephone cables.
- b) Cable markers should be installed at an interval not exceeding 30 mtr. Along the straight routes of cables at a distance of 0.5 mtr. Away from centre of cable with the arrow marked on the cable markers plate indicating the location of cable. Cable markers should also be used to identify change in direction of cable route and for location of every joint in underground cable.

H.D.P.E pipe for crossing road in cable laying shall be provided by employer. No deduction shall be made for cable laying in Hume pipe for not providing tiles, sand and excavation. RCC hump pipe at the ends shall be sealed by bituminous compound after laying and testing of cables by electrical contractor without any extra charge.

The trench shall be excavated using manual and mechanical methods as per field conditions. Most main roads are of asphalt surface and some of the roads with cement concrete surface.

An air compressor with pneumatic drill or equivalent mechanical tool will be essential if the road crossings are to be speedily made. Special system of laying Hume pipe under road without digging the surface may be adopted if feasible.

Where paved footpaths are encountered, the pavement slabs shall be properly stored and reinstated. Identification markers of other services shall be properly stored and restored.

The sides of the excavated trenches shall, wherever required, be well shored up with timber and sheeting.

Suitable wooden/ sheet steel barriers should be erected Between the cable trench and pedestrian/ motorway to prevent accidents. The barrier could be made out of sheet steel or wood planks. These could be portable types of size 1.5 m long by 1.2 m (height). These should be painted with red and white colored cross stripes. Warning and caution boards should be conspicuously displayed. Red lights as warning signal should be placed along the trench during the nights.

The excavated material shall be properly stored to avoid obstruction to public and traffic movement.

The bottom of the excavated trench should be leveled flat and free from any object, which would damage the cables. Any gradient encountered shall be gradual.

1.34.3 Cable Termination and Connections

The termination and connection of cables shall be done strictly in accordance with cable and termination kit manufacturer's instructions and relevant IS Codes.

The work shall include all clamping, fittings, fixing, plumbing, soldering, drilling, cutting, taping, heat shrinking (wherever applicable), connecting to cable terminal, shorting and grounding as required to complete the job.

Supply of all consumable, material, shall included in the scope of work and quoted offer by the Contractor.

The equipment will be generally provided with un-drilled gland plates for cables/conduit entry. The Contractor shall be responsible for drilling of gland plates as required using proper tools, painting and touching up. Holes shall not be made by gas cutting.

Control cable cores entering control panel/switchgear/ MCCB/MCC/miscellaneous panels shall be neatly bunched, clamped and tied with nylon strap or PVC perforated strap to keep them in position.

The Contractor shall tag/ferrule control cable cores at all terminations, as instructed by the engineer in charge. In panels where a large number of cables are to be terminated and cable identification may be difficult, each core ferrule may include the complete cable number as well.

Spare cores shall be similarly tagged with cable numbers and coiled up.

All cable entry points shall be sealed and made vermin and dust proof. Unused openings shall be effectively closed.

Double compression type nickel plated (coating thickness not less than 10 microns) brass cable glands shall be part of the quoted work. All power and control cables shall be provided with dust and weather proof terminations.

The cable glands shall conform to IS: 6121. They shall comprise of heavy duty brass casting, machine finished and nickel plated, to avoid corrosion and oxidation. Rubber components used in cable glands shall be neoprene and of tested quality. Cable glands shall be of approved make.

The cable glands shall also be suitable for dust proof and weather proof termination. The test procedure, for cable gland shall be as per manufacturer.

If the cable-end box or terminal enclosure provided on the equipment is found unsuitable and requires modification, the same shall be carried out by the Contractor, as directed by the engineer in charge.

Crimping tool used shall be of approved design and make.

Cable lugs shall be tinned copper solder-less crimping type conforming to IS-8309 & 8394. Bimetallic lugs shall be used depending upon type of cables used.

Solder-less crimping of terminals shall be done by using corrosion inhibitory compound. The cable lugs shall suit the type of terminals provided.

1.34.4 Storage and Handling of Cable Drums

Cable drums shall be unloaded, handled and stored in an approved manner. Rolling of drums shall be avoided as far as possible. For short distances, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum.

1.34.5 Directly Buried Cables/ Cables Laid In Ducts Underground

The Contractor shall construct the cable trenches required for directly buried cables. The scope of work shall include excavation in all type of soils, hard rock, murum and road, preparation of sand bedding, soil cover, supply and installation of pre-cast concrete protective covers, PVC/RCC Pipes, back filling and ramming, supply and installation of route markers and joint markers and construction of chamber etc.. The Bidder shall ascertain the soil conditions prevailing at site, and include the costing in the quoting.

The cable (power and control) Between LT stations, control room, building and fire lighting, pump house shall be laid in the cable trenches. In addition to the above, for lighting purpose also, buried cable trench can be used in outdoor area with cables laid in ducts, underground etc.

Cable route and joint markers and RCC warning covers shall be provided wherever required. The voltage grade of cables shall be engraved on the marker.

Cables wherever are to be placed in ducts shall be placed on cable jacks. They shall be guided through the ducts by means of the draw rope where possible. Threading shall be from one manhole or joint box or hand hole or chamber to the adjacent one, one span at a time. Cable shall not be allowed to rub excessively against the walls of the duct whilst being threaded in to avoid damage. The cable ends must be properly sealed. Any joints when necessary must be made at the manhole or joint box only and on no account will there be a joint outside these. Cables must have straight runs Between manholes or chambers.

Tension as specified by the cable manufacturer for a particular type of cable shall only be put on a cable whilst pulling it into a duct.

1.34.6 Installation of Cables

Cabling in the control room shall be done on ladder type cable trays while cabling in switchyard area shall be done on angles in the trench and for Electrical to container terminal it will be done in PVC conduits laid underground.

All cables from bay cable trench to equipment's including and all internal, cables (both power and control) for all equipment, shall be laid in PVC pipes of required diameter as per IS: 4985 which shall be buried in the ground at a specified depth below finish formation level. Separate PVC pipes shall be laid for control and power cables.

Cables shall be generally located adjoining the electrical equipment through the pipe insert embedded in the floor. In the case of equipment's located away from cable trench either pipe inserts shall be embedded in the floor connecting the cable trench and the equipment or in case the distance is small, notch/opening on the wall shall be provided. In all these cases necessary to maintain the bending radius as recommended by the cable manufacturer.

Cable racks and supports shall be painted after installation with two coats of metal primer (comprising of red oxide and zinc chromate in a synthetic medium) followed by two finishing coats of aluminum paint. The red oxide and zinc chromate shall conform to IS: 2074.

Suitable arrangement should be used Between fixed pipe / cable trays and equipment terminal boxes, where vibration is anticipated.

Power and control cables in the cable trench shall be laid in separate tiers. The order of laying of various cables shall be as follows, for cables other than directly buried.

- a) Power cables on bottom tiers.
- b) Control instrumentation and other service cables in top tiers.

Power and control cables shall be securely fixed to the trays/supports with self-locking type nylon ties with de-interlocking facility at every 5 meter interval for horizontal run. Vertical and inclined cable runs shall be secured with 25 mm wide and 2 mm thick aluminum strip clamps at every 2m.

Cables shall not be bent more than the minimum permissible limit. The permissible limits are as follows:

- Cable and Minimum bending radius
- Power cable 12 D, above 60mm dia 15 OD
- Control cable 10 D
- D is overall diameter of cable

In each cable run some extra length shall be kept at a suitable point to enable one (for LT cables) straight through joints to be made in case the cable develop fault at a later date.

Selection of cable drums for each run shall be so planned as to avoid using straight through joints. Cable splices will not be permitted except where called for, unavoidable or where permitted by the engineer in charge. If straight through joints are unavoidable, the Contractor shall use the straight through joints kit of reputed make. The cost of the same shall be deemed to have included in the respective cable item

Control cable terminations inside equipment enclosures shall have sufficient lengths so that changing of termination in terminal blocks can be done without requiring any splicing.

Metal screen and armour of the cable shall be bonded to the earthing system of the station, wherever required. Rollers shall be used at intervals of about two meters while pulling cables.

All due care shall be taken during unreeling, laying and termination of cable to avoid damage due to twist, kinks, sharp bends, etc.

