

TENDER DOCUMENTS

NAME of work: *Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)*



Tender Document Fee: Rs. 5,000/- (Rupees Fifteen Thousand only)+ 18% GST
E-tender Processing Fee : Rs. 5,000` /- (Rupees Five thousand only))+ 18% GST

Late date of submission of Tender: 07.08.2019, upto 11 a.m.

Date of opening of Eligibility Documents: 07.08.2019 at 11.30 a.m.

Indian Institute of Management Rohtak
at Sunaria Village, Rohtak (Haryana)

INDEX

Sl. No.	Description	Page No.
1.	Index	1
2.	Notice Inviting Tender	2
3.	Section I - Information & Instructions to Bidders for E-Tendering	3
4.	Section II - Information & General Instructions to bidders	10
5.	Section III - Forma for Qualification	19
i)	Letter of Transmittal	20
ii)	Form "A"	24
iii)	Form "B"	26
iv)	Form "C"	28
v)	Form "D"	29
vi)	Form "E"	30
vii)	Form "F"	31
viii)	Form "G"	32
ix)	Form "H"	33
6	Affidavit	36
7	Pledge of Compliance	39
8	Integrity Pact	40
9	Integrity Agreement	41
10	Format of Agreement	47
11	Form 8	49
12	Part A : General Conditions of Contract	1 to 114
13	Part B: Special Conditions and Additional Conditions of Contract	1 to 57
14	Part C: Civil Works Particular Specifications	1 to 102
15	Part D: Electrical & Mechanical (Internal Works) –Particular Specifications	1 to 97
16	Part E: Electrical & Mechanical (External Works) –Particular Specifications	1 to 84

IIM ROHTAK

NOTICE INVITING TENDER

N.I.T. No.	IIMR/CIVIL/K-73T	
Name of work	Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)	
Estimated Cost	For Civil	Rs. 12,42,69,919/-
	For Electrical & other works	Rs. 1,35,48,908/-
	Total:	Rs. 13,78,18,827/-
Earnest Money	Rs. 27,56,400.00	
Performance Guarantee	5% of tendered value.	
Security Deposit	5% of tendered value	
Time Allowed	07 months.	
Last date for Submission of Eligibility Documents & Financial Bids	07.08.2019 (upto 11.00 hrs IST)	
Date of opening of Eligibility Documents	07.08.2019 (at 11.30 hrs IST)	
Date of opening of Financial Bids	To be notified later	
Last date for receipt of queries	02.08.2019	

This NIT for Composite work amounting to **Rs. 13,78,18,827.00 (Rupees Thirteen Crore Seventy Eight lakhs Eighteen thousand Eight hundred Twenty Seven only)** is hereby approved.

NIT Contain :- PART A from Page 1 to 114, Part B from page 1 to 57, Part C from P-1 to 102 part D from P- 1 to 97 and part E from 1 to 84.

SECTION 1: INFORMATION & INSTRUCTIONS TO BIDDERS FOR E-TENDERING

The Director, Indian Institute of Management Rohtak invites on behalf of the Institute online item rate tenders from specialized firms/ contractors of repute in single stage two bid system for the following work:-

NIT No.	Name of Work & Location	Estimated Cost put to Tender	Earnest Money	Period of Completion	Last date & time of online submission of Eligibility Documents & Financial bids.	Period during which EMD and Eligibility Documents shall be physically submitted	Time and date of opening of Eligibility Documents
1	2	3	4	5	6	7	8
IIMR/CIVIL/K-73T	Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)	Rs. 13,78,18,827/-	Rs. 27,56,400.00	07 Months	Up to 11.00 Hrs on 07.08.2019	Up to 11.00 Hrs on 07.08.2019	11.30 Hrs on 07.08.2019

- A. The Bidder submitting the tender should read the schedule of quantities, additional conditions, additional specifications, particular specifications and other terms and conditions given in the NIT and drawings. The tenderer should also read the General Conditions of Contract forming Part A of the tender document. The set of drawings and NIT shall be available with the **Indian Institute of Management, Rohtak at Sunaria Village, Rohtak, Haryana**. The drawings provided are for tender purpose and indicative of the nature and type of work and meant only as a guide for the tenderer. The working architectural and structural drawings will be made available on award of work in a phased manner, as per the requirement of the same as per approved programme of completion submitted by the contractor after award of the work. The contractor shall take into account that best practices in the profession shall be employed in the detailing and construction of the project, and rates quoted shall take that into account. The site for the work is available. The Bidder should also visit the site of work and acquaint himself with the site conditions before tendering. The following conditions, which already form part of the tender conditions, are specially brought to his notice for compliance while filling the tender. They are requested to comply following instructions.
- B. Tenders with any condition including that of conditional rebates shall be rejected forthwith. Rates of such tenders shall neither be read out, not be entered in the tender opening register at the time of opening of tender.

- C. Bidder must ensure to quote rate for each item. The column meant for rate in figure appears in white colour and once rate is entered, it turns green. While selecting any of the cell a warning appears that if any cell is left blank the same shall be treated as '0' (Zero). Therefore, if any cell is left blank and no rate is quoted by the Bidder, rate of such item(s) shall be treated as '0' (Zero).
- D. GST, Building and other Construction Workers Welfare Cess or any other tax, levy or Cess in respect of input for or output by this contract shall be payable by the contractor and Institute shall not entertain any claim whatsoever in this respect except as provided under Clause 38. The Institute shall deduct from the running bills and final bill, the **TDS** and other statutory deductions as applicable.
- E. It will be obligatory on part of the Bidder to tender for all the component parts. The Institute reserves right to accept tender in full or in part. The Institute does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without assigning any reason. All bids in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the Bidders shall be summarily rejected.
- F. **The Earnest Money Deposit will have to be submitted in the form of a Demand Draft/Bankers' Cheque, drawn on a Scheduled Bank, in favour of "Director, Indian Institute of Management Rohtak", payable at Rohtak.**
- G. **It is mandatory to sign the Integrity Pact by the Bidder failing which the Tenderer will stand disqualified from the tendering process and such Application would be summarily rejected.**
- H. Specialized Firms / Contractors who fulfill the following requirements shall only be eligible to apply. **Applications from Joint ventures or consortium of companies will not be accepted or considered for participation.**

Chief Engineer

Kailash Pati Mishra

Indian Institute Of Management Rohtak

- (a) Should have satisfactorily completed the works as mentioned below during the last Seven (7) years ending 07.08.2019.
- (i) Three (3) similar works each costing not less than Rs. 5.52 crores
OR
 Two (2) similar works each costing not less than Rs. 8.26 crores
OR
 One (1) similar work costing not less than Rs. 11.03 crores
- (ii) At least one similar work should have been completed in Ministries/ Departments/Autonomous Bodies/Public Sector Undertakings under Government of India.

A Similar work shall mean works, completed in India, of:

- (i) Construction of Building work (excluding the related site development works) with RCC framed structure with a minimum of 2 storeys including masonry, finishing works, executed under single composite contract covering internal LT/HT electrical installations, firefighting, fire alarm, etc. all complete. (Note: Mummy and machine room will not be counted as storey for above purpose).

Components of works executed other than those included in definition of similar work shall be deducted while calculating cost of similar work. Bidder shall submit abstract of cost of work in support of this.

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

- (b) Should have had a minimum average annual financial turnover (Gross) of Rs. 15 crores on similar building construction works during the last three consecutive balance sheets duly audited by a Chartered Accountant.
- (c) Profitability: The Bidder should be a Profit (Net) making firm and should have made profit during any two of the past 3 Financial Years ending 31st March 2019 for which balance sheets, duly certified by the Chartered Accountant, are available.
- (d) **Net worth:** The bidder should have positive net worth of at least 2.10 Crores will be judged from the Audited Balance Sheet of the last financial year ending 31.03.2019.
- (e) Should have a minimum solvency of Rs. 5.52 crores.
- I. The tender document consisting of plans, specifications, schedule of quantities 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 obtained from the office of **Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (Telephone No. 01262-228521 Email : project.newcampus@iimrohtak.ac.in)** during the office hours on _____ all days except on, Sunday & Public holidays and also can be downloaded free of cost

from website <http://tenderwizard.com/iim-rohtak>. **Bidders are mandatorily required to obtain one copy from the Institute, which has to be returned along with the tender.**

Bidders are advised to keep visiting the above mentioned web-sites from time to time (till the deadline for bid submission) for any updates in respect of the tender documents, if any. Failure to do so shall not absolve the Bidder of his liabilities to submit the tender complete in all respect including updates thereof, if any.

Prospective Bidders may seek clarification regarding the project and/or the Tender documents, in writing to the Institute on or before 11.00 Hrs on 15.07.2019. No requests for clarifications will be entertained after this date. Any clarification given by the Institute will be uploaded on the websites mentioned above and shall form part of the Tender document

- J. The Bidder shall submit hard copy of the Eligibility Documents, along with Earnest Money Deposit and Tender Document fee at the office of Director, Indian Institute of Management Rohtak, at Rohtak on or before the date specified herein above.
- K. Scanned copies of Eligibility Documents and Financial Bids are to be submitted only through the e-procurement portal <http://www.tenderwizard.com/iim-rohtak>. Those Bidders not registered on the website <http://www.tenderwizard.com/iim-rohtak> are required to get registered themselves beforehand. The intending Bidder must have valid class-III digital signature to submit the bid. The Bidders must furnish the Financial Bids only in the MS Excel Spreadsheet to be uploaded on the website <http://www.tenderwizard.com/iim-rohtak>.
- L. **Submission of hardcopy of the Financial Bid will render the tender invalid.**
- M. Bidders shall be required to pay to KEONICS e-Tender processing Fee (non-refundable) of Rs 5000/- through the e-gateway by credit/debit card, internet banking or RTGS/NEFT facility.
- N. Bidders shall be required to pay a Tender Document Fee (non-refundable) of Rs 5,000/- by way of a Demand Draft drawn in favour of Director, Indian Institute of Management Rohtak, payable at Rohtak
- O. The Tenderer shall submit the following documents, on or before the last date and time specified herein above, in the manner prescribed below:

By Manual mode

As per prescribed formats, in a sealed cover, addressed to Director, Indian Institute of Management Rohtak, at Sunaria Village, Rohtak

Envelope 1: Eligibility Documents

1. Letter of Transmittal

2. Document Checklist
3. Form 'A' – Structure & Organisation of Bidder (with supporting documents)
4. Form 'B' – Financial Information (with supporting documents)
5. Form 'C' – Banker's Certificate
6. Form 'D' – Details of similar works completed (with supporting documents)
7. Form 'E' – Details of similar works in hand (with supporting documents)
8. Form 'F' - Performance reports of works
9. Form 'G' – Details of Technical & Administrative Personnel
10. Form 'H' – Details of Plant & Equipment
- 11. Affidavit**
- 12. Pledge of Compliance**
13. **Integrity** Pact and Integrity Agreement
14. **Hard** copy of the Tender document, **supplied by Institute**, duly signed on each page by authorized signatory.

Envelope 2: EMD, Tender Document Fee and Solvency Certificate

1. Demand Draft/Bank Cheque towards Earnest Money Deposit.
2. Form 'C' – Banker's Certificate, issued by a Scheduled Bank.
3. Demand Draft, from a Scheduled Bank towards Tender Document Fee.

Outer Envelope 3:

1. Envelope 1
2. Envelope 2

By E-tendering mode only through E-tendering Portal (www.tenderwizard.com/iim-rohtak)

1. Eligibility Documents (in *.jpg or *.pdf format)	To be digitally signed
2. Financial Bid (.xls format)	To be digitally signed

- P. In case any discrepancy is noticed between the documents as uploaded at the time of submission of the bid online and hard copies as submitted physically in the office of

Institute, then the bid submitted shall become invalid and the Institute shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further, the tenderer shall not be allowed to participate in the retendering process of the work.