Cable ends shall be kept sealed to prevent damage. In cable vault, fire resistant seal shall be provided underneath the panels.

Inspection on receipt, unloading and handling of cables shall generally be in accordance with IS: 1255 and other Indian Standard Codes of practices.

Wherever cable pass through floor or through wall openings or other partitions, GI/PVC wall sleeves with bushes having a smooth curved internal surface so as not to damage the cable, shall be supplied, installed and properly sealed by the Contractor at no extra charges.

Contractor shall remove the RCC/Steel trench covers before taking up the work wherever provided and shall replay the covers after the erection-work in particular area is completed or when further work is not likely to be taken up for some time.

Contractor shall furnish three copies of the report on work carried out in a particular week, indicating cable numbers, date on which laid, actual length and route, testing carried out, terminations carried out, along with the marked up copy of the cable schedule and interconnection drawing wherever any modifications are made. Contractor shall paint the tray identification number on each run of trays at an interval of 10 m.

In case any other part of a cable is damaged, the same shall be replaced by a healthy cable at no extra cost to the Owner, i.e. the Contractor shall not be paid for installation and removal of the damaged cable.

All cable terminations shall be appropriately tightened to ensure secure and reliable connections. The Contractor shall cover the exposed part of all cable lugs whether supplied by him or not with insulating tape, sleeve or paint.

The cable end seals shall be checked after laying and, if found damaged, shall immediately be resealed. Sufficient number of heat shrinkable cable end sealing caps shall be stocked at site stores for testing and jointing work. The integrity of the outer sheath shall be checked after the cable is laid in position.

1.34.7 RCC Hume Pipe

RCC hume pipe shall be of NP2 class dia as specified in the BOQ complete with collar jointing, excavation in all types of soil, hard rock, murrum etc... up to a depth of 1 meter including back filling & sealing of ends to avoid choking of pipes.

The jointing of pipes shall be only through collar joints with cementing at end of the collars.

1.34.8 Proforma for testing cables:

- i. Drum No. from which cable taken.
- ii. Cable from ---- to -----
- iii. Length of run of this cable -----meter
- iv. Insulation resistance test
 - Between core 1 to earth : Mega ohm
 - Between core 2 to earth : Mega ohm
 - Between core 3 to earth : Mega ohm
 - Between core 1 to core 2 : Mega ohm
 - Between core 2 to core 3 : Mega ohm
 - Between core 1 to core 3 : Mega ohm
- v. High voltage test
 - Between core an earth.
 - Between individual cores

This proforma shall be jointly signed by the Engineer-in-charge and the contractor in duplicate.

1.35 Installation of Lighting Fixtures

Scope of work under this item shall start from light point, with a connector/ ceiling Rose ,with minimum 1.5 mm.² PVC insulated wires from the point to the connector inside the lighting fixture, connections, fixing of lighting fixture complete with all accessories including supports, down rods lamps on wall / roof / steel truss etc. testing the lighting fixture and commissioning.

1.36 Minimum Tool Box

1.36.1 HT Equipment's & Cables

Sr. No	Item Description	Item Specification	Qty	per Gang	Remarks
UNDERGROUND CABLING					
1	Insulated Crow Bar	5 feet steel rod with nylon insulated grip for half-length			Qty as per number of gang members
2	Rollers for cable pulling	Steel rollers fixed on frame used at 2m interval and at turnings (valid for cable laid directly in ground). For cables laid in ducts pulleys to be provided.			Qty as per length of cable trench
3	Jack for cable drums	Jacks with suitable strength for lifting cable drum through one feet height			At least one set

SAFETY GADGETS

1	Helmets	Yellow without flap Qty as per number of gang members White normal For Engineer/supervisor
2	Road barricades	2m x 1.5m (H) pipe structure painted yellow At regular intervals as per site requirement
3	Red Flag	Red cotton cloth of adequate size to indicate danger As per site requirement
4	Luminous Warning Board	Minimum 2 Nos
5	Caution Tape	Red printing on white back ground Running Cable length
6	First Aid Kit	Minimum one set
7	Safety Shoes	Qty as per number of gang members

TESTING & MEASURING EQUIPMENT'S

1	HV Tester	0-30/60kV, 0-100mA	1 No
2	Megger	5kV, Hand Held manual driven	1 No Electronic megger is optional

Sr. No	Item Description	Item Specification	Qty per Gang minimum	Remarks
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HT EQUIPMENT'S

1	Crimping Tool	25-400sqmm	1 No
2	Cutting Pliers	8" insulated grip	1 No
3	Screw Driver	9" power grip	1 No
4	Screw Driver	4" power grip	1 No
5	Adjustable Spanner	24mm	1 No
6	Spanner	25/9 Ring Spanner set of 25	1 No
7	Hack Saw	Frame and Blade 12"	1 No
8	Knife	6"	1 No
9	Pedestal Type ladder		1 No
10	Welding Machine	with suitable cable 415V, 5kVA, 400A	1 No
11	Torches	5 Cell	1 No
12	Vice	8"	1 No
13	Drill Machine	½" Drill bits	1 No
14	Bamboo/ FRP Ladder	3m local	1 No

SAFETY GADGETS

1	Helmets	Yellow without flap Qty as per number of gang members White normal For Engineer / supervisor
2	Discharge Rods	20', 3 connectable fiber pipes 2 sets
3	Caution Board	Red letters on white back ground on plastic base board (300x400mm)
4	Hand Gloves	15kV Rubber Grip One pair
5	First Aid Kit	1 No
6	Rubber Sheets	10mm x 5' x 3' 1 No
7	Earthing Spikes	2 feet, local make 1 No For additional earthing

TESTING & MEASURING EQUIPMENT'S

1	Tester 230V	1 No	
2	Measuring metal tape	3m	1 No
3	Clip on meter 0-1000A	1 No	For engineers
4	CMRI as per specifications	1 No	For engineers
5	Cell Tester 3-0-3V	1 No	
6	Insulation Tester 1kV	1 No	
7	Insulation Tester 5kV	1 No	
8	Earth resistance tester	4 Terminal Type	1 No

1.36.2 LT Equipment's

Sr. No	Item Description	Item Specification	Qty per Gang minimum	Remarks
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TOOLS

1	Crimping Tool 25-400sqmm	1 No
2	Cutting Pliers 8" insulated grip	1 No
3	Screw Driver 9" power grip	1 No
4	Screw Driver 4" power grip	1 No
5	Adjustable Spanner 24mm	1 No
6	Spanner 24mm	1 No
7	Hack Saw Frame and Blade 12"	1 No
8	Knife 6"	1 No
9	Bamboo/ FRP Ladder 3m local	1 No

SAFETY GADGETS

1	Helmets	Yellow without flap White normal	Qty as per number of gang members For Engineer/ supervisor
2	Discharge Rods	20', 3 connectable fiber pipes	2 sets
3	Caution Board	Red letters on white back ground on plastic base board (300x400mm)	2 sets
4	Hand Gloves	15kV Rubber Grip	One pair
5	First Aid Kit	1 No	
	For additional earthing	2 feet, local make	1 No

TESTING & MEASURING EQUIPMENT'S

1	Tester 230V	1 No	
2	Measuring metal tape 3m	1 No	
3	Clip on meter 0-1000A	1 No	For engineers
4	CMRI as per specifications	1 No	For engineers
5	Earth resistance tester	1 No	Optional Item

8.0 DISTRIBUTION TRANSFORMER 400 KVA, 22/0.415 KV, 50 Hz DISTRIBUTION TRANSFORMER

8.1 This specification covers design, manufacturing, testing, delivery, testing and commissioning of outdoor type 400 kVA, 22/0.415 kV, 50 Hz THREE PHASE, DISTRIBUTION TRANSFORMERS, oil immersed, Air Natural (ONAN)

8.2 The equipment offered shall be complete with all parts necessary for their effective and trouble-free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated or not.

8.3 Tolerances:

The tolerance of guaranteed electrical performance (excluding losses) shall be as specified in the (Part-I) table 7 of latest issue of IS 2026 amended up to date .

8.4 System Particulars:-

The transformers shall be suitable for outdoor installation with following system particulars and they shall be suitable for service under fluctuations in supply voltage as permissible under Indian Electricity Rules

8.4.1	Nominal System Voltage	: 22 kV
8.4.2	Corresponding Highest System Voltage	: 24 kV
8.4.3	Neutral earthing	: Solidly earthed
8.4.4	Frequency	: 50 Hz with ± 3 % tolerance
8.4.5	Number of Phase	: 3

8.5 SERVICE CONDITIONS:

i	Max. ambient air temperature	: 45 Deg. C
ii	Max. relative humidity	: 100 %
iii	Max. annual rainfall	: 2000 mm
iv	Max. wind pressure	: 150 kg/sq.m.
v	Max. altitude above mean sea level	: 1000 mtrs.
vi	Isoceraunic level	: 50
vii	Seismic Zone Level	: 5
viii	Climatic Condition	Moderately hot and humid tropical climate conducive to rust and fungus growth.
ix	Reference Ambient Temperature for temperature rise	: 50 deg C

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

8.6 APPLICABLE STANDARDS:-

8.6.1 The design, manufacture and performance of the equipment shall comply with all currently applicable statutes, regulations and safety codes.

Nothing in this specification shall be construed to relieve the bidder off his responsibilities.

8.6.2 The Distribution Transformers shall conform to IS: 2026 as amended up to date or other International Standards for equal or better performance.

8.6.3 Unless otherwise specified, the equipment offered shall conform to latest applicable Indian, IEC, British or U.S.A. Standards and in particular, to the following:-

a. IS: 2299
IS:1180 Distribution Transformer

b. IS:335/1993
New insulating oil- Specification (fourth revision)

c.
IS:2099/1986, IS: 7421-1988, IS:3347 (Part-I /Sec-2)-1979, IS:3347 (Part-I /Sec-1)-1982
amended up to date
Bushing

d.
IS 5
Colours for ready mixed paints and enamels.

e.
IS 13730 (Part-27)1996
Specification for particular types of winding wires.

f.
IS: 3073/1974, IS: 3070(Part-II)
Specifications for L.Aís

g.
CBIP Publication No.295:2006
Manual on transformers

8.6.4 In case of conflict arising out due to variations Between the applicable standard and the standards specified herein the provisions of this specification shall prevail.

9 Specific Technical requirement:

9.1 Standard kVA Ratings: -

The standard ratings for transformer shall be 400 kVA.

9.1.1 Nominal voltage ratings

Primary voltage : 22 kV

Secondary voltage : 0.415 kV

9.1.2 W i n d i n g connections: -

H.V. Winding : Delta ()

L.V. W inding : Star (Y)

The neutral of the L.V. winding shall be brought out to a separate insulated terminal. The voltage group shall be Dyn-11.

9.2 Temperature Rise:

The temperature rise for top oil over an ambient temperature of 50°C should be 35°C maximum (measured by thermometer in accordance with IS 2299.)

Temperature rise for winding over an ambient temperature of 50°C should be 40°C maximum (measured by resistance method in accordance with IS 2299.)

9.3 No load voltage ratio:-

The no load voltage ratio shall be 22000/415 Volts.

10 Design & construction

10.1 Core

The core shall be stacked/ wound type.

For Stack core:-

The core shall be of high grade cold rolled grain oriented (C.R.G.O) annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated. The complete design of core must ensure permanency of the core losses with continuous working of the transformers.

For Wound core:-

The core shall be 'E' type construction of high grade cold rolled grain oriented (C.R.G.O.) annealed steel lamination having low loss and good grain properties, coated hot oil proof insulation or Amorphous core material. The complete design of Core must ensure permanency of the core losses with continuous working of the transformers. The core material shall not be brittle in case of CRGO material.

Core clamping for C.R.G.O./Amorphous Wound core type transformers shall be as follows:

1. Core clamping shall be with top and bottom U- shaped core clamps made of sheet steel clamped
 2. M.S. core clamps shall be painted with oil-resistant paint.
 3. Suitable provision shall be made in the bottom core clamp / bottom plate of the transformer to arrest movement of the active part.
 4. Core shall be clamped by 16 mm diameter MS Tie rods. The grade of core laminations shall be M4 or better.
- The successful bidder, shall be required to submit the manufacturer's test report showing the W att Loss per kg and the thickness of the core lamination, to ascertain the quality of Core materials.

The client reserves the right to get sample of the core material tested at any Government recognized laboratory.

The transformer core shall not be saturated for any value of V/f ratio to the extent of

112.5% of the rated value of V/f ratio (i.e. 22000/50) (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and will not get saturated. The bidder shall furnish necessary design data in support of this situation.

Flux density:-

Flux density should not be more than 1.55 Tesla at the rated voltage and frequency. The value of the flux density allowed in the design shall be clearly stated in the offer along with graph.

The No load current at rated voltage shall not exceed the percentage as given below.

The no load current of 400 KVA transformer shall not exceed 1.5 % the full load current. The no load current shall not exceed 2 times that at rated voltage when the applied voltage is 112.5%.

Number of steps of core shall be minimum of
400 kVA - 9 standard steps

10.2 Winding:-

Materials:

Double paper covered copper conductor shall be used for HV and LV winding for 22 KV class distribution transformers.

Current Density:

Current density for HV and LV winding should not be more than 2.8 A/sq. mm for Copper conductor.

L.V. Neutral formation shall be at top.

10.3 Losses:

The total losses at 50% & 100% loading for three phase, 400 kVA, 22/0.415 kV transformers at rated voltage, frequency and at 75 deg .centigrade shall not exceed the values indicated as per CPWD specification.

Tolerances:

No positive tolerance shall be allowed on the losses given in the above table for both 50% & 100 % loading values. In case the actual loss values exceed the above guaranteed values, the transformers shall be rejected at the risk, cost and responsibility of the supplier.

The values guaranteed for flux density, no load current at rated voltage, no load current at 112.5% of rated voltage and no load loss at rated voltage shall be individually met.

10.4 Insulation material & clearances:

Materials - Makes of Electrical grade insulating craft paper, Press Board, Perma wood/ Haldi wood insulation shall be declared by the bidder. The test reports for all properties as per relevant I.S. amended up to date shall be submitted during inspection.

The electrical clearance Between the winding and body of the tank (Between inside surface of the tank and outside edge of the windings) should not be less than 40 mm for 22 class respectively.

Minimum external clearances of bushing terminals

22 kV

HV	Ph to Ph	330 mm
	Ph to E	230 mm
LV	Ph-to-Ph	75 mm
	Ph to E	40 mm

10.5 Impedance Value-

The percentage impedance at 75 °C shall be 5% for 22 KV distribution transformers (± 10 % tolerance is applicable as per IS:2026).

10.6 Tank

The transformer tank shall be made up of prime quality M.S. sheets of rectangular shape.No other shape will be accepted. The transformer tank shall be of robust construction. All joints of tank and fittings should be oil tight and no bulging shall occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plates shall be of such strength that the complete transformer when filled with oil may be lifted bodily by means of the lifting lugs provided. Tank inside shall be painted by varnish. Top cover plate shall be slightly sloping; approximately 5 to 10 deg. towards HV side and edges of cover plate should be bent downwards so as to avoid entry of water through the cover plate gasket. The width of bend plate shall be 25 mm min. The top cover shall have no cut at point of lifting lug. The rectangular tank shall be fabricated by welding at corner

The transformer tank of corrugation is also acceptable, however shape of tank shall be rectangular only. The corrugation sheets thickness shall be of minimum 1.6mm. Corrugation panel shall be used for cooling. The transformer shall be capable of giving continuous rated output without exceeding the specified temperature rise. The successful Bidder shall submit the detailed calculation sheet . The safe guard angle frame 50X50X5 mm shall be welded for corrugated side to the tank.

In rectangular shape tanks, horizontal or vertical joints in tank side walls and its bottom or top cover will be not allowed. In addition the cover of the main tank shall be provided with an air release plug.

Side wall thickness : 4 mm. (min.) Top and bottom plate thickness : 6 mm. (min.)

Reinforced by welded angle 50X50X5 MM on all the outside walls on the edge of tank to form two equal compartments. The permanent deflection is not more than 5mm up to 750 mm length and 6mm up to 1250 mm length when transformer tank without oil is subject to air pressure of 35 KPa above atmospheric pressure for 30 min.