- Q. In case the lowest tendered amount (worked out on the basis of quoted rate of individual items) of two or more Bidders is the same, then such lowest Bidders may be asked to submit sealed revised offer quoting rate of each item of schedule of quantity for all sub sections/ sub heads as the case may be, but the revised quotes rate of each item of schedule of quantity for all sub sections / sub heads should not be higher than their respective original rate quoted already at the time of submission of tender. The lowest tender shall be decided on the basis of revised offer.
- R. If the revised tendered amount (worked out on the basis of quoted rate of individual items) of two or more Bidders received in revised offer is again found to be equal, then the lowest tender among such Bidders shall be decided by a draw of lots in the presence of lowest Bidders who have quoted equal amount of their tenders.
- S. In case any of such lowest Bidders in his revised offer quotes rate of any item more than their respective original rate quoted already at the time of submission of tender, then such revised offer shall be treated as invalid. Such case of revised offer of the lowest firm/contractor or case of refusal to submit revised offer by the lowest Bidder shall be treated as withdrawal of his tender before acceptance and 50% of his earnest money shall be forfeited.
- T. In case all the lowest Bidders those who have tendered amount (as a result of their quoted rates of individual items), refuses to submit revised offers, then tenders are to be recalled after forfeiting 50% of EMD of each lowest Bidder.
- U. The tender for the works shall remain open for acceptance for a period of ninety (90) days from the date of opening of Eligibility Documents. In case the Tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the Institute, then the Institute shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the Tenderer shall not be allowed to participate in the re-tendering process of the work.
- V. Bidder, whose earnest money is forfeited because of non-submission of revised offer, or quoting higher revised rate (s) of any item(s) than their respective original rate quoted already at the time of submission of his bid shall not be allowed to participate in the re-tendering process of the work.
- W. The tender inviting Authority shall have the right of rejecting all or any of the tenders and will not be bound to accept the lowest or any other tender.
- X. The successful tenderer shall get registered with works contract cell of sales tax department under Govt. of Haryana and submit a valid registration certificate before the execution of Agreement.

- Y. The Successful Tenderer shall be required to submit a Performance Guarantee of 5% (Five Percent) of the agreement amount within 15 days of issue of letter of intent. This guarantee shall be in the form of Fixed Deposit Receipts or Bank Guarantee from any Scheduled Bank or the State Bank of India in accordance with the prescribed form. This period can be further extended by Engineer-in-Charge/Institute upto a maximum period of 15 days on the written request of the contractor, **however late fee will be charged @ 0.1% per day.**
- AA. The Tenderer whose tender is accepted (Successful Tenderer/Bidder or Contractor) will also be required to furnish by way of Security Deposit for the fulfillment of his contract, an amount equal to 5.0 % of the tendered value of the work. The Security deposit will be collected by deductions from the running bills of the Contractor at the rates mentioned above and the earnest money deposited at the time of tenders, will be treated as a part of the Security Deposit. The Security amount will also be accepted as Fixed Deposit Receipt or Bank Guarantee of a Scheduled Bank or State Bank of India, provided confirmatory advice is enclosed.
- BB. On acceptance of the tender, the name of the accredited representative(s) of the selected Contractor who would be responsible for taking instructions from the IIM Rohtak shall be communicated in writing to the IIM Rohtak. The selected Contractor shall give a list of Institute employees related to him.
- CC. The Selected Contractor shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Accepting Authority may in his discretion, without prejudice to any other right or remedy available in law, cancel the Contract. The Selected Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.
- DD. Agreement shall be drawn with the successful bidder as per the format forming part of the Tender Documents. This Notice Inviting Tender shall form a part of the contract document. The successful bidder / tenderer, on acceptance of his bid by the Accepting Authority shall within 15 days from the letter of acceptance, sign the agreement consisting of :-

The Notice Inviting Tender, all the documents including special conditions, additional conditions, 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.

Chief Engineer

Kailash Pati Mishra

Indian Institute Of Management Rohtak

SECTION II - INFORMATION & GENERAL INSTRUCTIONS TO BIDDERS**1.0 General**

- 1.1 Letter of transmittal and forms for qualification are given in Section III.
- 1.2 All information called for in the enclosed forms should be furnished against the relevant columns in the forms. If for any reason, information is furnished on a separate sheet, reference to the same should be mentioned against the relevant column. Even if no information is to be provided in a column, a 'Nil' or 'No such case' entry should be made in that column. If any particulars/query is not applicable in case of the Bidder, it should be stated as 'not applicable'. The Bidders are cautioned that not giving complete information called for in the application forms or not giving it in clear terms or making any change in the prescribed forms or deliberately suppressing the information may result in the Bidder being summarily disqualified. Submissions made by telegram, fax, email or telex and those received late will not be entertained.
- 1.3 The Application should be type written. The Bidder's name should appear on each page of the Application.
- 1.4 The Application alongwith required documents should be submitted in Original and should be hard bound and each page serially numbered. All the pages should be duly signed in ink on each page & official seal stamped and should be submitted in a sealed envelope superscribing "Tender documents for Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)", addressed to Director, Indian Institute of Management Rohtak, Haryana. Documents submitted in connection with this tender will be treated confidential and will not be returned.
- 1.5 Overwriting should be avoided. Correction, if any, shall be made by neatly crossing out, initialing, dating and rewriting.
- 1.6 References, information and certificates from the respective clients certifying suitability, technical knowledge or capability of the Bidder should be signed by an officer not below the rank of Executive Engineer or equivalent.
- 1.7 The Bidder is advised to attach any additional information which he thinks is necessary in regard to his capabilities to establish that the Bidder is capable to successfully complete the envisaged work. He is, however, advised not to furnish superfluous information. No information shall be entertained after submission of Tender Application, unless it is called for by the Institute.

- 1.8 The Tender Application in prescribed form duly completed and signed shall be submitted along with a non-refundable processing fee of Rs 5,000/- (Rupees Five thousand only) shall be submitted in a sealed cover. The processing fee shall be in the form of a Demand Draft/Banker's cheque drawn in favour of "Director, Indian Institute of Management Rohtak" from a scheduled Bank and payable at Rohtak.
- 1.9 The credentials submitted in respect of Tender Application shall be verified before award of work. Any information furnished by the Bidder found to be incorrect either immediately or at a later date, would render him liable to be debarred from any work awarded and from tendering/taking up of any other work in the Institute. If such Bidder happens to be an enlisted contractor of any Govt. organisation, his name shall also be recommended for removal from the approved list of contractors.
- 1.10 Bidders are advised to keep visiting IIM Rohtak and e-tender wizard websites from time to time (till the deadline for Tender submission) for any updates in respect of the Tender notice, if any. Failure to do so shall not absolve the Bidder of his liabilities to submit its Tender Application complete in all respect including update, thereof, if any. Incomplete Application may be liable to rejection.

2.0 Definitions

In this document the following words and expressions have the meaning hereby assigned to them.

- 2.1 **Institute:** means Indian Institute of Management Rohtak, acting through Director, IIM Rohtak, Sunaria Village, Rohtak.
- 2.2 **Bidder:** means a legal entity in the form of a proprietary firm, firm in partnership, limited company (private or public) or corporation acting through its authorized signatory. Wherever the generic expression 'he' is used to refer to a Bidder, it will refer to any bidder irrespective of gender.
- 2.3 **"Year"** means "Financial Year" unless stated otherwise.

3.0 Method of Application:

- 3.1 If the Bidder is a Proprietary Firm, the application shall be signed by the proprietor, with his full typewritten name, and full name of his Firm with its current address.
- 3.2 If the Bidder is a Firm in partnership, the application shall be signed by all the partners of the firm with their full typewritten names and current addresses, or, alternatively, by a partner holding power of attorney for the firm. In the latter case a certified copy of the power of attorney shall accompany the Application. A certified copy of the partnership deed and current address of all partners of the firm shall also accompany the Application.

- 3.3** If the Bidder is a Limited Company or a Corporation, the application shall be signed by a duly authorized person holding power of attorney for signing the application. In such a case, a certified copy of the power of attorney shall accompany the application. The Bidder should also furnish a copy of the Certificate of Incorporation, Memorandum and Articles of Association duly authenticated by the statutory auditor and attested by Public Notary.
- 3.4** In case of Foreign entities, only entities having registered establishment in India for carrying out its operations for atleast last 7 years and meeting all other eligibility criteria, as mentioned in this document, may also apply.

4.0 Final decision making authority:

The Institute reserves the right to accept or reject any Tender and to annul the process and reject all tenders at any time, without assigning any reason or incurring any liability to the Bidders unless such action is warranted by actions of any bidder(s).

5.0 Particulars provisional:

The particulars of the work given Tender Documents are provisional. They are liable to change and must be considered only as information to assist the Bidder to tender for proposed work.

6.0 Site visit:

The site for the work is available. The Bidders are advised to visit the site of work and its surrounding and obtain for himself on his own responsibility, all information that may be necessary for preparing the Tender. The cost of visiting the site shall be at the Bidder's own expense.

7.0 Eligibility Criteria:

- 7.1** The Bidder should have experience of having satisfactorily completed works as mentioned below during the last Seven (7) years ending 30.07.2019.

(i) Three (3) similar works each costing not less than Rs. 5.52 crores

OR

(ii) Two (2) similar works each costing not less than Rs. 8.26 crores

OR

(iii) One (1) similar work costing not less than Rs. 11.03 crores

(iv) At least one similar work should have been completed in Ministries/ Departments/Autonomous Bodies/Public Sector Undertakings under Government of India.

A Similar work shall mean works, completed in India, of:

- (i) Construction of Building work (excluding the related site development works) with RCC framed structure with a minimum of 2 storeys including masonry,

finishing works executed under single composite contract covering internal LT/HT electrical installations, firefighting, fire alarm etc. all complete. (Note: Mumpty and machine room will not be counted as storey for above purpose).

Components of works executed other than those included in definition of similar work shall be deducted while calculating cost of similar work. Bidder shall submit abstract of cost of work in support of this.

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

- 7.2 The Bidder should have had a minimum average annual financial turnover (gross) of Rs. 15.00 crores on similar building construction works during the last three consecutive balance sheets duly audited by Chartered Accountant. Year in which no turnover is shown should also be considered for working out the average.
- 7.3 The Bidder must submit an undertaking that the bidder is not in default of payment of Statutory dues (other than disputed dues being contested by the Bidder) and that up to date tax returns have been filed alongwith the payment of due taxes, and submit copies of such returns submitted to the IT Department/Department of Trade and Taxes.
- 7.4 The Bidder should not have incurred any loss in the more than two years during the last five years ending 31st March 2019 for which balance sheets, duly certified by the Chartered Accountant, are available.
- 7.5 The Bidder should have a minimum solvency of Rs. 5.52 crores certified by his Bankers after date of issue of these Tender documents.
- 7.6 Profitability: The Bidder should be a Profit (Net) making firm and should have made profit during any two of the past 3 Financial Years ending 31st March 2019 for which balance sheets, duly certified by the Chartered Accountant, are available.
- 7.7 **Net worth:** The bidder should have positive net worth of at least 2.10 Crores will be judged from the Audited Balance Sheet of the last financial year ending 31.03.2019.
- 7.8 Bidder should not have been blacklisted by any State/Central Government Department/Autonomous Bodies or PSU. The bidder must submit a duly notarized affidavit to this effect. **Applications received without affidavit in original shall stand automatically rejected.**
- 7.9 The Bidder should own construction equipment required for the proper and timely

execution of the work. The Bidder should furnish a list of these equipments.

- 7.10** The Bidder should have on his pay roll sufficient number of Technical and Administrative employees for the proper execution of the contract. The Bidder should submit a list of these employees clearly stating how they would be involved in this work.
- 7.11** The bidder shall submit the supporting documents such as:
- a) List of full-time technical staff (clearly mentioning regular/contract staff) proposed to be deployed for the work with name, qualification and experience, each alongwith complete CV, not exceeding 2 pages.
 - b) Attested copies of Degree/Diploma and experience certificate.
- 7.12** The Bidder's performance for each work completed in the last seven years and in hand should be certified by an officer not below the rank of Executive Engineer or equivalent.
- 7.13** The Bidder needs to make disclosure of any liquidated damages or penalties imposed on it by the clients towards delay in completion of project or for not meeting the contractual specifications, including issues relating to defects, workmanship and warranty obligations.
- 7.14** The Bidder will be required to give an undertaking that it would comply with all statutory laws and compliances, including those applicable to the sub-contractors appointed by him and indemnify the Institute of all implications and consequences resulting from any non-compliances due to any reasons whatsoever,

Chief Engineer

Kailash Pati Mishra

Indian Institute Of Management Rohtak

8.0 Evaluation Criteria for Qualification:

8.1 For the purpose of qualification, the details submitted by the Bidders will be evaluated in the following manner:

8.1.1 The initial criteria prescribed in para 7.1 to 7.13 above in respect of experience of similar class of works completed, solvency and financial turn over etc. will first be scrutinized and the Bidder's eligibility for the work to be determined.

The Institute also reserves the right to appoint a committee or any consultants to complete any part of the selection process.

8.2 Even if a Bidder satisfies the above requirements, he may be liable to disqualification if he has:

(a) Made misleading or false representation or deliberately suppressed the information in the forms, statements and enclosures required in the eligibility criteria document.

(b) Record of poor performance such as abandoning work, not properly completing the contract, or financial failures/weaknesses etc.

(c) If confidential inquiry reveals facts contrary to the information provided by the Bidder.

(d) If confidential inquiry reveals unsatisfactory performance in any of the selection criteria

(e) If inspection of works in progress or completed by the Bidder are not found satisfactory by the Institute.