All welding operations to be carried out by MIG process.

Lifting lugs: 4 nos. welded heavy duty lifting lugs of MS plate of 8mm thickness suitably reinforced by vertical supporting flat of same thickness as of lug welded edgewise below the lug on the side wall, up to reinforcing angle. They shall be so extended that cutting of bend plate is not required.

Pulling lugs: 4 nos. of welded heavy duty pulling lugs of MS plate of 8mm thickness shall be provided to pull the transformer horizontally.

Top cover fixing bolts: GI nut bolts of 1/2" diameter with one plain washer shall be used for top cover fixing, spaced at 4" apart. 6 mm neoprene bonded cork oil resistance gaskets conforming to type B/C IS 4253 Part-II amended up to date will be placed Between tank and cover plate.

Vertical clearance: - The height of the tank shall be such that minimum vertical clearance up to the top cover plate of 120 mm is achieved from top yoke.

10.7 Heat Dissipation:

a) Heat dissipation by tank walls excluding top and bottom should be 500 W /sq.m.

b) Heat dissipation by fin type radiator 1.25 mm thick will be worked out on the basis of Manufacturers data sheet. The successful bidder shall submit the calculation sheet.

c) Radiators shall be provided only on both HV side tank wall and shall be of fin type. They should be fixed at right angle to the sides and not diagonally. The size of the radiator shall be such that it covers at least 50% of the bottom yoke, full core and complete top yoke.

10.8 Total Minimum Oil Volume :

Sr.No.

KVA rating

Voltage Ratio in

Volts

Oil in liters (exclusive of oil absorbed in core & coil assembly)

1

400 KVA

22000/415

800

Note: Transformer shall be supplied complete with first filling of oil and 10 % extra of total volume of oil in separate container/ drum to the concerned stores. Detailed calculation of absorption should be submitted.

10.9 Conservator:

The total volume of conservator shall be such as to contain 10% of total quantity of oil.

Normally 3% quantity of the total oil will be contained in the conservator.

Dimension of the conservator shall be indicated on the General Arrangement Drawing.

Oil level indicator shall be provided on the side which will be with fully covered detachable flange with single gasket and tightened with MS nut-bolt.

The inside diameter of the pipe connecting the conservator to the main tank shall be within 20 to 50 mm and it should be project into the conservator in such way that its end is approximately

20mm above the totem of the conservator so as to create a sump for collection of impurities. The minimum oil level (corresponding to (-) 5 deg.) should be above the sump level.

The pipe from conservator tank connecting to main tank shall be of 30 mm (min.) dia and shall have a slopping flap so that the oil falling from the pipe shall not fall directly on the active job and shall fall on the side walls only.

The conservator shall be provided with the drain plug and a filling hole (30mm dia) with cover.

10.10 Breather:

Breather joints will be screwed type. It shall have die-cast aluminium body or of Poly propylene materials and inside container for silica gel shall be of tin sheet, Volume of breathers shall be suitable for 500 gm. of silica gel.

10.11 Terminals:

Brass rods 12 mm. diameter for HV with necessary nuts, check-nuts and plain thick tinned washer.

Tinned Copper Rods of 30 mm diameter for 400 kVA distribution transformers for LV extension with suitable cable lugs, necessary nuts, check-nuts and plain thick tinned washer.

10.12 Bushings & Connections:

The HT bushing/ terminal shall be of class 24 kV and for 415 volts 1.0 kV bushing/terminal shall be used. Bushings/terminal of the same voltage class shall be interchangeable. Bushings/terminal with plain shed shall be as per relevant IS: 3347 amended up to date. HV and LV Bushings/terminal shall be inside the suitable IP rated cable end box mounted on the transformer tank.

The cable end boxes on /LV sides as per the table given below.

VOLTAGE KVA DETAILS LV

415 IP rated 4 P-3G Air filled cable box suitable to 3.5 core 400 sq.mm. PVC aluminum cable with copper flats fitted on LT studs to connect XLPE cable.

The HV and LV Bushings/Terminals with cable end box on LV side shall be as per relevant IS specifications amended up to date and suitable for continuous operation at all weather condition.

The minimum creep age distance for both HV & LV Bushings/ terminal shall not be less than 25 mm per kV.

10.13 Internal connections:

10.13.1 H.V. Winding:

The H . V . winding/s all jumpers from winding to bushing/ terminal shall have cross section larger than winding conductor.

Inter coil connection shall be by crimping and brazing.

The Copper Winding Delta joints shall be with crimping and Brazing only.

Lead from delta joint shall be connected to bushing/terminal rod by brazing only.

10.13.2 L.V. Winding:

L.T. Star point shall be formed of Copper flat of sufficient length. Lead from winding shall be connected to the flat by crimping and brazing.

Firm connections of L.T. winding to bushing/ terminal shall be made of adequate size of 'L' shaped flat. Connection of L.T. Coil lead to 'L' shape flat shall be by crimping and brazing. Alternatively 'L' shape lug of adequate capacity effectively crimped shall be acceptable.

'L' shape flat/lug shall be clamped to L.V. Bushing/terminal metal part by using nut, lock-nut and washers.

For copper winding crimping and silver brazing alloy shall be used.

10.14 Terminal Marking Plates and Rating Plates:

Terminals shall be provided with terminal marking plates. The transformer shall be provided with riveted rating plate of minimum 8 SWG aluminum anodized material sheet in a visible position. The entries of the rating plate shall be indelibly marked (i.e. by etching, engraving or stamping).

Marking as 'Sr. No.' of transformer shall be engraved on transformer main tank below L.T. bushings.

The name of the company, order No., capacity, month and year of manufacturing shall be engraved on separate plate which shall be firmly welded to main tank and shall form integral part of the tank.

11.0 Fittings:

The fittings on the transformers shall be as under:

- 1 Rating and diagram plate 1 no.
- 2 Earthing terminals with lugs. 2 nos.
- 3 Lifting lugs 4 nos. to tank body & 2 nos of tank cover
- 4 Oil filling hole with cap (on conservator) 1 no
- 5 Drain valve - 32mm for all T/Fs (It shall be covered with metallic box spot welded to tank) 1 no
- 6 Conservator with drain plug. 1 no
- 7 Thermometer pocket 1 no
- 8 Explosion vent 1 no
- 9 Silica gel breather 1 no
- 10 Platform mounting channel (with hole suitable for axle of rollers) 2 nos
- 11 Oil level gauge indicating 3 positions of oil marked as below : 1no
Minimum (-) 5 deg.C.
Normal 30 deg.C
Maximum 98 deg.C.
- 12 HT & LT cable end Box As per specification
- 13 Radiators As per specification

- 14 Lightning Arrestors for HT bushings
- 15 Pulling lugs 4 nos
- 16 Metallic cover spot welded to tank for drain valve shall be provided.
17. Rollers (Dia. 150 mm & width ñ 50 mm) 4 nos
18. Filter valve (32 mm dia)

12.0 Transformer Oil

Transformer oil to be used in all the Distribution transformers shall comply with the requirements of latest IS 335/1983 amended up to date thereof. In addition the oil should conform to ' Ageing Characteristics' specified below for New Oil and Oil in Transformers. Type test certificates of oil being used shall be produced to EE (IW) at the time of stage inspection.

New oil - Ageing characteristics after accelerated ageing test 96 hrs at 1158 C (open beaker method with copper catalyst):

Specific Resistance (Resistivity)

- a) At 20 9 C :- 2.5×10^{12} Ohm-Cm (Min)
- b) At 90 9 C :- 0.2×10^{12} Ohm-Cm (Min)

Dielectric dissipation factor - 0.20 (Max. tan delta) at 90 9 C

Total acidity mg/KOH/gm - 0.05 (Max)

Total sludge value (%) by weight - 0.05 (Max.)

The method of testing these aging characteristics is given in Appendix - C of IS 335 amended up to date.

Oil filled in Transformers:

The important characteristics of the transformer oil after it is filled in the transformer (within 3 months of filling) shall be as follows: -

Sr.No.	Characteristics	Specifications
1.	Electric Strength (Breakdown voltage)	IS: 335 & IS: 6792 amended up to date
2.	Dielectric dissipation factor (Tan Delta) at 90 deg.C.)	0.01 (Max)
3.	Specific Resistance (Resistivity) at 27 deg. C (ohm-cm)	10×10^{12}
4.	Flash Point, P.M. (closed)	140 9 C (Min)
5.	Inter facial tension at 27 9 C.	0.03N/M (Min)
6.	Neutralization value (total acidity)	0.05Mg.KOH/g m (Max.)
7	Water content PPM	35 (Max)

13.0 Test and Inspection:-

The transformer Test and Inspection shall be as per CPWD Technical Specifications.

INTEGRITY PACT

To,

.....,
.....,
.....

Sub: NIT No. for the work Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

Dear Sir,

It is here by declared that IIT Mandi is committed to follow the principle of transparency, equity and competitiveness in public procurement.

The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the integrity Agreement, which is an integral part of tender/bid documents, failing which the tenderer/bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.

This declaration shall form part and parcel of the Integrity Agreement and signing of the same shall be deemed as acceptance and signing of the Integrity Agreement on behalf of the IIT Mandi.

Yours faithfully

Superintending Engineer,
IIT Mandi

To,

Superintending Engineer,
IIT Mandi, Kamand campus
Distt. Mandi (H.P.)

Sub: Submission of Tender for the work of "Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi."

Dear Sir,

I/We acknowledge that IIT Mandi is committed to follow the principles thereof as enumerated in the Integrity Agreement enclosed with the tender/bid document.

I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that I/We will sign the enclosed integrity Agreement, which is an integral part of tender documents, failing which I/We will stand disqualified from the tendering process. I/We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the NIT.

I/We confirm acceptance and compliance with the Integrity Agreement in letter and spirit and further agree that execution of the said Integrity Agreement shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by IIT Mandi. I/We acknowledge and accept the duration of the Integrity Agreement, which shall be in the line with Article 1 of the enclosed Integrity Agreement.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Agreement, while submitting the tender/bid, IIT Mandi shall have unqualified, absolute and unfettered right to disqualify the tenderer/bidder and reject the tender/bid in accordance with terms and conditions of the tender/bid.

Yours faithfully

(Duly authorized signatory of the Bidder)

To be signed by the bidder and same signatory competent / authorised to sign the relevant contract on behalf of IIT Mandi.

INTEGRITY AGREEMENT

This Integrity Agreement is made at on this..... Day of..... 20.....

BETWEEN

BoG represented through Superintending Engineer, IIT Mandi (Hereinafter referred as the 'Principal/Owner', which expression shall unless repugnant to the meaning or Context hereof include its successors and permitted assigns)

AND

.....
(Name and Address of the Individual/firm/Company)

Through..... (Hereinafter referred to as the
(Details of duly authorized signatory)

"Bidder/Contractor" and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

Preamble

WHEREAS the Principal / Owner has floated the Tender (hereinafter referred to as "Tender/Bid") and intends to award, under laid down organizational procedure, contract for "Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings, providing power supply to proposed buildings (A-6,A-7, A-8), Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work f IIT Mandi." hereinafter referred to as the "Contract".

AND WHEREAS the Principal/Owner values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/transparency in its relation with its Bidder(s) and Contractor(s).

AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Agreement (hereinafter referred to as "Integrity Pact" or "Pact"), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract Between the parties.

NOW, THEREFORE, in consideration of mutual covenants contained in this Pact, the parties hereby agree as follows and this Pact witnesses as under:

Article 1: Commitment of the Principal/Owner

- 1) The Principal/Owner commits itself to take all measures necessary to prevent corruption and to observe the following principles:
 - (a) No employee of the Principal/Owner, personally or through any of his/her family members, will in connection with the Tender, or the execution of the Contract,

demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

- (b) The Principal/Owner will, during the Tender process, treat all Bidder(s) with equity and reason. The Principal/Owner will, in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the Tender process or the Contract execution.
 - (c) The Principal/Owner shall endeavor to exclude from the Tender process any person, whose conduct in the past has been of biased nature.
- 2) If the Principal/Owner obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal code (IPC)/Prevention of Corruption Act, 1988 (PC Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion in this regard, the Principal/Owner will inform the Chief Vigilance Officer and in addition can also initiate disciplinary actions as per its internal laid down policies and procedures.

Article 2: Commitment of the Bidder(s)/Contractor(s)

- 1) It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the Government / Department all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.
- 2) The Bidder(s)/Contractor(s) commit himself 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)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's employees involved in the Tender process or execution of the Contract or to any third person 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 during the Tender process or during the execution of the Contract.
 - b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) 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 cartelize in the bidding process.
 - c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act. Further the Bidder(s)/Contractor(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal/Owner as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/representatives in India, if any. Similarly Bidder(s)/Contractor(s) of Indian Nationality shall disclose names and addresses of foreign agents/representatives, if any. Either the Indian agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participate in a tender on behalf of one manufacturer, he shall not be allowed to quote on behalf of another manufacturer

along with the first manufacturer in a subsequent/parallel tender for the same item.

- e) The Bidder(s)/Contractor(s) will, when presenting 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 the Contract.
- 3) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 4) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice means a willful misrepresentation or omission of facts or submission of fake/forged documents in order to induce public official to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to the detriment of the Government interests.
- 5) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/ her reputation or property to influence their participation in the tendering process).

Article 3: Consequences of Breach

Without prejudice to any rights that may be available to the Principal/Owner under law or the Contract or its established policies and laid down procedures, the Principal/Owner shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the Bidder/ Contractor accepts and undertakes to respect and uphold the Principal/Owner's absolute right:

- 1) If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Owner after giving 14 days notice to the contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the Tender process or terminate/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Owner. Such exclusion may be forever or for a limited period as decided by the Principal/Owner.
- 2) Forfeiture of EMD/Performance Guarantee/Security Deposit: If the Principal/Owner has disqualified the Bidder(s) from the Tender process prior to the award of the Contract or terminated/determined the Contract or has accrued the right to terminate/determine the Contract according to Article 3(1), the Principal/Owner apart from exercising any legal rights that may have accrued to the Principal/Owner, may in its considered opinion forfeit the entire amount of Earnest Money Deposit, Performance Guarantee and Security Deposit of the Bidder/Contractor.
- 3) Criminal Liability: If the Principal/Owner obtains knowledge of conduct of a Bidder or Contractor, or of an employee or a representative or an associate of a Bidder or Contractor which constitutes corruption within the meaning of IPC Act, or if the Principal/Owner has substantive suspicion in this regard, the Principal/Owner will inform the same to law enforcing agencies for further investigation.

Article 4: Previous Transgression

- 1) The Bidder declares that no previous transgressions occurred in the last 5 years with any other Company in any country confirming to the anticorruption approach or with Central Government or State Government or any other Central/State Public Sector Enterprises in India that could justify his exclusion from the Tender process.
- 2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the Tender process or action can be taken for banning of business dealings/ holiday listing of the Bidder/Contractor as deemed fit by the Principal/ Owner.
- 3) If the Bidder/Contractor can prove that he has resorted / recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion, revoke the exclusion prematurely.

Article 5: Equal Treatment of all Bidders/Contractors/Subcontractors

- 1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principles laid down in this agreement/Pact by any of its Sub contractors/sub-vendors.
- 2) The Principal/Owner will enter into Pacts on identical terms as this one with all Bidders and Contractors.
- 3) The Principal/Owner will disqualify Bidders, who do not submit, the duly signed Pact Between the Principal/Owner and the bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

Article 6- Duration of the Pact

This Pact begins when both the parties have legally signed it. It expires for the Contractor/Vendor 12 months after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other bidders, till the Contract has been awarded.

If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged/determined by the Competent Authority, CPWD.

Article 7- Other Provisions

- 1) This Pact is subject to Indian Law, place of performance and jurisdiction is the Headquarters of the Principal/Owner, who has floated the Tender.
- 2) Changes and supplements need to be made in writing. Side agreements have not been made.

- 3) If the Contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Pact must be signed by a representative duly authorized by board resolution.
- 4) Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 5) It is agreed term and condition that any dispute or difference arising Between the parties with regard to the terms of this Integrity Agreement / Pact, any action taken by the Owner/Principal in accordance with this Integrity Agreement/ Pact or interpretation thereof shall not be subject to arbitration.