9.0 Financial Information :

Bidder should furnish the following financial information:

- (a) Annual financial statement for the last five (5) years in (Form 'B'). This should be supported by audited balance sheets and profit and loss accounts duly certified by the statutory auditor and copies of Income Tax Return filed with Income Tax Department.
- (b) Solvency certificate issued by a Scheduled Bank after date of issue of these Tender documents, in (Form 'C') Name and address of the bankers, identification of individuals familiar with the Bidder's financial standing and a banker's statement on availability of credit.

10.0 Experience in works highlighting experience in similar works:

10.1 Bidder should furnish the following:

- (a) List of all works of similar nature successfully completed during the last seven years in (Form 'D').
- (b) List of the projects under execution or awarded in (Form 'E').
- (c) Calculation of Bidding Capacity in (Form 'E').

10.2 Particulars of completed works and performance of the Bidder duly authenticated/certified by an officer not below the rank of Executive Engineer or equivalent should be furnished separately for each work completed or in progress. (Form 'F').

11.0 Organization Information:

Bidder is required to submit the information in respect of his organization in Form 'A' & 'G'.

12.0 Construction plant and equipment:

Bidder should furnish the list of construction plant and equipment including steel shuttering, centering and scaffolding to be used in carrying out the work. (in Form 'H'). Details of any other plant & equipment required for the work not included in Form 'H' and available with the Bidder may also be indicated.

13.0 Letter of Transmittal:

The Bidder should submit the letter of transmittal attached with the document.

14.0 Financial Bids:

After evaluation of Eligibility Documents, a list of the qualified Bidders will be prepared. Financial Bids of the qualified Bidders will be opened on a later date. Date for Financial Bid's opening will be informed separately to the qualified Bidders.

15.0 Miscellaneous:

15.1 The Institute reserves the right, without being liable for any damages or obligation to inform the Bidders, to:

- (a) Reject any or all the Tenders without assigning any reason.
- 15.2** Any effort on the part of the Bidder or his agent to influence or pressurize the Institute would result in rejection of his Tender. Canvassing of any kind is prohibited.
- 15.3** Work shall be executed according to General Conditions of Contract forming part of the Tender Documents. The Institute reserves the right to modify any of the conditions, to its specific requirements.
- 15.4** The Bidding process shall be governed by, and construed in accordance with, the laws of India and the Courts at Rohtak (Haryana) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/or in connection with the Bidding process.
- 15.5** The Institute, in its sole discretion and without incurring any obligations or liability, reserves the right, at any time, to;
- a) Suspend and/or cancel the Tender process and/or amend and/or supplement the Tender process or modify the dates or other terms and conditions relating thereto;
 - b) Consult any Bidder in order to receive clarification or further information;
 - c) Qualify or not to qualify any Bidder and/or to consult any Bidder in order to receive clarification or further information;
 - d) Retain any information and/or evidence submitted to the Institute by, on behalf of, and/or in relation to any Bidder; and/or
 - e) Independently verify, disqualify, reject and/or accept any and all submissions or other information and/or evidence submitted by or on behalf of any Bidder;
 - f) Call for information from previous clients and evaluate the previous completed projects regarding all submissions including litigations;
 - g) Undertake physical verification of completed projects and interact with clients;
 - h) Call for information from taxation authority or by financial auditor, banker, chartered accountant engaged by the Bidder.
- 15.6** It shall be deemed that by submitting the Tender, the Bidder agrees and releases the authority, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/or performance of any obligations hereunder and the Tender Documents, pursuant here to, and/or in connection with the Tender process, to the fullest extent permitted by

applicable law, and raise any and all rights and/or claims it may have in this respect, whether actual or contingent, whether present or in future.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

Section-III
FORMS FOR QUALIFICATION

LETTER OF TRANSMITTAL

From:

(Full Address of Bidder)

To,

Director

Indian Institute of Management Rohtak

Sunaria Village, Rohtak -124001, Haryana

Subject: Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)

Sir,

Having examined the details given in Notice Inviting Tender for the above work, I/We hereby submit the requisite documents and other relevant information.

1. I/We hereby certify that all the statements made and information supplied in the enclosed Forms 'A' to 'H' and accompanying statements are true and correct.
2. I/We have furnished all information and details necessary for selection of Contractor and have no further pertinent information to supply.
3. I/We submit the requisite certified solvency certificate and authorize the Director, Indian Institute of Management Rohtak to approach the Bank issuing the solvency certificate to confirm the correctness thereof. I/We also authorise the Institute to approach individuals, employers, firms and corporations to verify our competence and general reputation.
4. I/We have not been blacklisted by any State/Central Government Department or PSU or Autonomous Bodies. I/We have submitted a duly notarized affidavit to this effect.
5. I/We undertake that we would comply with all statutory laws and compliances, including those applicable to the sub-contractors appointed by us and indemnify the Institute of all implications and consequences resulting from any non-compliances due to any reasons whatsoever.
6. I/We submit the certificates as per the Form 'D' in support of our suitability, technical knowledge and capability for having successfully completed the following works:

S. No.	Name of work	Amount		Contact particulars of certificate issuing authority
1.				
2.				
3.				

* The Bidder shall furnish all contract information such as postal address, telephone and fax numbers, e-mail ids etc. Incomplete information will make the Application liable for rejection.

7. Non-refundable Tender Document Fee amounting to Rs. 5,000/- (Five Thousand only) in the Demand Draft/ Bankers' Cheque in favour of Indian Institute of Management Rohtak, Payable at Rohtak is submitted herewith.
8. Earnest Money Deposit for an amount of Rs. _____ (Rupees _____) in the form of a Demand Draft no. _____ issued by _____ (name of Bank).
9. Following documents are submitted herewith
 - i. Document Checklist
 - ii. Form 'A' – Structure & Organisation of Bidder (with supporting documents)
 - iii. Form 'B' – Financial Information (with supporting documents)
 - iv. Form 'C' – Banker's Certificate
 - v. Form 'D' – Details of similar works completed (with supporting documents)
 - vi. Form 'E' – Details of similar works in hand (with supporting documents)
 - vii. Form 'F' - Performance reports of works
 - viii. Form 'G' – Details of Technical & Administrative Personnel
 - ix. Form 'H' – Details of Plant & Equipment
 - x. Affidavit
 - xi. Pledge of Compliance
 - xii. Integrity Pact and Integrity Agreement
 - xiii. Demand Draft/ Bank Cheque towards Earnest Money Deposit.
 - xiv. Demand Draft from a Scheduled Bank, towards Tender Document Fee
 - xv. Hard copy of the Tender document, duly signed on each page by authorized signatory.

Seal of Bidder:

Date of Submission:

Signature of Bidder

CHECKLIST OF SUBMISSIONS (Envelope 1)

No.	Document Name	Yes/No	Remarks
1	Letter of Transmittal		--
2	Form 'A' - Structure & Organisation of Bidder		
	<i>Supporting documents (attach copies)</i>		
	<ul style="list-style-type: none"> Certificate of Incorporation, Certificate of Commencement of Business 		To be certified by Auditor
	<ul style="list-style-type: none"> Partnership Deed /Memorandum & Articles of Association 		-do-
	<ul style="list-style-type: none"> Certificate of Registration with Government Departments 		-do-
	<ul style="list-style-type: none"> Income Tax PAN Card 		-do-
	<ul style="list-style-type: none"> Registration with EPF & ESIC 		--
3	Form 'B' - Financial Information		To be certified by Auditor
	<i>Supporting documents (for last 5 financial years)</i>		
	<ul style="list-style-type: none"> Audited Profit & Loss Account Statement 		To be certified by Auditor
	<ul style="list-style-type: none"> Audited Balance Sheet 		-do-
	<ul style="list-style-type: none"> Income Tax Return 		--
4	Form 'D' – Details of similar works completed		To be certified by Auditor
	<ul style="list-style-type: none"> Attach copy of Award Letter(s) with photographs 		-do-
5	Form 'E' - Details of similar works in hand with Bidding Capacity Calculations		-do-
	<ul style="list-style-type: none"> Attach copy of Award Letter(s) with photographs 		-do-
6	Form 'F' – Performance reports of works (for each work in Form 'D' and Form 'E')		--
7	Form 'G' – Details of Technical & Administrative Personnel to be employed for this work		-do-
8	Form 'H' – Details of Plant & Equipment		-do-
9	Affidavit		To be notarised
10	Pledge of compliance		-do-
11	Integrity Pact and Integrity Agreement		--
12	Hard copy of the Tender document, duly signed on each page by authorized signatory		--
	<ol style="list-style-type: none"> <u>All the above documents will have to be arranged serially, duly page numbered.</u> <u>All pages will have to be initialed by the Authorised Signatory of the Bidder, duly stamped with the seal of the Bidder</u> <u>The Qualification documents shall be hard-bound and each page serial numbered.</u> 		

Documents to be enclosed in Envelope 2

Sl. No.	Document Name	Confirm Submission Yes/No	Remarks
1	Form 'C' –Bankers' certificate		
2	Processing Fee (Non-refundable) of Rs 5,000/- (Rupees Five Thousands only)		
3	Demand Draft/ Back Cheque towards Earnest Money Deposit		

Documents to be enclosed in Outer Envelope 3

1. Envelope 1
2. Envelope 2

FORM 'A'

STRUCTURE & ORGANISATION

1	Name & complete address of the Bidder	
2	Telephone no./Telex no./Fax no.	
3	Legal status of the Bidder (attach certified copies of original document defining the legal status)	(a) A proprietary firm (b) A firm in partnership (c) A limited company or Corporation
4	Details of incorporation/commencement of business	
5	Date of commencement of business	
6	Income Tax Permanent Account No (PAN)	
7	Particulars of registration with various Government Bodies for Construction Works (submit proof, duly attested by Bidder)	
8	Names and designation of Directors & Partners	
9	Name and designation of Authorised Signatory authorized to act for the organization.	
10	Was the Bidder ever required to suspend construction for a period of more than six months continuously after he commenced the construction? If so, give the name of the project and reasons of suspension of work.	
11	Has the Bidder, or any constituent partner in case of partnership firm, ever abandoned the awarded work before its completion? If so,	

	give name of the project and reasons for abandonment.	
12	Has the Bidder, or any constituent partner in case of partnership firm, ever been debarred/black listed for tendering in any organization at any time? If so, give details.	
13	Has the Bidder or any constituent partner in case of partnership firm, ever been convicted by a court of law? if so, give details.	
14	In which field of Civil Engineering construction, the Bidder has specialization and interest?	
15	Any other information considered necessary related to the Tender that has not been included above.	
16	Name and address particulars of Chartered Accountant/Statutory Auditor verifying the financial information	
17	Name and Complete Address particulars of the Bidder's Bankers	

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

FORM 'B'
FINANCIAL INFORMATION

Name of the Bidder

A) Bankers Details		
a)	Name of Bank	
b)	Address	
c)	City	
d)	Pin Code	
Details of contact person for verification of particulars		
a)	Name & Designation	
b)	Phone Nos. with STD Code	
c)	E-mail Ids	
d)	Fax No.	
B) Details of Chartered Accountant/Financial Auditors		
a)	Name of Firm/CA	
b)	Address	
c)	City	
d)	Pin Code	
Details of contact person for verification of particulars		
a)	Name & Designation	
b)	Phone Nos. with STD Code	
c)	E-mail Ids	
d)	Fax No.	

- I. Financial Analysis – Details to be furnished duly supported by figures in balance sheet/profit & loss account for the last five years duly certified by the Statutory Auditor.

Fig. in Rs lakhs

Sl. No.	Particulars	Financial Year					Average annual turnover
		2014-15	2015-16	2016-17	2017-18	2018-19	
	Mention whether records are audited	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	
1.	Gross Annual turnover on construction works.						
2.	Profit (+) / Loss (-)						

3	Financial Position						
	a. Cash						
	b. Current Assets						
	c. Current Liabilities						
	d. Working Capital (b-c)						
	e. Net worth						
4.	Whether Audited	Yes/No					

II. Income Tax Return for the last five years (to be attached)

III. Solvency Certificate from Bankers of Bidder in the prescribed Form 'C' issued after date of issue of these Tender documents.. (to be enclosed in a separate sealed envelope)

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor/
Chartered Accountant with Seal

FORM 'C'**FORM OF BANKER'S CERTIFICATE FROM A SCHEDULED BANK**

This is to certify that to the best of our knowledge & information, M/s
 having registered office at
, a
 customer of our bank, is respectable & can be treated as good for any engagement upto a limit
 of Rs.Lakh (RupeesLakh).

This certificate is issued without any guarantee or responsibility on the bank or any of its
 officers.