Article 8- LEGAL AND PRIOR RIGHTS

All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this Integrity Pact will have precedence over the Tender/Contact documents with regard any of the provisions covered under this Integrity Pact.

IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and date first above mentioned in the presence of following witnesses:

.....
 (For and on behalf of Principal/Owner)

.....
 (For and on behalf of Bidder/Contractor)

WITNESSES:

1.
 (Signature, name and address)

2.
 (Signature, name and address)

Place:

Dated:

SECTION-I
LIST OF APPROVED MAKES OF MATERIALS / ELECTRICAL ITEMS

Name of Work: - "Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi."

	Product	Make/Agencies
1	22/0.4 KV, 400 KVA Transformerr	<ul style="list-style-type: none"> • Kirlosker • Crompton Greaves • Schneider Electric
2	Static power meter & Logger (Trivector)	<ul style="list-style-type: none"> • L&T • Secure • Schneider Electric •
3	GOD Switch, DO Fuse	<ul style="list-style-type: none"> • Pactil • G.K. Electricals • Asiatic Electrical & Switchgear Pvt. Ltd.
4	Insulators	<ul style="list-style-type: none"> • BHEL • Jyoti • Modern Insulators Ltd.
5	LT Power Distribution Panel	<ul style="list-style-type: none"> • Schneider Electric • Advance Panel • Tricolite
6	Current Transformer	<ul style="list-style-type: none"> • Automatic Electric Ltd. • Kappa • Ricco
7	ACB	<ul style="list-style-type: none"> • Siemens • L&T • Schneider Electric • ABB
8	MCCB	<ul style="list-style-type: none"> • L&T • Schneider Electric • ABB
9	Bus Bar Chamber	<ul style="list-style-type: none"> • L&T • Legrand • Hager

	Product	Make/Agencies
10	Digital Multifunction Meter (Load Manager)	<ul style="list-style-type: none"> • L&T • Schneider Electric • HPL
11	Electronic Digital Meter (A/V/PF/HZ/KWH) with LED display. Dual Energy Meter with Centralized metering & billing System Prepaid Meters & Accessories Electromagnetic Meters	<ul style="list-style-type: none"> • L&T • Rishab • Schneider Electric
12	Analog Voltmeter / Ammeter	<ul style="list-style-type: none"> • L&T • Rishab • Schneider Electric
13	Indicating Lamps (LED type) and Push Button	<ul style="list-style-type: none"> • L&T • Siemens • Schneider Electric
14	Voltmeter Selector Switch / Ammeter Selector Switch	<ul style="list-style-type: none"> • Siemens • L&T – Salzer • Legrand
15	MCB, ELCB, RCCB, RCBO	<ul style="list-style-type: none"> • L&T • ABB • Schneider Electric
16	HV Cables	<ul style="list-style-type: none"> • Havells • Polycab • KEI
17	LV Cables	<ul style="list-style-type: none"> • Havells • Polycab • KEI
18	HS type End termination kits	<ul style="list-style-type: none"> • Raychem • Denson • 3M
19	LV Gland & Lugs	<ul style="list-style-type: none"> • Dowell Electro Works • Jainsons • Asian
20	LT Jointing Kit / Termination	<ul style="list-style-type: none"> • Raychem • Mahindra • 3M

	Product	Make/Agencies
21	Terminal Block	<ul style="list-style-type: none"> • Connect Well • Elmex • Technoplast
22	RCC Hume Pipes (NP2 Class)	<ul style="list-style-type: none"> • Indian Hume Pipes • Jian Spun Pipes • Shri Laxmi Pipes Industries
23	Cement	<ul style="list-style-type: none"> • ACC • Ambuja • Jaypee
24	Steel Reinforcement / Structural Steel	<ul style="list-style-type: none"> • Sail • Tata • Jindal
25	Synthetic Enamel Paint	<ul style="list-style-type: none"> • Asian • Berger • Nerolac
26	All other items not covered above	As per approval of the Engineer-in-charge.

Note: - The Superintending Engineer, IIT Mandi reserves the right to add or delete any materials and Brands in the list of approved materials/brands.

Indian Institute of Technology Mandi

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

PART C

O/o Superintending Engineer, IIT Mandi, Kamand campus

Indian Institute of Technology Mandi

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

INDEX – PART-C (SCHEDULE OF QUANTITIES)

Sl. No.	Description	Sheet No.
1	Schedule of Quantity Electrical	106-113
2	Schedule of Quantity Civil	114-115

It is certified that this document Part C contains total pages from 104 to 115.

Schedule of quantity

Name of work: Providing 22/0.4 KV, 2X400 KVA Substation for residential buildings and providing power supply to proposed buildings (A-6, A-7, A-8) & Mechanical Lab extension in South campus and Guest House & Faculty Housing Block at Gharpa including associated Civil work of IIT Mandi.

Item No	Description of Item	Qty	Unit	Rate	Amount
1	Supply & erection of 11 mtr. long steel tubular pole (working Load 300 Kg) with 2000 mm long RCC muff including concreting.as per entire satisfaction and direction of engineer-in-charge.	12	Each		
2	Supply & erection of 9 mtr. long steel tubular pole (Working Load 200 Kg) with 2000 mm long RCC muff including concreting. as per entire satisfaction and direction of engineer-in-charge.	10	Each		
3	Supply of 12.7/22 KV 3 core 95 mm sq.aluminium conductor XLPE insulated armoured cable. Conforming to IS: 7098 Part-II amended up to date.as per entire satisfaction and direction of engineer-in-charge.	1540	Meter		
4	Supply and erection of ACSR conductor 6/1/4.72 mm sq.Conforming to IS: 398 Part-II. amended up to date.as per entire satisfaction and direction of engineer-in-charge.	120	Meter		
5	Supply of 400 Sq.mm size of 1.1 KV three and half core Aluminium conductor XLPE Insulated, armoured cable. Conforming to IS: 1554 Part-I amended up to date.as per entire satisfaction and direction of engineer-in-charge.	390	Meter		
6	Supply of 240 Sq.mm size of 1.1 KV three and half core Aluminium conductor XLPE Insulated, armoured cable. Conforming to IS: 1554 Part-I amended up to date.as per entire satisfaction and direction of engineer-in-charge.	670	Meter		
7	Supplying of 120 Sq.mm size of 1.1 KV three and half core Aluminium conductor XLPE Insulated, armoured cable. Conforming to IS: 1554 Part-I amended up to date.as per entire satisfaction and direction of engineer-in-charge.	700	Meter		
8	Supplying of 120 Sq.mm size of 1.1 KV Single core Aluminium conductor XLPE Insulated, armoured cable. Conforming to IS: 1554 Part-I amended up to date.as per entire satisfaction and direction of engineer-in-charge.	100	Meter		
9	Supply of 70 Sq.mm size of 1.1 KV three and half core Aluminium conductor XLPE Insulated, armoured cable. Conforming to IS: 1554 Part-I amended up to date.as per entire satisfaction and direction of engineer-in-charge.	185	Meter		

10	Laying of one number XLPE power cable of 33/22 KV grade of up to 120 sq. mm direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer-in-charge.	715	Meter		
11	Laying of one number additional XLPE power cable of 33/22 KV grade up to 120 sq. mm direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer-in-charge.	715	Meter		
12	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 33/22 KV grade up to 120 sq. mm size in the existing RCC/ HUME/ METAL pipe as required. as per entire satisfaction and direction of engineer-in-charge.	110	Meter		
13	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 kV grade of above 185 sq.mm and up to 400 sq.mm direct in ground including excavation , sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer-in-charge.	665	Meter		
14	"Laying of two number additional PVC insulated and PVC sheathed/ XLPE power cable of 1.1 KV grade of above 185 sq.mm and up to 400 sq.mm direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer-in-charge.	324	Meter		
15	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of above 185 sq.mm and up to 400 sq.mm size in the existing RCC/ HUME/ METAL pipe as required. as per entire satisfaction and direction of engineer-in-charge.	36	Meter		
16	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of Above 95 sq.mm and up to 185 sq.mm size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer-in-charge.	395	Meter		
17	Laying of one number additional PVC insulated and PVC sheathed/ XLPE power cable of 1.1 KV grade of above 95 sq.mm and up to 185 sq.mm size direct in ground in the same trench in one tier horizontal formation including excavation and refilling the trench etc. as required, but excluding sand cushioning and protective covering. as per entire satisfaction and direction of engineer-in-charge.	80	Meter		

18	Laying of two number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of above 95 sq.mm and up to 185 sq.mm size in the existing RCC/ HUME/ METAL pipe as required. as per entire satisfaction and direction of engineer–in–charge.	12	Meter		
19	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of above 35 sq.mm and up to 95 sq.mm size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required. as per entire satisfaction and direction of engineer–in–charge.	165	Meter		
20	Erection of 120 sq. mm 3.5 core LT cable on existing steel tubular poles 9 mtr. & 11 mtr. as per entire satisfaction and direction of engineer–in–charge.	240	Meter		
21	Providing and laying G.I. pipes of 100 mm dia complete with G.I. fitting i/c excavation trenches of required width for pipes, cables, etc. including excavation for sockets and dressing of sides, ramming of bottoms, depth up to 1.5m, including getting out the excavated soil and then returning the soil as required in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering etc. and disposing of surplus soil as directed within a lead of 50 m : All kinds of soil, Pipes, cables etc. exceeding 80 mm dia. but not exceeding 300 mm dia. as per entire satisfaction and direction of engineer–in–charge.	48	Meter		
22	Supplying and fixing of light class G.I. pipe of 100 mm dia. (nominal) 6meters length along the pole for protection of underground cable as required. as per entire satisfaction and direction of engineer–in–charge.	18	Each		
23	Supplying and making end termination with brass compression gland and aluminium lugs for 3½ X 400 sq.mm (82mm) size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. as per entire satisfaction and direction of engineer–in–charge.	6	Each		
24	Supplying and making end termination with brass compression gland and aluminium lugs for 3½ X 240 sq.mm (62mm) size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. as per entire satisfaction and direction of engineer–in–charge.	6	Each		
25	Supplying and making end termination with brass compression gland and aluminium lugs for 3½ X 120 sq.mm (60mm) size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. as per entire satisfaction and direction of engineer–in–charge.	10	Each		
26	Supplying and making end termination with brass compression gland and aluminium lugs for 3½ X 70 sq.mm (38mm) size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. as per	4	Each		

	entire satisfaction and direction of engineer-in-charge.				
27	Supplying and fixing of 7/8 SWG dia stay wire with 22KV XLPE 3 core 95 mm sq.cable as earthing conductor. Conforming to IS: 2141 - 2000. as per entire satisfaction and direction of engineer-in-charge.	701	Kg		
28	Supplying of 8 SWG dia G.I. wire. Conforming to IS: 280 - 2006. as per entire satisfaction and direction of engineer-in-charge.	397	Kg		
29	Erection of G.I. Wire No. 8 SWG including binding etc. as required. as per entire satisfaction and direction of engineer-in-charge.	397	Kg		
30	Supplying and making outdoor cable end termination with heat shrinkable jointing kit complete with all accessories including lugs suitable for 95sq. mm / 120 sq. mm size of 3 core, XLPE aluminium conductor cable of 22/33 KV grade as required. as per entire satisfaction and direction of engineer-in-charge.	16	No.		
31	Supply and erection of MSCl X-arm 3200 mm long made of MSCl 100 mm X 50 mm X 6 mm i/c necessary half clamp made of MSFI 50 mm X 6 mm with two coat of aluminium paint and MS Nut & Bolt of required size. as per entire satisfaction and direction of engineer-in-charge.	61	Each		
32	Supply and erection of MSCl X-arm 2400 mm long made of MSCl 100 mm X 50 mm X 6 mm i/c necessary half clamp made of MSFI 50 mm X 6 mm with two coat of aluminium paint and MS Nut & Bolt of required size. as per entire satisfaction and direction of engineer-in-charge.	8	Each		
33	Supply and erection of MSCl X-arm 750 mm long made of MSCl 100 mm X 50 mm X 6 mm i/c necessary half clamp made of MSFI 50 mm X 6 mm with two coat of aluminium paint and MS Nut & Bolt of required size. as per entire satisfaction and direction of engineer-in-charge.	6	Each		
34	Supply and erection of 22 KV Disc insulators set including bend staples, dead end clamps suitable for ACSR conductor 6/1/4.72 mm sq. and necessary nuts & bolts complete in all respects. as per entire satisfaction and direction of engineer-in-charge.	36	Set		
35	Supply and erection of 22 KV Pin insulators with pins. as per entire satisfaction and direction of engineer-in-charge.	48	Set		
36	Supply and erection of 22 KV GO switch. i/c guide clamp base channel and bracing etc. complete in all respect.as per entire satisfaction and direction of engineer-in-charge.	7	Set		
37	Supply and erection of 22 KV drop out fuse unit. i/c connection etc.as per entire satisfaction and direction of engineer-in-	3	Set		

	charge.				
38	Supply and erection of 18 KV lightning arrester. i/c connection with earth etc. as per entire satisfaction and direction of engineer-in-charge.	3	Set		
39	Supply and erection of D-Iron including one MS Nut & Bolt 5"X5/8". as per entire satisfaction and direction of engineer-in-charge.	6	Set		
40	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required. as per entire satisfaction and direction of engineer-in-charge.	9	Set		
41	Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. (but without charcoal/ coke and salt) as required. as per entire satisfaction and direction of engineer-in-charge.	4	Set		
42	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required. as per entire satisfaction and direction of engineer-in-charge.	228	Meter		
43	Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as required. as per entire satisfaction and direction of engineer-in-charge.	60	Meter		
44	Supplying, installing, testing and commissioning of 22/0.4 KV, 400 KVA Transformer. i/c connection etc complete in all respect. as per entire satisfaction and direction of engineer-in-charge.	2	Each		
60	Supply and erection of Barbed wire. Conforming to IS: 278 – 2009 amended up to date. as per entire satisfaction and direction of engineer-in-charge.	100	Kg		
46	Supply and erection of 22 KV Danger Plate. i/c necessary clamps and Nut Bolts etc. as per entire satisfaction and direction of engineer-in-charge.	9	Set		
47	Supplying, installing, testing and commissioning of 400 amps (S.C. rating for 1 sec - 15 KA) 4 ways, Copper Bus Bar Chamber. as per entire satisfaction and direction of engineer-in-charge.	1	Each		

48	<p>Supplying, Installation, Testing and commissioning of outdoor cubical type feeder pillar suitable for 415 V, 3 phase, 4 wires, 50Hz AC Supply system dimensions 1.90mtr. X 1.50 mtr. X 0.50 mtr. (L X W X D)fabricated in compartmentalized design from CRCA sheet steel of 2 mm thick for frame work & covers, 3 mm thick for gland plates i/c cleaning and finishing complete with 7 tanks process for powder coating in approved shade , having appropriate capacity extensible type TPN Aluminum Alloy bus bar of high conductivity each for normal and emergency supply, DMC/SMC bus bar supports with SC withstand capacity of 31 MVA for 1 sec, bottom base channel made of M.S. Angle iron 50mm X 50mm X 6mm, fabrication shall be done in transportable sections, panel should have 2 no's earth studs at the rear, solid connection from main bus bar to switch gear with required size Al. bus bar and control wiring with 2.5 Sq.mm PVC insulated copper conductor s/c , with hinged door mounted from front and back open able with locking arrangement having bottom cable entry duly fixed 90 cms above G/L with mounting legs made out of 50 mm X 50 mm X 6 mm angle iron & Top hood for rain protection, brick masonry concreting, i/c connections / inter connections and fixing of following accessories etc. complete as required.</p> <p>FEEDER PILLER</p> <p>Incomer: - 400 Amp, 50 KA, 4P MCCB - 1 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 400A 4P - 2 No.</p> <p>Outgoing: - 200 Amp, 36 KA, 4P MCCB - 3 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 200A 4P - 6 No. 125 Amp, 36 KA, 4P MCCB - 3 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 125A 4P - 6 No. 63 Amp, 18 KA, 4P MCCB - 1 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 63A 4P - 2 No.</p> <p>Metering :- Multi - Function Meter, 3 ph 4W 240V 5A with RS485 Port Class 1.0 accuracy Measurement: Voltage, Current, Power Factor, and Frequency with suitable size of CT. Phase Indications Lamps Switches. (Note: - 1. The drawing should be got approved before fabrication. 2. All MCCBs should be having with thermal magnetic release for S/C & Overload protection). as per entire satisfaction and direction of engineer-in-charge.</p>	1	No.		
49	<p>Supplying, Installation, Testing and commissioning of outdoor cubical type feeder pillar suitable for 415 V, 3 phase, 4 wires, 50Hz AC Supply system dimensions 1.90mtr. X 1.50 mtr. X 0.50 mtr. (L X W X D)fabricated in compartmentalized design from CRCA sheet steel of 2 mm thick for frame work & covers, 3 mm thick for gland plates i/c cleaning and finishing complete with 7 tanks process for powder coating in approved shade ,</p>	1	No.		