SIGNATURE
 (FOR BANK)

Note:

- (i) This certificate should have been issued on or after 30.07.2019
- (ii) Banker's certificate should be on letter head of the Bank, sealed in cover, addressed to
 Director, Indian Institute of Management Rohtak, Sunaria Village, Rohtak.
- (iii) In case of partnership firm, certificate should include names of all partners as recorded
 with the bank.

FORM 'D'

**DETAILS OF ALL WORKS OF SIMILAR CLASS COMPLETED
DURING THE LAST SEVEN YEARS ENDING ON 30.07.2019**

Sl. No.	Name of work/project and location	Owner or sponsoring organization	Cost of work in crores of rupees (as per award letter)	Final cost at completion	Date of commencement as per contract	Actual date of commencement	Stipulated date of completion	Actual date of completion	Litigation / arbitration cases pending / in progress with details*	Name and address / telephone number of officer to whom reference may be	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

Note: Please attach attested copies of relevant Document/PO/Complete certificate etc

* including gross amount claimed and amount awarded by the Arbitrator.

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor/
Chartered Accountant with Seal

FORM 'E'

PROJECTS UNDER EXECUTION OR AWARDED (As on 30.07.2019)

Sl. No.	Name of work / project and location	Owner or sponsoring organization	Cost of work in crores of rupees (as per award letter)	Date of commencement as per contract	Actual date of commencement	Stipulated date of completion	Upto date percentage progress of work	Slow progress if any and reasons thereof	Name and address / telephone number of officer to whom reference may be made	Remarks
1	2	3	4	5	6	7	8	9	10	11

Note: Please attach attested copies of relevant Document/PO/Complete certificate etc

The Bidding Capacity calculation is shown hereunder:

$$\text{Bidding Capacity} = \{A \times N \times 2\} - B$$

Value of A Rs..... Crores

Value of N 1.5 years

Value of B Rs..... Crores

Bidding Capacity Rs..... Crores

Certified that the above list of works is complete and no work has been left out and that the information given is correct to the best of my knowledge and belief.

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor/
Chartered Accountant with Seal

FORM 'F'**PERFORMANCE REPORT OF WORKS REFERRED TO IN FORMS "D" & "E"**

1. Name of work/project & location
2. Name and address of the authority under whom the works executed:
3. Agreement No.
4. Estimated cost
5. Tendered cost
6. Gross amount of the work completed
7. Date of start
8. Date of completion
 - (i) Stipulated date of completion
 - (ii) Actual date of completion
9. Amount of compensation levied for delayed completion, if any.
10. Amount of reduced rate items, if any
11.
 - i) Did the contractor go for arbitration
 - ii) If yes, total amount of claim
 - iii) Total amount awarded
12. Performance report

(1) Quality of work	Very Good/Good/Fair/Poor
(2) Financial soundness	Very Good/Good/Fair/Poor
(3) Technical Proficiency	Very Good/Good/Fair/Poor
(4) Resourcefulness	Very Good/Good/Fair/Poor
(5) General Behaviour	Very Good/Good/Fair/Poor

Dated:

Executive Engineer or Equivalent

FORM 'G'

**DETAILS OF TECHNICAL & ADMINISTRATIVE PERSONNEL
TO BE EMPLOYED FOR THE WORK**

S.No.	Name	Designation	Regular /Part-time	Qualification	Experience in years		Roles & Responsibilities	Projects involving	Deployment (part-time/Full-time)
					Total	In present company			

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor /
Chartered Accountant with Seal

FORM "H"

**DETAILS OF CONSTRUCTION PLANT AND EQUIPMENT
LIKELY TO BE USED IN CARRYING OUT THIS WORK**

S. No.	Name of equipment	Nos.	Capacity or Type	Age	Condition	Ownership Status			Current Location	Remarks
						Presently Owned	Leased	To be purchased		
1	2	3	4	5	6	7	8	9	10	11
Earth moving equipment										
1.	Excavators (various sizes)									
Equipment for hosting and lifting										
1.	Tower crane									
2.	Builder's hoist									
Equipment for concrete work										
1.	Concrete batching plant									
2.	Concrete pump									
3.	Concrete transit mixer									
4.	Concrete Mixer (diesel)									
5.	Concrete mixer (electrical)									
6.	Needle vibrator (electrical)									
7.	Needle vibrator (petrol)									
8.	Table vibrator (electrical / petrol)									

Kailash Pati Mishra
Chief Engineer (Civil)

Equipment for building work										
1.	Block making machine									
2.	Bar bending machine									
3.	Bar cutting machine									
4.	Wood thickness planner									
5.	Drilling machine									
6.	Circular machine									
7.	Welding generators									
8.	Welding transformer									
9.	Cube testing machines									
10.	M.S. pipes									
11.	Steel shuttering									
12.	Steel scaffolding									
13.	Grinding / polishing machines									
Equipment's for Road work										
1.	Road rollers									
2.	Bitumen paver finishers									
3.	Hot mix plant									
4.	Spreaders									
5.	Earth rammers									
6.	Vibratory road rollers									

Equipment for transportation										
1.	Tippers									
2.	Trucks									
Pneumatic Equipment										
1.	Air compressor (diesel)									
De-watering equipment										
1.	Pump (Diesel)									
2.	Pump (Electric)									
Power Equipment										
1.	Diesel Generators (any other plant / equipment)									

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor /
Chartered Accountant with Seal

(TO BE SWORN ON A NON-JUDICIAL STAMP PAPER OF Rs.10/-)**AFFIDAVIT**

*I/we authorized signatory of..... (Mention name of firm/company and its complete address).....do hereby solemnly affirm and declare as under:-

1. That *I/we.....*am/are registered as (mention name of *firm/company) vide registration No..... under the provisions of (mention the name of the Act).
2. That*I/we.....have applied in response to the Tender Documents for Construction of various Buildings and other related structures and facility for Construction of Phase 1A of Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)).
3. That the above named Bidder is eligible to submit the aforesaid Application , as neither the bidder nor any of its constituents have been barred by the Central Government and/or any State Government in India at any time prior to the date of submitting this affidavit.
4. That the above named Bidder during the last three years has neither failed to perform on any Agreement nor was expelled from any project or Agreement nor any Agreement was terminated for any breach by the bidder.
5. That the above named Bidder has not been blacklisted by any State/Central Government Department/Autonomous Bodies or PSU.
6. That the above named Bidder is not in default of payment of statutory dues (other than disputes being contested by the Bidder).
7. That the above named Bidder confirms that eligible similar work(s) have not been got executed through another contractor on back to back basis.

8. That the above named Bidder confirms and agrees that, if any such violation comes to the notice of Indian Institute of Management, Rohtak (“Owner”) in the future, then the Owner shall be at liberty to initiate appropriate penal and legal action against the Tenderer and to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.

DEPONENT

VERIFICATION

*I/we..... the above named deponent do hereby verify that the contents of the aforesaid paragraphs 1 to 8 are true and correct to the best of*my/our knowledge and belief and nothing is concealed therefrom.

Verified atthisday of

DEPONENT

* Strike out whichever is not applicable.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

Pledge of Compliance

(To be given by the authorized signatory of the Bidder)

Name:
Designation:

Date:

DECLARATION

I,(name & designation with company name), acting on behalf of(company name & address), which is an bidder for the Application for Construction of various Buildings and other related structures and facility for New Campus Development of Indian Institute of Management Rohtak at Sunaria Village, Rohtak, Haryana, hereby undertake that my Firm/company is fully conscious that if my Firm/company is selected for providing the services to IIM Rohtak, at NO point of time my Firm/company or its officials performing any responsibility on its behalf, or any associates sub-hired by us for executing any activity in the part of the project assigned to us, shall consciously or callously do anything to delay, obstruct or stall the progress of the project or any activities, decisions or actions related to the project, nor shall it refuse to cooperate or comply with any provisions of the Agreement or with any instructions issued by IIM Rohtak, including its authorized representatives, officials, PM/PMC and/or MPD (Project Architect) for the stated or unstated reason that IIM Rohtak's position, approach or assessment related to any elements or aspects of the Project is at variance with the position, approach or assessment of my company or its officials.

It is further undertaken that in the event of any breach of the above undertaking during the entire period of project implementation assigned to my Firm/company, the full responsibility of any losses incurred by IIM Rohtak, including financial, time or reputation losses, as assessed by IIM Rohtak, shall lie with my company and its officials and my company shall fully compensate IIM Rohtak for all such losses without resort to conciliation or arbitration processes.

Date:

Signature of the Bidder/
Authorised Signatory

Seal of Bidder:

Signature of Statutory Auditor /
Chartered Accountant with Seal

INTEGRITY PACT

To,
Director,
Indian Institute of Management,
Rohtak

Subject: **Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works) (IIMR/CIVIL/K-73T)**

Dear Sir,

I/We acknowledge that Indian Institute of Management Rohtak (IIM Rohtak) is committed to following 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 APPLICATION 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 IIM-R. I/We acknowledge and accept the duration of the Integrity Agreement, which shall be in 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, IIM-R 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

Seal of bidder
Date:

Signature(s) of Bidder (s)
Name and Address

INTEGRITY AGREEMENT

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

BETWEEN

IIM Rohtak represented through its Director,
(hereinafter referred as the 'Principal/Owner', which expression shall unless repugnant to
the meaning or context hereof includes its successors and permitted assigns)

AND

.....

through (hereinafter referred to as the
"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 (NIT No.....)
(hereinafter referred to as "Tender/Bid ") and intends to award, under laid down
organizational procedure, contract for
..... (name of the work)
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 endeavour 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 IIM Rohtak 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) commits 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 Institute 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, IIM-R.

Article 7- Other Provisions

- 1) This Pact is subject to Indian Law, place of performance and jurisdiction is the Headquarters of the Institute i.e. 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 :

(To be executed by and between the Owner and the successful tenderer)

FORMAT OF AGREEMENT

This agreement is executed at _____(place of execution) on the _____ day of _____, 20__ BETWEEN _____, which expression shall mean and include its successors and assigns (name and address of the Owner) (“ Owner”) of the FIRST PART AND _____(name and address of the successful tenderer) (“Contractor”) of the SECOND PART.

The Owner and the Contractor shall be individually referred to as the “Party” and collectively referred to as the “Parties”

WHEREAS IIM Rohtak (the Owner) is desirous of developing a permanent campus and invited tenders by issuing Notice Inviting Tender (“Tender”) for selection of a contractor for constructing the said campus. The Contractor has submitted its bid pursuant to the issuing of the Tender by the Owner.

WHEREAS the details of the work proposed to be executed by the Contractor is more particularly specified in the Tender (name and identification number of Contract) (“Works”) and the Owner has accepted the Tender submitted by the Contractor for the execution and completion of the Works and the remedying of any defects therein, at a contract price of Rs.(Rupees _____(in words)

WHEREAS the Owner has now desirous of laying down the terms and conditions governing the execution of the Works and has therefore, requested the Contractor to execute the present Agreement.

NOW THIS AGREEMENT WITNESSETH as:

1. In this Agreement, words and expressions shall carry the same meanings as are ascribed to them in the Conditions of Contract as more particularly mentioned in the Tender. The Parties agree that the Tender shall form an integral part of this Agreement and shall be read and construed accordingly.
2. In consideration of the payments to be made by IIM Rohtak (the Owner) to the Contractor as the consideration for execution of the Works (“Consideration”), the Contractor hereby covenants with IIM Rohtak (the Owner) to execute and complete the Works and remedy the defects therein in conformity in all aspects with the provisions of the Tender and this Agreement.
3. The Owner hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and in the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Tender and this Agreement at the times and in the manner prescribed under the Tender.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement:

- i) Notice Inviting Tender
- ii) Contractor's Application and documents submitted for Selection
- iii) Letter of Acceptance;
- iv) Notice to proceed with the Works;
- v) Contractor's Tender;
- vi) Contract Data;
- vii) Conditions of Contract (including Special Conditions of Contract);
- viii) Specifications;
- ix) Drawings;
- x) Bill of Quantities; and
- xi) Any other documents listed in the Contract Data as forming part of the Contract.

In witness whereof the Parties have caused this Agreement to be executed on the day and year first written above.

The Common Seal of

was hereunto affixed in the presence of:

Signed Sealed and Delivered by the said

Binding Signature of Owner

Binding Signature of Contractor

in the presence of

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

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 & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work **Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)**. I/We hereby tender for the execution of the work specified for Director, Indian Institute of Management Rohtak, within the time specified in Schedule 'F' viz., schedule of quantities and in accordance in all respect with the specifications, designs, drawing and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respect of accordance with, such conditions so far as applicable.

We agree to keep the tender open for ninety (90) days from the date of opening of bid and not to make any modification in its terms and conditions.

A sum of Rs. _____/- is hereby forwarded in demand draft/bank guarantee issued by a scheduled bank as earnest money. If I/We fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said Director, Indian Institute of Management Rohtak or his successors representatives, 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 work as specified, I/We agree that Director Indian Institute of Management Rohtak or the successors representatives in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said the performance guarantee absolutely. The said performance Guarantee shall be a guarantee to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the General Conditions of Contract. Further, I/We agree that in case of forfeiture of Earnest Money & Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

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 authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated:**

Signature of Contractor **

Witness: **

Address: **

Postal Address **

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for an on behalf of the Indian Institute of Management Rohtak for a sum of Rs.....(Rupees.....).

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

- (a) *
- (b) *
- (c) *

**For & on behalf of Indian Institute
of Management Rohtak**

Signature

Designation

Dated:

**Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak**

PROFORMA OF SCHEDULES**SCHEDULE 'A'**

Schedule of quantities for Civil and Electrical has been attached separately

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
NIL				

SCHEDULE 'C'

Tools and plants to be hired to the contractor

S. No.	Description	Hire charges per day	Place of Issue
NIL			

SCHEDULE 'D'

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

- a. Special Conditions of Contract
- b. Particular Specifications
- c. Tender Drawings
- d. Guarantee Certificate

SCHEDULE 'E'

Reference to General Conditions of Contract: General Conditions of Contract

Name of work	Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)
---------------------	---

ESTIMATED COST OF WORK

I.	Civil Components	Rs. 12,42,69,919/-
II.	Electrical Components	Rs. 1,35,48,908 /-
III.	Earnest Money	Rs. 27,56,400/-

I.	Performance Guarantee	5% of tendered amount
II.	Security Deposit	5% of tendered value

SCHEDULE 'F' (GENERAL RULES & DIRECTIONS)

OFFICER INVITING TENDER: Director, Indian Institute of Management, Rohtak

Definitions:

1.	Engineer-in-Charge	Chief Engineer, Indian Institute of Management, Rohtak
2.	Accepting Authority	Director, Indian Institute of Management, Rohtak or successor thereof.
3.	Percentage on cost of materials and Labour cover all to overheads and profits	15%
4.	Standard Schedule of Rates	DSR' 2018 read alongwith correction slips/amendments
5.	Department	Indian Institute of Management Rohtak
6.	Contract Form	Form 8, General Conditions of Contract

Clause 1

1.	Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance	15 (Fifteen) days
2.	Maximum allowable extension beyond the period provided in (i) above	15 (Fifteen) days with late fee @ 0.1% per day of the PG amount.

Clause 2

Authority for fixing compensation under clause 2	Director, Indian Institute of Management Rohtak or successor thereof.
--	--

Buildings of the project for which separate period of completion shall apply

Sl No	Name of Building	Time allowed for completion from the date of start of the project
1	Student Hostel	07 (Seven) months

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

Clause 2A

Whether Clause 2A shall be applicable	Yes
---------------------------------------	------------

Clause 5

Number of days from the date of issue of letter of acceptance for reckoning date of start	15 (Fifteen) days or date of handing over of site whichever is later.
---	--

Mile stones for Civil works

S. No	Description of Milestone (Physical)	Time allowed in months (from date of start)	Amount to be with-held in case of non achievement of mile stone (% of tendered amount of Civil component)
D – Student Hostel			
1	<i>Total Work done of Rs.3.00 Crore</i>	<i>2 months</i>	3% of tender value
2	<i>Total Value of Work done of Rs. 8.00 crore</i>	<i>5 months</i>	3% of Tender value
3	<i>Completion of work</i>	<i>7 months</i>	4% of Tender value

Time allowed for execution of work **07 (Seven) Months**

Authority to decide:

(i)	Extension of time :-	Director, Indian Institute of Management Rohtak or successor thereof.
(ii)	Rescheduling of mile stones :-	Director, Indian Institute of Management Rohtak or successor thereof.
(iii)	Shifting of date of start in case of delay in handing over of site:	Director, Indian Institute of Management Rohtak or successor thereof.

Chief Engineer
Kailash Pati Mishra
Indian Institute of Management Rohtak

Clause 6, 6A

Clause applicable - (6 or 6A)	6A
-------------------------------	-----------

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	Rs. 1 Cr. for (Civil work and Electrical work)
--	---

Clause 10A

List of testing equipment to be provided by the contractor at site lab as per [TABLE-1] of Annexure-I attached.

Clause 10B(ii)- Applicable with interest of 12% P.A

Whether Clause 10 B (i) & (ii) shall be applicable	Yes
--	------------

Whether Clause 10 B (iii) shall be applicable	No
---	-----------

Clause 10C

Component of labour expressed as percent of value of work	Non-Applicable
---	----------------

Clause 10CA: - Not Applicable**Clause 10CC: - Not Applicable****Clause 11**

Specifications to be followed for execution of work	CPWD Specifications 2009 volume- I & II read alongwith correction slips/amendments issued upto 30.07.2019 and CPWD latest specification for Electrical works
---	---

Clause 12

Type of work	: Project and original work.
--------------	------------------------------

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	: Please refer below
---	----------------------

IIMR/CIVIL/K-73T

12.2. 12.3	Deviation limit beyond which clauses 12.2 & 12.3 shall apply for building work	25% (Twenty five percent) 25% (Twenty five percent)
12.5	i) Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for foundation work.	100% (One Hundred percent)

Clause 16

Competent Authority for deciding reduced rates.	Director, Indian Institute of Management Rohtak or successor thereof.
---	--

Clause 17

Defect liability period - Applicable

Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site:-

As per [TABLE-2] of Annexure-I attached.

Clause 25

Constitution of Dispute Redressal Committee: -

The Dispute Redressal Committee shall be constituted by Director, Indian Institute of Management Rohtak, if required and deemed necessary.

Chief Engineer

Kailash Pati Mishra

Indian Institute of Management Rohtak

Clause 36 (i)**Requirement of Technical Representative(s) and Recovery Rates**

Sl. 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)	
						Figures (in Rs.)	Words
1.	Project Manager with degree in Civil Engineering	Civil	Principle Technical Representative	15 Yrs	1 no.	80,000/-	(Rupees Eighty thousand only) per Month
2.	Graduate Engineer	Civil	Senior Technical Representative	10 yrs	1 nos.	60,000/-	(Rupees Sixty Thousand only) Per Month
3.	Graduate Engineer Or Diploma Engineer	Civil /Electrical	Technical Representative	5 Yrs	2 nos	40,000/-	(Rupees Forty Thousand only) Per Month
5.	Diploma Engineer	Civil	Quantity Surveyor	5 Yrs	1 no.	40,000/-	(Rupees Forty Thousand only) per month

Assistant Engineers retired from Government services who are holding Diploma will be treated at par with Graduate Engineers. Diploma holder with minimum 10-year relevant experience with a reputed construction company can be treated at par with Graduate Engineers for the purpose of such deployment subject to the condition that such diploma holders should not exceed 50% of requirement of degree engineers.

The contractor shall submit a certificate of employment of the technical representative(s) (in the form of copy of Form -16 or CPF deduction issued to the Engineers employed by him) along with every account bill/final bill and shall produce evidence if at any times so required by the Engineer-in-charge.

Clause 42

(i)	(a)	Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates	DSR 2018 with read alongwith upto date correction
-----	-----	---	--

ANNEXURE – I**(TABLE -1)****Equipments for Testing of Materials & Concrete at Site Laboratory**

All necessary equipment for conducting all necessary tests shall be provided at the site in the well furnished site laboratory of minimum size 25 feet X 15 feet by the contractor at his own cost The following minimum laboratory equipments shall be set up at site office laboratory: -

Sl. No.	Equipment	Numbers (Minimum)
1.	100MT compression testing machine, electrical-cum-manually operated)	1
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	1 set
3.	Vicats apparatus with Desk pot	1
4.	Megger & earth resistance tester	1
5.	Pumps and pressure gauges for hydraulic testing of Pipes	1
6.	Weighing scale platform type 100 Kg capacity	2
7.	Graduated glass measuring cylinder	As per Requirement
8.	Sets of sieves of 450mm internal dia for coarse aggregate [100mm, 80mm, 40mm; 20mm; 12.5mm; 10mm; 4.75mm complete with lid and pan]	2
9.	Sets of sieves of 200mm internal dia for fine aggregate [4.75mm; 2.36mm; 1.18mm; 600 microns; 300 microns & 150 micron , with lid and pan]	2
10.	Sieve Brushes and sieve shaker capable of 200mm and 300mm dia sieves , manually operated with timing switch assembly	2
11.	Cube moulds size 70mmx70mmx70mm	18
12.	Cube moulds size 150mmx150mmx150mm	36
13.	Ultrasonic Test Equipment (For concrete)	1
14.	Hot air oven temp. Range 50°c to 300°c- sensitivity 1 degree	1
15.	Electronic balance 600gx0.1g., 10 kg and 50 kg each	1 Each
16.	Physical balance weight upto 5 kg	1
17.	Digital thermometer upto 150oc	2
18.	Air Content of concrete testing machine	1
19.	Measuring jars 100ml, 200ml, 500ml	3 nos each size

20.	Gauging trowels 100mm & 200mm with wooden handle	2
21.	Spatula 100mm & 200mm with long blade wooden handle	2
22.	Vernier calipers 12" & 6" size	3 each
23.	Digital PH meter least count 0.01mm	1each
24.	Digital Micrometer least count. 0.01mm	1 each
25.	Digital paint thickness meter for steel 500 micron range	2
26.	GI tray 600x450x50mm, 450x300x40mm,300x250x40mm	2 nos each
27.	Electric Motor mixer 0.25 cum capacity	2
28.	Rebound hammer test digital rebound hammer	2
29.	Screw gauge 0.1mm-10mm, least count 0.05	4
30.	Water testing kit	2
31.	Motorized sieve shaker	1
32.	Pruning Rods 2 Kg weight length 40 cm and ramming face 25 mm ²	2
33.	Extra Bottom plates for 15 cm cube mould	6
34.	Standard Vibration Table for gauging the cubes	1
35.	Pocket concrete pernetrometer 0 to 50kg/ sq.cm	1
36.	Concrete temperature measuring thermometer with Brass protection sheath 0- 100 degree centigrade	2
37.	Mortar Cube vibrator	1
38.	Dial type spring balance preferable with zero correction knob capacity 100 kgs reading to ½ kg.	1
39.	Counter scale capacity 1 kg and 10 kg	1
40.	Iron Weight of 5 kg, 2 kg, 1 kg, 500 gm, 200 gm, 100 gm	1 each
41.	Brass Weight of 50 gm, 20 gm, 10 gm, 5 gm, 2 gm, 1 gm	1 each
42.	Measuring cylinder TPX or Poly propylene capacity 100 ml, 500 ml, 250 ml, 100 ml	1 each
43.	Pyrex, corning or Borosil beakers with cover capacity 500 ml, 200 ml, 50 ml	2 each
44.	Wash Bottles capacity 500 ml	3
45.	Thermometers 1-100 degree centigrades/ max. and Min/ Dry and wet with table	3
46.	Set of box spanner ratchet	2
47.	Hammer 1lb& 2lb	2 each

48.	Rubber Hammer	2
49.	Hacksaw with 6 blades	2
50.	Measuring tape 2 mtr	5
51.	Depth gauge 20cm	3
52.	Shovels& Spade	3
53.	Steel plates 5 mm thick 75x75 cm	4
54.	Plastic or G.I. Buckets 15 ltr, 10 ltr, 5 ltr	1 each
55.	Wheel Barrow	3
56.	Floor Brushes, hair dusters, scrappers, wire brush, paint brushes, shutter steel plat oil, kerosene with stove etc.	3 each
57.	Moisture meter	1
58.	Any other equipment for site tests as outlined in BIS codes and as directed by the Engineer-in-charge.	