having appropriate capacity extensible type TPN Aluminum Alloy bus bar of high conductivity each for normal and emergency supply, DMC/SMC bus bar supports with SC withstand capacity of 31 MVA for 1 sec, bottom base channel made of M.S. Angle iron 50mm X 50mm X 6mm, fabrication shall be done in transportable sections, panel should have 2 no's earth studs at the rear, solid connection from main bus bar to switch gear with required size Al. bus bar and control wiring with 2.5 Sq.mm PVC insulated copper conductor s/c , with hinged door mounted from front and back open able with locking arrangement having bottom cable entry duly fixed 90 cms above G/L with mounting legs made out of 50 mm X 50 mm X 6 mm angle iron & Top hood for rain protection, brick masonry concreting, i/c connections / inter connections and fixing of following accessories etc. complete as required.

FEEDER PILLER

Incomer: -

400 Amp, 50 KA, 4P MCCB - 1 No. Make: - L&T, Siemens, ABB, Schneider Electric.
 Spreader Link MCCB 400A 4P - 2 No.

Outgoing: -

200 Amp, 36 KA, 4P MCCB - 5No. Make: - L&T, Siemens, ABB, Schneider Electric.
 Spreader Link MCCB 200A 4P - 10 No.
 125 Amp, 36 KA, 4P MCCB - 2 No. Make: - L&T, Siemens, ABB, Schneider Electric.
 Spreader Link MCCB 125A 4P - 4 No.

Metering :-

Multi - Function Meter, 3 ph 4W 240V 5A with RS485 Port Class 1.0 accuracy Measurement: Voltage, Current, Power Factor, and Frequency with suitable size of CT.
 Phase Indications Lamps Switches.
 (Note: - 1. The drawing should be got approved before fabrication.
 2. All MCCBs should be having with thermal magnetic release for S/C & Overload protection).
 as per entire satisfaction and direction of engineer-in-charge.

50	<p>Supplying, Installation, Testing and commissioning of outdoor cubical type feeder pillar suitable for 415 V, 3 phase, 4 wires, 50Hz AC Supply system dimensions 1.90mtr. X 1.50 mtr. X 0.50 mtr. (L X W X D)fabricated in compartmentalized design from CRCA sheet steel of 2 mm thick for frame work & covers, 3 mm thick for gland plates i/c cleaning and finishing complete with 7 tanks process for powder coating in approved shade , having appropriate capacity extensible type TPN Aluminum Alloy bus bar of high conductivity each for normal and emergency supply, DMC/SMC bus bar supports with SC withstand capacity of 31 MVA for 1 sec, bottom base channel made of M.S. Angle iron 50mm X 50mm X 6mm, fabrication shall be done in transportable sections, panel should have 2 no's earth studs at the rear, solid connection from main bus bar to switch gear with required size Al. bus bar and control wiring with 2.5 Sq.mm PVC insulated copper conductor s/c , with hinged door mounted from front and back open able with locking arrangement having bottom cable entry duly fixed 90 cms above G/L with mounting legs made out of 50 mm X 50 mm X 6 mm angle iron & Top hood for rain protection, brick masonry concreting, i/c connections / inter connections and fixing of following accessories etc. complete as required.</p> <p>FEEDER PILLER</p> <p>Incomer:-</p> <p>200 Amp, 36 KA, 4P MCCB - 1 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 200A 4P - 2 No.</p> <p>Outgoing:-</p> <p>125 Amp, 36 KA, 4P MCCB - 3 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 125A 4P - 6 No. 63 Amp, 18 KA, 4P MCCB - 4 No. Make: - L&T, Siemens, ABB, Schneider Electric. Spreader Link MCCB 125A 4P - 8 No.</p> <p>Metering :-</p> <p>Multi - Function Meter, 3 ph 4W 240V 5A with RS485 Port Class 1.0 accuracy Measurement: Voltage, Current, Power Factor, and Frequency with suitable size of CT. Phase Indications Lamps Switches. (Note: - 1. The drawing should be got approved before fabrication. 2. All MCCBs should be having with thermal magnetic release for S/C & Overload protection). as per entire satisfaction and direction of engineer-in-charge.</p>	1	No.		
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51	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sq.m on plan) including disposal of excavated earth, lead up to 50m and lift up to 1.5m, disposed earth to be leveled and neatly dressed. All kinds of soil as per entire satisfaction and direction of engineer-in-charge.	13.48	Cum		
52	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : "1:1.5:3 (1 cement: 1.5 coarse sand (zone-III): 3 graded stone Aggregate 20 mm nominal size). as per entire satisfaction and direction of engineer-in-charge.	1.60	Cum		
53	Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. above plinth level up to floor five level, excluding cost of centering, shuttering, finishing and reinforcement 1:1.5:3 (1 cement : 1.5 coarse sand(zone-III) : 3 graded stone aggregate 20 mm nominal size) as per entire satisfaction and direction of engineer-in-charge.	19.40	Cum		
54	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : 1:5:10 (1 cement: 5 coarse sand (zone-III): 10 graded stone aggregate 40 mm nominal size). as per entire satisfaction and direction of engineer-in-charge.	2.75	Cum		
55	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : "1:2:4 (1 cement: 2 coarse sand (zone-III): 4 graded stone aggregate 20 mm nominal size) as per entire satisfaction and direction of engineer-in-charge.	10.33	Cum		
56	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete up to plinth level. Thermo-Mechanically Treated bars of grade Fe-500D or more. as per entire satisfaction and direction of engineer-in-charge.	71.00	Kg		
57	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level. Thermo-Mechanically Treated bars of grade Fe-500 D or more. as per entire satisfaction and direction of engineer-in-charge.	699.00	Kg		
58	Centering and shuttering including strutting, propping etc. and removal of form for all heights Foundations, footings, bases of columns, etc. for mass concrete. as per entire satisfaction and direction of engineer-in-charge.	7.20	Sq.m		

59	Centering and shuttering including strutting, propping etc. and removal of form for all heights Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc. as per entire satisfaction and direction of engineer-in-charge.	46.90	Sq.m		
60	Finishing walls with water proofing cement paint of required shade New work (Two or more coats applied @ 3.84 kg/10 sq.m) as per entire satisfaction and direction of engineer-in-charge.	43.00	Sq.m		
61	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete. as per entire satisfaction and direction of engineer-in-charge.	3170.0 0	Kg		
62	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade : Two or more coats on new work as per entire satisfaction and direction of engineer-in-charge.	85.00	Sq.m		
63	Providing and fixing ISI marked oxidized M.S. sliding door bolts with nuts and screws etc. complete 250x16 mm as per entire satisfaction and direction of engineer-in-charge.	2.00	Each		
64	Providing and fixing ISI marked oxidized M.S. handles conforming to IS: 4992 with necessary screws etc. complete 125 mm as per entire satisfaction and direction of engineer-in-charge.	8.00	Each		
65	Providing and fixing oxidized M.S. double acting spring hinges with necessary screws etc. complete 150 mm as per entire satisfaction and direction of engineer-in-charge.	12.00	Each		
66	Providing and fixing G.I. chain link fabric fencing of required width in mesh size 50x50 mm including strengthening with 2 mm dia wire or nuts, bolts and washers as required complete as per the direction of Engineer-in-charge. Made of G.I. wire of dia 4 mm as per entire satisfaction and direction of engineer-in-charge.	125.00	Sq.m		

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Superintending Engineer