(TABLE-2)

PLANT AND EQUIPMENT REQUIRED TO BE OWNED / TAKEN ON LEASE BY THE CONTRACTOR

Sl. No.	Equipment	Numbers (Minimum)
2.	Concrete batch mix plant of 10 cum per hour	1
3.	Excavator cum loader (JCB 3D model or equivalent).	1
4.	Compressor machine minimum 200 cfm with rock breaker.	1
5.	DG set of minimum capacity 62.5 KVA.	1
6.	Mini batching plant (12 cum./hr.).	1
8.	Concrete pump (minimum capacity 30 cum/hr. & head 90m).	1
9.	Needle Vibrators.	6
10.	Plate Vibrators.	1
11.	Screed leveller	1

12.	Dumper/Tipper.	2
13.	Reinforcement bending machine.	2
14.	Reinforcement cutting machine.	2
15.	Automatic Ring making machine (Reinforcement)	1
16.	Power driven earth rammer (Soil compactor).	2
17.	Total station.	1
18.	Auto level & staff.	2
19.	Tractor with trolley.	2
20.	Water tanker (minimum capacity 5000 litres)	2
21.	Welding machine 400 Ampere	2
22.	Screener for coarse sand and fine sand	2
23.	Centrifugal monoblock water pump minimum capacity 2 HP	1
24.	Shuttering with necessary props	2,500 sqmt
25.	Double steel scaffolding and staging material	1,000 sqmt
26.	Air Compressor	1
27.	Stone cutting machine	1
29.	Stone polishing machine	1
30.	Stone hand polishing machine	1
31.	Computer & Printer for billing	3
32.	Any other machinery required for completion of the work as per decision of Engineer-in-charge.	As per Actual requirement

Note: The above list is only indicative and not exhaustive and the contractor may be required to mobilise additional Tools & Plants as per requirement.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

BRIEF PARTICULARS OF THE WORK

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

Name of work	:	Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)		
Composite Estimated Cost	:	For Civil Components	=	Rs. 12,42,69,919/-
	:	For Elect. Components	=	Rs. 1,35,48,908/-
	:	Total	=	Rs. 13,78,18,827/-
Period of Completion	:	07 (Seven) months.		

2. The site is situated at Sunaria Village, NH-10 Southern Bye Pass, Rohtak (Haryana)
3. The proposed work shall consist of Construction of 4 Nos of Hostel Building consist of 42 nos of room each.
4. Following is the broad scope of work.
- i. Civil work components – RCC framework in basement and superstructure.
 - ii. masonry work.
 - iii. External finishing works, aluminium work etc.
 - iv. Building finishes such as flooring, wall finishes, etc.
 - v. Waterproofing
 - vi. Water supply, sanitary installations, drainage, & recycling of water (internal & external)
 - vii. Internal & External installations, HT/LT Distribution System and Cabling
 - viii. Fire Alarm, fire fighting system
 - ix. Road Work, street lighting

Chief Engineer

Kailash Pati Mishra

Indian Institute Of Management Rohtak

PART-A
GENERAL CONDITIONS OF
CONTRACT

CONDITIONS OF CONTRACT

Name of work:

Construction of Four Nos (4) of Hostel Block (G+2) for Permanent Campus of Indian Institute of Management, Rohtak at Sunaria Village, Rohtak (SH: Civil, E&M works for Hostel Block and External Development Works)



INDIAN INSTITUTE OF MANAGEMENT ROHTAK
Sunaria Village, Rohtak – 124001, (Haryana)
Phone: 9053002621

GENERAL RULES & DIRECTIONS

1. All work proposed for execution for contract will be notified in a form of invitation to tender pasted in public places and signed by the officer inviting tender or by publication in News papers as the case may be.

This form will state the work to be carried out, as well as the date for submitting and opening tenders and the time allowed for carrying out the work, also the amount of earnest money to be deposited with the tender, and the amount of the security deposit and Performance Guarantee to be deposited by the successful tenderer and the percentage, if any, to be deducted from bills. Copies of the specifications, design and drawings and any other documents required in connection with the work signed for the purpose of identification by the officer inviting tender shall also be open for inspection by the contractor at the office of officer inviting tender during office hours.

2. In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so, such power of attorney to be produced with the tender, and it must disclose that the firm is duly registered under the Indian Partnership Act, 1952.
3. Receipts for payment made on account of work, when executed by a firm, must also be signed by all the partners, except where contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having due authority to give effectual receipts for the firm.
4. Application for Item Rate Tender only
Any person who submits a tender shall fill up the usual printed form, stating at what rate he is willing to undertake each item of the work. Tenders, which propose any alteration in the work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort, including conditional rebates, will be summarily rejected. No single tender shall include more than one work, but contractors who wish to tender for two or more works shall submit separate tender for each. Tender shall have the name and number of the works to which they refer, written on the envelopes.

The rate(s) must be quoted in decimal coinage. Amounts must be quoted in full rupees by ignoring fifty paisa and considering more than fifty paisa as rupee one.

In case the lowest tendered amount (worked out on the basis of quoted rate of individual items) of two or more contractors is same, then such lowest contractors may be asked to submit sealed revised offer quoting rate of each item of the schedule

of quantity for all sub sections/sub heads as the case may be, but the revised quoted rate of each item of schedule of quantity for all sub sections / sub heads should not be higher than their respective original rate quoted already at the time of submission of tender. The lowest tender shall be decided on the basis of revised offer.

If the revised tendered amount (worked out on the basis of quoted rate of individual items) of two or more contractors received in revised offer is again found to be equal, then the lowest tender, among such contractors, shall be decided by draw of lots in the presence of _____ & the lowest contractors those have quoted equal amount of their tenders.

In case of any such lowest contractor in his revised offer quotes rate of any item more than their respective original rate quoted already at the time of submission of tender, then such revised offer shall be treated invalid. Such case of revised offer of the lowest contractor or case of refusal to submit revised offer by the lowest contractor shall be treated as withdrawal of his tender before acceptance and 50% of his earnest money shall be forfeited.

In case all the lowest contractors those have same tendered amount (as a result of their quoted rate of individual items), refuse to submit revised offers, then tenders are to be recalled after forfeiting 50% of EMD of each lowest contractors.

Contractors, whose earnest money is forfeited because of non-submission of revised offer, or quoting higher revised rate(s) of any item(s) than their respective original rate quoted already at the time of submission of his bid shall not be allowed to participate in the re-tendering process of the work.

4A Applicable for Percentage Rate Tender only

In case of Percentage Rate Tenders, contractor shall fill up the usual printed form, stating at what percentage below/above (in figures as well as in words) the total estimated cost given in Schedule of Quantities at Schedule-A, he will be willing to execute the work. The tender submitted shall be treated as invalid if:

1. The contractor does not quote percentage above/below on the total amount of tender or any section/sub head of the tender.
2. The percentage above/below is not quoted in figures & words both on the total amount of tender or any section/sub head of the tender.
3. The percentage quoted above/below is different in figures & words on the total amount of tender or any section/sub head of the tender.

Tenders, which propose any alteration in the work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort including conditional rebates, will be summarily

rejected. No single tender shall include more than one work, but contractors who

wish to tender for two or more works shall submit separate tender for each. Tender shall have the name and number of the works to which they refer, written on the envelopes.

- 4B. In case the lowest tendered amount (estimated cost + amount worked on the basis of percentage above/below) of two or more contractors is same, such lowest contractors will be asked to submit sealed revised offer in the form of letter mentioning percentage above/below on estimated cost of tender including all sub sections/sub heads as the case may be, but the revised percentage quoted above/below on tendered cost or on each sub section/sub head should not be higher than the percentage quoted at the time of submission of tender. The lowest tender shall be decided on the basis of revised offers.

In case any of such contractors refuses to submit revised offer, then it shall be treated as withdrawal of his tender before acceptance and 50% of earnest money shall be forfeited.

If the revised tendered amount of two more contractors received in revised offer is again found to be equal, the lowest tender, among such contractors, shall be decided by draw of lots in the presence of _____ and the lowest contractors those have quoted equal amount of their tenders.

In case all the lowest contractors those have quoted same tendered amount, refuse to submit revised offers, then tenders are to be recalled after forfeiting 50% of EMD of each contractor.

Contractor(s), whose earnest money is forfeited because of non-submission of revised offer, shall not be allowed to participate in the re-tendering process of the work.

5. The officer inviting tender or his duly authorized assistant will open tenders in the presence of any intending contractors who may be present at the time, and will enter the amounts of the several tenders in a comparative statement in a suitable form. In the event of a tender being accepted, a receipt for the earnest money shall thereupon be given to the contractor who shall thereupon for the purpose of identification sign copies of the specifications and other documents mentioned in Rule-I. In the event of a tender being rejected, the earnest money shall thereupon be returned to the contractor remitting the same, without any interest.
6. The officer inviting tenders shall have the right of rejecting all or any of the tenders and will not be bound to accept the lowest or any other tender.
7. The receipt of an accountant or clerk for any money paid by the contractor will not be considered as any acknowledgment or payment to the officer inviting tender and the

contractor shall be responsible for seeing that he procures a receipt signed by the officer inviting tender or a duly authorized Cashier.

8. The memorandum of work tendered for and the schedule of materials to be supplied by the department and their issue-rates, shall be filled and completed in the office of the officer inviting tender before the tender form is issued. If a form is issued to an intending tenderer without having been so filled in and incomplete, he shall request the officer to have this done before he completes and delivers his tender.
 9. The tenderers shall sign a declaration under the official Secret Act 1923, for maintaining secrecy of the tender documents drawings or other records connected with the work given to them. The unsuccessful tenderers shall return all the drawings given to them.
- 9A. Use of correcting fluid, anywhere in tender document is not permitted. Such tender is liable for rejection.
10. In the case of Item Rate Tenders, only rates quoted shall be considered. Any tender containing percentage below/above the rates quoted is liable to be rejected. Rates quoted by the contractor in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words. However, if a discrepancy is found, the rates which correspond with the amount worked out by the contractor shall unless otherwise proved be taken as correct. If the amount of an item is not worked out by the contractor or it does not correspond with the rates written either in figures or in words, then the rates quoted by the contractor in words shall be taken as correct. Where the rates quoted by the contractor in figures and in words tally, but the amount is not worked out correctly, the rates quoted by the contractor will unless otherwise proved be taken as correct and not the amount. In event no rate has been quoted for any item(s), leaving space both in figure(s), word(s), and amount blank, it will be presumed that the contractor has included the cost of this/these item(s) in other items and rate for such item(s) will be considered as zero and work will be required to be executed accordingly. (Applicable for Item Rate Tender only).
 - 10A. In case of Percentage Rate Tenders only percentage quoted shall be considered. Any tender containing item rates is liable to be rejected. Percentage quoted by the contractors in percentage rate tender shall be accurately filled in figures and words, so that there is no discrepancy.
 11. In the case of any tender where unit rate of any item/items appear unrealistic, such tender will be considered as unbalanced and in case the tenderer is unable to provide satisfactory explanation, such a tender is liable to be disqualified and rejected.

12. All rates shall be quoted on the tender form. The amount for each item should be worked out and requisite totals given. Special care should be taken to write the rates in figures as well as in words and the amount in figures only, in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures, the word 'Rs.' should be written before the figure of rupees and word 'P' after the decimal figures, e.g. 'Rs. 2.15 P' and in case of words, the word, 'Rupees' should precede and the word 'Paise' should be written at the end. Unless the rate is in whole rupees and followed by the word 'only' it should invariably be upto two decimal places. While quoting the rate in schedule of quantities, the word 'only' should be written closely following the amount and it should not be written in the next line. (Applicable for Item Rate Tender only).
- 12A. In Percentage Rate Tender, the tenderer shall quote percentage below/above (in figures as well as in words) at which he will be willing to execute the work. He shall also work out the total amount of his offer and the same should be written in figures as well as in words in such a way that no interpolation is possible. In case of figures, the word 'Rs.' should be written before the figure of rupees and word 'P' after the decimal figures, e.g. 'Rs. 2.15P' and in case of words, the word 'Rupees' should precede and the word 'Paisa' should be written at the end. (Applicable for Item Rate Tender only).
13. (i) The Contractor whose tender is accepted, will be required to furnish performance guarantee of 5% (five percentage) of the tendered amount within the period specified in Schedule F. The guarantee This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10,000/-) or Deposit at call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any scheduled bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form.
- (ii) The contractor whose tender is accepted will also be required to furnish by way of Security Deposit for the fulfillment of his contract, an amount equal to 2.5% of the tendered value of the work. The Security deposit will be collected by deductions from the running bills of the contractor at the rates mentioned above and the earnest money deposited at the time of tenders, will be treated as a part of the Security Deposit. The Security amount will also be accepted in cash or in the shape of Government Securities. Fixed Deposit Receipt of a Scheduled Bank or State Bank of India will also be accepted for this purpose provided confirmatory advice is enclosed.
14. On acceptance of the tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from the Institute shall be communicated in writing to the Institute.

15. GST, Building and other Construction Workers Welfare Cess or any other tax, levy or Cess in respect of input for or output by this contract shall be payable by the contractor and Institute shall not entertain any claim whatsoever in this respect except as provided under Clause 38.
16. The contractor shall give a list of Institute's employees related to him.
17. The tender for the work shall not be witnessed by a contractor or contractors who himself/themselves has/have tendered or who may and has/have tendered for the same work. Failure to observe this condition would render, tenders of the contractors tendering, as well as witnessing the tender, liable to summary rejection.
18. The tender for composite work includes, in addition to building work, all other works such as sanitary and water supply installations drainage installation, electrical work, horticulture work, roads and paths etc. The tenderer apart from being a registered contractor (B&R) of appropriate class, must associate himself with agencies of appropriate class which are eligible to tender for sanitary and water supply drainage, electrical and horticulture works in the composite tender.
19. The contractor shall submit list of works which are in hand (progress) in the following form:

Name of work	Name and particulars of Divn. Where work is being executed	Value of work	Position of works in progress	Remarks

20. The contractor shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Institute, may in his discretion, without prejudice to any other right or remedy available in law, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

CONDITIONS OF CONTRACT

Definitions

1. **The Contract** means the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority of IIM Rohtak and the Contractor, together with the documents referred to therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by Institute. All these documents, taken together, shall be deemed to form one contract and shall be complementary to one another.
2. In the contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them:-
 - (i) The expression **works** or **work** shall, unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean the works by or by virtue of the contract to be executed whether temporary or permanent, and whether original, altered, substituted or additional.
 - (ii) **Site** shall mean the land/or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.
 - (iii) **Contractor** shall mean the individual, firm or company, whether representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.
 - (iv) **Director** means the Director, Indian Institute of Management Rohtak and his successors.
 - (v) **IIM Rohtak** means Indian Institute of Management Rohtak through Director or its assignees and successors or any other official/agency assigned by the Institute.
 - (vi) **Government** shall mean the Government of India or Government of Haryana, as the case may be.
 - (vii) **Accepting Authority** shall mean the Director, IIM Rohtak.
 - (viii) **Excepted Risk** are risks due to riots (other than those on account of contractor's employees), war (whether declared or not) invasion, act of foreign enemies, hostilities, civil war, rebellion revolution, insurrection, military or usurped power, any acts of Government, damages from aircraft, acts of God, such as earthquake, lightening and unprecedented floods, and other causes over which the contractor has no control and accepted as such by the Accepting Authority.

- (ix) **Market Rate** shall be the rate as decided by IIM Rohtak on the basis of the cost of materials and labour at the site where the work is to be executed plus the provisions to cover, all overheads and profits.
- (x) **Schedule(s)** referred to in these conditions shall mean the relevant schedule(s) annexed to the tender papers or the standard Schedule of Rates mentioned in Schedule 'F', hereunder, with the amendments thereto issued upto the date of receipt of the tender.
- (xi) **Institute** means Indian Institute of Management Rohtak which invites tenders on behalf of Director, IIM Rohtak.
- (xii) **District Specifications** means the specifications followed by the State Government in the area where the work is to be executed.
- (xiii) **Tendered value** means the value of the entire work as stipulated in the letter of award.
- (xiv) **Date of commencement of work:** The date of commencement of work shall be the date of start as specified in schedule 'F' or the first date of handing over of the site, whichever is later, in accordance with the phasing if any, as indicated in the tender document.

Scope and Performance

3. Where the context so requires, words imparting the singular only also include the plural and vice versa. Any reference to masculine gender shall whenever required include feminine gender and vice versa.
4. Headings and Marginal notes to these General Conditions of Contract shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.
5. The contractor shall be furnished, free of cost one certified copy of the contract documents except standard specifications, Schedule of Rates and such other printed and published documents, together with all drawings as may be forming part of the tender papers. None of these documents shall be used for any purpose other than that of this contract.

Works to be carried out

6. The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plants, equipment and transport which may be required in preparation of and for and in the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities (Schedule-A) shall, unless otherwise stated, be held to include wastage on materials, carriage and cartage, carrying and return of empties, hoisting, setting, fitting and fixing in position and all other labours necessary in and for the full and entire execution and completion of the work as aforesaid in accordance with good practice and recognized principles.

Sufficiency of Tender

7. The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the Schedule of Quantities, which rates and prices shall, except as otherwise provided, cover all his obligations under the Contract and all matters and things necessary for the proper completion and maintenance of the works.

Discrepancies and Adjustment of Errors

8. The several documents forming the Contract are to be taken as mutually explanatory of one another, detailed drawings being followed in preference to small scale drawing and figured dimensions in preference to scale and Special Conditions in preference to General Conditions.

- 8.1 In the case of discrepancy between the Schedule of Quantities, the Specifications and/ or the Drawings, the following order of preference shall be observed:-

- (i) Description of Schedule of Quantities.
- (ii) Particular Specification and Special Conditions, if any.
- (iii) Drawings
- (iv) CPWD Specifications 2009
- (v) Indian Standard Specifications of B.I.S.

- 8.2 If there are varying or conflicting provisions made in any one document forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor.

- 8.3 Any error in description, quantity or rate in Schedule of Quantities or any omission therefrom shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the contract.

Signing of Contract

9. The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work, sign the contract consisting of:-

- (i) the notice inviting tender, all the documents including drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.
- (ii) Standard Form as mentioned in Schedule 'F' consisting of:
 - (a) Various standard clauses with corrections up to the date stipulated in Schedule 'F' along with annexures thereto.

- (b) Safety Code.
 - (c) Model Rules for the protection of health, sanitary arrangements for workers employed by Institute or its contractors.
 - (d) Contractor's Labour Regulations.
 - (e) List of Acts and omissions for which fines can be imposed.
- (iii) No payment for the work done will be made unless contract is signed by the contractor.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

CLAUSES OF CONTRACT

CLAUSE 1

Performance Guarantee

- (i) The contractor whose tender is accepted shall submit an irrevocable Performance Guarantee of 5% (Five percent) of the tendered amount in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract agreement, (not withstanding and/or without prejudice to any other provisions in the contract) within period specified in Schedule 'F' from the date of issue of letter of acceptance. This period can be further extended by Institute up to a maximum period as specified in Schedule 'F' on written request of the contractor stating the reason for delays in procuring the Performance Guarantee, to the satisfaction of Institute. This guarantee shall be in the form of Demand Draft of any scheduled bank/Pay Order of any scheduled bank or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the form annexed hereto. In case a fixed deposit receipt of any Bank is furnished by the contractor to Institute as part of the performance guarantee and the Bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to Institute to make good the deficit. 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.
- (ii) The Performance Guarantee shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case the time for completion of work gets enlarged, the contractor shall get the validity of Performance Guarantee extended to cover such enlarged time for completion of work. After recording of the completion certificate for the work by the Engineer-in-charge/ competent authority, the Performance Guarantee shall be returned to the contractor, without any interest. However, in case of contracts involving maintenance of building and services / any other work after construction of same building and services / other work, then 50% of Performance Guarantee shall be retained as Security Deposit. The same shall be returned yearwise proportionately.
- (iii) In the event of the contract being determined or rescinded under provision of any of the Clause/Condition of the agreement, the Performance Guarantee shall stand forfeited in full and shall be absolutely at the disposal of the Institute.

CLAUSE 1 A

Recovery of Security Deposit

The person/persons whose tender(s) may be accepted (hereinafter called the contractor) shall permit Institute at the time of making any payment to him for work done under the contract to deduct a sum at the rate of 5% (five percent) of the gross amount of each running and final bill till the sum deducted will amount to security deposit of 5% (Five percent) of the tendered value of the work. Such deductions will be made and held by Institute by way of Security Deposit unless he/they has/have deposited the amount of Security at the rate mentioned above in cash or in the form of Government Securities or fixed deposit receipts. In case a fixed deposit receipt of any Bank is furnished by the contractor to the Institute as part of the security deposit and the Bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to the Institute to make good the deficit.

All compensations or the other sums of money payable by the contractor under the terms of this contract may be deducted from, or paid by the sale of a sufficient part of his security deposit or from the interest arising therefrom, or from any sums which may be due to or may become due to the contractor by Institute on any account whatsoever and in the event of his Security Deposit being reduced by reason of any such deductions or sale as aforesaid, the contractor shall within 10 days make good in DD or fixed deposit receipt tendered by the State Bank of India or by Scheduled Banks endorsed in favour of the Institute, any sum or sums which may have been deducted from, or raised by sale of his security deposit or any part thereof.

The Security Deposit as deducted above can be released against bank guarantee issued by a scheduled bank, on its accumulations to a minimum of Rs. 5 lacs subject to the condition that amount of such bank guarantee, except last one, shall not be less than Rs. 5 lac. Provided further that the validity of bank guarantee shall be in conformity with provisions contained in clause 17 which shall be extended from time to time depending upon extension of contract granted under provisions of clause 2 and clause 5.

In case of contracts involving maintenance of building and services / any other work after construction of same building and services / other work, then 50% of Performance Guarantee shall be retained as Security Deposit. The same shall be returned year wise proportionately.

CLAUSE 2

Compensation for Delay

If the contractor fails to maintain the required progress in terms of Clause 5 or to complete the work and clear the site on or before the contract or extended date of completion, he shall, without prejudice to any other right or remedy available under the law to

the Institute on account of such breach, pay as agreed compensation the amount calculated at the rates stipulated below as the authority specified in schedule 'F' (whose decision in writing shall be final and binding) may decide on the amount of tendered value of the work for every completed day/month (as applicable) that the progress remains below that specified in Clause 5 or that the work remains incomplete.

This will also apply to items or group of items for which a separate period of completion has been specified.

- (i) Compensation @ 1.5 % per month of delay
for delay of work to be computed on per day basis

Provided always that the total amount of compensation for delay to be paid under this Condition shall not exceed 10% of the Tendered Value of work or of the Tendered Value of the item or group of items of work for which a separate period of completion is originally given.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Institute. In case, the contractor does not achieve a particular milestone mentioned in schedule F, or the re-scheduled milestone(s) in terms of Clause 5.4, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding of this amount on failure to achieve a milestone, shall be automatic without any notice to the contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released based on the decision of the Institute. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

The completion period of the entire work shall be as stipulated in Schedule F. The time limit specified above and as approved in writing by Institute shall be strictly adhered to and followed. Liquidated Damages will be applicable, item wise and against item wise time schedules. Accordingly the Damages will be based on the value of the Item for which delay has occurred. In case of delay, the penalty shall be recoverable from the Security Deposit provided by the Contractor and if the Security Deposit is not sufficient, then from the Performance Bank Guarantee or any sum payable to the Contractor under this Contract with the IIM Rohtak.

CLAUSE 2A

Incentive for early completion

In case, the contractor completes the work ahead of updated stipulated date of completion considering the effect of extra work (to be calculated on pro-rata basis as cost of extra work X

stipulated period / tendered cost), a bonus @ 1% (one per cent) of the tendered value per month computed on per day basis, shall be payable to the contractor, subject to a maximum limit of 5% (five per cent) of the tendered value. The amount of bonus, if payable, shall be paid along with final bill after completion of work. Provided always that provision of the Clause 2A shall be applicable only when so provided in 'Schedule F' . However, the quality of work completed shall be an important criterion before finalization of incentive, if any.

CLAUSE 3

When Contract can be Determined

Subject to other provisions contained in this clause, Institute may, without prejudice to its any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and/or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

- (i) If the contractor having been given by Institute a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or unworkman-like manner shall omit to comply with the requirement of such notice for a period of seven days thereafter.
- (ii) If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of Institute (which shall be final and binding) he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from Institute.
- (iii) If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by Institute.
- (iv) If the contractor persistently neglects to carry out his obligations under the contract and/or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by Institute.
- (v) If the contractor shall offer or give or agree to give to any person in Institute's service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract for Institute.

- (vi) If the contractor shall enter into a contract with Institute in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to Institute.
- (vii) If the contractor shall obtain a contract with Institute as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of integrity pact.
- (viii) If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors.
- (ix) If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.
- (x) If the contractor shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days.
- (xi) If the contractor assigns, transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof without the prior written approval of Institute.

When the contractor has made himself liable for action under any of the cases aforesaid, the Accepting Authority on behalf of Institute shall have powers:

- (a) To determine the contract as aforesaid (of which termination notice in writing to the contractor under the hand of Institute shall be conclusive evidence). Upon such determination, the Earnest Money Deposit, Security Deposit already recovered and Performance Guarantee under the contract shall be liable to be forfeited and shall be absolutely at the disposal of the Institute.
- (b) After giving notice to the contractor to measure up the work of the contractor and to

take such whole, or the balance or part thereof, as shall be un-executed out of his hands and to give it to another contractor to complete the work. The contractor, whose contract is determined as above, shall not be allowed to participate in the tendering process for the balance work.

In the event of above courses being adopted by Institute, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under this contract unless and until Institute has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified.

CLAUSE 3A

In case, the work cannot be started due to reasons not within the control of the contractor within 1/8th of the stipulated time for completion of work or one month whichever is higher, either party may close the contract. In case contractor wants to close the contract, he shall give notice to the department stating the failure on the part of department. In such eventuality, the Performance Guarantee of the contractor shall be refunded within following time limits, but no payment on account of interest, loss of profit or damages etc. shall be payable at all:

- | | | |
|---|---|---------|
| (i) If the Tendered value of work is upto Rs. 45 lac | : | 15 days |
| (ii) If the Tendered value of work is more than 45 and upto Rs. 2.5 crore | : | 21 days |
| (iii) If the Tendered value of work exceeds Rs. 2.5 crore | : | 30 days |

CLAUSE 4

Contractor liable to pay Compensation even if action not taken under Clause 3.

In any case in which any of the powers conferred upon Institute by Clause-3 thereof, shall have become exercisable and the same are not exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the contractor and the liability of the contractor for compensation shall remain unaffected. In the event of Institute putting in force all or any of the powers vested in him under the preceding clause he may, if he so desires after giving a notice in writing to the contractor, take possession of (or at the sole discretion of Institute which shall be final and binding on the contractor) use as on hire (the amount of the hire money being also in the final determination of Institute) all or any tools, plant, materials and stores, in or upon the works, or the site thereof belonging to the contractor, or procured by the contractor and intended to be

used for the execution of the work/or any part thereof, paying or allowing for the same in account at the contract rates, or, in the case of these not being applicable, at current market rates to be certified by Institute, whose certificate thereof shall be final, and binding on the contractor, clerk of the works, foreman or other authorized agent to remove such tools, plant, materials, or stores from the premises (within a time to be specified in such notice) in the event of the contractor failing to comply with any such requisition, Institute may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and his risk in all respects and the certificate of Institute as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the contractor.

CLAUSE 5

Time and Extension for Delay

The time allowed for execution of the Works as specified in the Schedule 'F' or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the works shall commence from such time period as mentioned in schedule 'F' or from the date of handing over of the site whichever is later. If the Contractor commits default in commencing the execution of the work as aforesaid, Institute shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the Performance Guarantee absolutely.

5.1 As soon as possible after the Contract is concluded, the Contractor shall submit a Time and Progress Chart for each mile stone and get it approved by the Institute. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between Institute and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per the mile stones given in Schedule 'F'.

- a) Project Management shall be done by using project management software for works costing more than Rs. 5 Crore.
- b) The Project Management shall be done using M.S. Project software for work costing more than Rs. 5 Crore and upto Rs. 20 Crore.

PROGRAMME CHART

- (i) The Contractor shall prepare an integrated programme chart in MS Project / Primavera software 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 programme within the stipulated period or earlier and submit the same for approval to the Institute within ten days of award of the contract. A recovery of Rs. 2500/- (for works costing upto Rs. 20 Crores / Rs. 5000/- (for works costing more than Rs. 20 crores) shall be made on per day basis in case of delay in submission of the above programme.

- (ii) The programme chart should include the following:
 - a) Descriptive note explaining sequence of the various activities.
 - b) Network (PERT/CPM/BAR CHART).
 - c) Programme for procurement of materials by the contractor.Programme of procurement of machinery / equipments having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor. In addition to above to achieve the progress of work as per programme, the contractor must bring at site adequate shuttering material required for cement concrete and R.C.C. works etc. for three floors within one month from the date of start of work till the completion of RCC work as per requirement of work. The contractor shall submit shuttering schedule adequate to complete structure work within laid down physical milestone.
- (iii) If at any time, it appears to the Institute that the actual progress of work does not conform to the approved programme referred above or after rescheduling of milestone, the contractor shall produce a revised programme within 7 (seven) days, showing the modifications to the approved programme to ensure timely completion of the work. The modified schedule of programme shall be approved by the Institute. A recovery of Rs. 2500/- (for works costing upto Rs. 20 crores) / Rs. 5000/- (for works costing more than Rs. 20 crores) shall be made on per day basis in case of delay in submission of the modified programme.
- (iv) The submission for approval by the Institute of such programme or such particulars shall not relieve the contractor of any of the duties or responsibilities under the contract. This is without prejudice to the right of Institute to take action against the contractor as per terms and conditions of the agreement.
- (v) The contractor shall submit the progress report using MS Project /Primavera software with base line programme referred above for the work done during previous month to the Institute on or before 5th day of each month failing which a recovery Rs. 2500/- (for works costing upto Rs. 20 Crores) / Rs. 5000/- (for works costing more than Rs. 20 Crores) shall be made on per day basis in case of delay in submission of the monthly progress report.

5.2 If the work(s) be delayed by:-

- (i) force majeure, or
- (ii) abnormally bad weather, or
- (iii) serious loss or damage by fire, or
- (iv) civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or

- (v) delay on the part of other contractors or tradesmen engaged by Institute in executing work not forming part of the Contract, or
- (vi) non-availability of stores, which are the responsibility of Institute to supply or
- (vii) non-availability or break down of tools and Plant to be supplied or supplied by Institute or
- (viii) any other cause which, in the absolute discretion of Institute is beyond the Contractor's control.

then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the authority as indicated in Schedule 'F' but shall nevertheless use constantly his best endeavours to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of Institute to proceed with the works.

5.3 Request for rescheduling of Mile stones and extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay on the prescribed form to the authority as indicated in Schedule 'F'. The Contractor may also, if practicable, indicate in such a request the period for which extension is desired.

5.4 In any such case the authority as indicated in Schedule 'F' may give a fair and reasonable extension of time and reschedule the mile stones for completion of work. Such extension or rescheduling of the milestones shall be communicated to the Contractor by the authority as indicated in Schedule 'F' in writing, within 3 months or 4 weeks of the date of receipt of such request respectively. Non application by the contractor for extension of time/rescheduling of the milestones shall not be a bar for giving a fair and reasonable extension extension/rescheduling of the milestones by the authority as indicated in Schedule 'F' and this shall be binding on the contractor.

CLAUSE 6

Measurements of Work Done

Institute shall, except as otherwise provided, ascertain and determine by measurement, the value in accordance with the contract of work done.

All measurement of all items having financial value shall be entered in Measurement Book and/or level field book so that a complete record is obtained of all works performed under the contract.

All measurements and levels shall be taken jointly by Institute or his authorized representative and by the contractor or his authorized representative from time to time during the progress of the work and such measurements shall be signed and dated by Institute and the contractor or their representatives in token of their acceptance. If the

contractor objects to any of the measurements recorded, a note shall be made to that effect with reason and signed by both the parties.

If for any reason the contractor or his authorized representative is not available and the work of recording measurements is suspended by Institute or his representative, Institute shall not entertain any claim from contractor for any loss or damages on this account. If the contractor or his authorized representative does not remain present at the time of such measurements after the contractor or his authorized representative has been given a notice in writing three (3) days in advance or fails to countersign or to record objection within a week from the date of the measurement, then such measurements recorded in his absence by Institute or his representative shall be deemed to be accepted by the Contractor.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for measurements and recording levels.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available, then a mutually agreed method shall be followed.

The contractor shall give, not less than seven days' notice to Institute or his authorized representative in charge of the work, before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of Institute or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of measurements without such notice having been given or Institute's consent being obtained in writing, the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Institute or his authorized representative may cause either themselves or through another representative to check the measurements recorded jointly or otherwise as aforesaid and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this contract that recording of measurements of any item of work in the measurement book and/or its payment in the interim, on account or final bill shall not be

considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over measurement or defects noticed till completion of the defects liability period.

CLAUSE 6A

Computerized Measurement Book

Institute shall, except as otherwise provided, ascertain and determine by measurement the value of work done in accordance with the contract. All measurements of all items having financial value shall be entered by the contractor and compiled in the shape of the Computerized Measurement Book (MB) having pages of A-4 size as per the format of the Institute so that a complete record is obtained of all the items of works performed under the contract.

All such measurements and levels recorded by the contractor or his authorized representative from time to time, during the progress of the work, shall be got checked by the contractor from Institute or his authorized representative as per interval or program fixed in consultation with Institute or his authorized representative. After the necessary corrections made by Institute, the measurement sheets shall be returned to the contractor for incorporating the corrections and for resubmission to Institute for the dated signatures by Institute and the contractor or their representatives in token of their acceptance.

Whenever bill is due for payment, the contractor would initially submit draft computerized measurement sheets and these measurements would be got checked/test checked from Institute and/or his authorized representative. The contractor will, thereafter, incorporate such changes as may be done during these checks/test checks in his draft computerized measurements, and submit to the Institute a computerized measurement book, duly bound, and with its pages machine numbered. Institute and/or his authorized representative would thereafter check this MB, and record the necessary certificates for their checks/test checks.

The final, fair, computerized measurement book given by the contractor, duly bound, with its pages machine numbered, should be 100% correct, and no cutting or over-writing in the measurements would thereafter be allowed. If at all any error is noticed, the contractor shall have to submit a fresh computerized MB with its pages duly machine numbered and bound, after getting the earlier MB cancelled by the Institute. Thereafter, the MB shall be taken in the Institute records, and allotted a number as per the Register of Computerised MBs. This should be done before the corresponding bill is submitted to the Institute for payment. The contractor shall submit two spare copies of such computerized MBs for the purpose of reference and record by the various officers of the Institute.

The contractor shall also submit to the Institute separately his computerized Abstract of Cost

and the bill based on these measurements, duly bound, and its pages machine numbered along with two spare copies of the bill. Thereafter, this bill will be processed by the Institute and allotted a number as per the computerized record in the same way as done for the measurement book meant for measurements.

The contractor shall, without extra charge, provide all assistance with every appliance, labour and other things necessary for checking of measurements/levels by Institute or his representative.

Except where any general or detailed description of the work expressly shows to the contrary, measurements shall be taken in accordance with the procedure set forth in the Specifications notwithstanding any provision in the relevant Standard Method of measurement or any general or local custom. In the case of items which are not covered by specifications, measurements shall be taken in accordance with the relevant standard method of measurement issued by the Bureau of Indian Standards and if for any item no such standard is available then a mutually agreed method shall be followed.

The contractor shall give not less than seven days' notice to Institute or his authorized representative in charge of the work before covering up or otherwise placing beyond the reach of checking and/or test checking the measurement of any work in order that the same may be checked and/or test checked and correct dimensions thereof be taken before the same is covered up or placed beyond the reach of checking and/or test checking measurement and shall not cover up and place beyond reach of measurement any work without consent in writing of Institute or his authorized representative in charge of the work who shall within the aforesaid period of seven days inspect the work, and if any work shall be covered up or placed beyond the reach of checking and/or test checking measurements without such notice having been given or Institute's consent being obtained in writing the same shall be uncovered at the Contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with which the same was executed.

Institute or his authorized representative may cause either themselves or through another representative to check the measurements recorded by contractor and all provisions stipulated herein above shall be applicable to such checking of measurements or levels.

It is also a term of this contract that checking and/or test checking the measurements of any item of work in the measurement book and/or its payment in the interim, on account of final bill shall not be considered as conclusive evidence as to the sufficiency of any work or material to which it relates nor shall it relieve the contractor from liabilities from any over-measurement or defects noticed till completion of the defects liability period.

CLAUSE 7

Payment on Intermediate Certificate to be Regarded as Advances

No payment shall be made for work, estimated to cost Rs. Twenty Thousand or less, till after the whole of the work shall have been completed and certificate of completion given. For works estimated to cost over Rs. Twenty thousand, the interim or running account bills shall be submitted by the contractor for the work executed on the basis of such recorded measurements on the format of the Institute in triplicate on or before the date of every month fixed for the same by the Institute. The contractor shall not be entitled to be paid any such interim payment if the gross work done together with net payment/ adjustment of advances for material collected, if any, since the last such payment is less than Rs. Twenty thousand in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved. Institute shall arrange to have the bill verified by taking or causing to be taken, where necessary, the requisite measurements of the work. In the event of the failure of the contractor to submit the bills, Institute shall prepare or cause to be prepared such bills in which event no claim whatsoever due to delays on payment including that of interest shall be payable to the contractor. Payment on account of amount admissible shall be made by the Institute certifying the sum to which the contractor is considered entitled by way of interim payment at such rates as decided by the Institute. The amount admissible shall be paid by 10th working day after the day of presentation of the bill by the Contractor to the Institute together with the recovery/account of the material issued by the Institute and dismantled materials, if any.

Running account bills shall be submitted by the contractor for the work executed on the basis of such recorded measurements on the format of the Institute in triplicate on or before the date of every month fixed for the same by IIM Rohtak. The contractor shall not be entitled to be paid any interim payment if the gross work done together with net payment/adjustment of advances, if any, since the last such payment is less than the amount specified in Schedule 'F', in which case the interim bill shall be prepared on the appointed date of the month after the requisite progress is achieved. IIM Rohtak shall arrange to have the bill verified by taking or causing to be taken, where necessary, the requisite measurements of the work. In the event of the failure of the contractor to submit the bills, IIM Rohtak shall prepare or cause to be prepared such bills in which event no claims whatsoever due to delays on payment including that of interest shall be payable to the contractor. Payment on account of amount admissible shall be made by IIM Rohtak certifying the sum to which the contractor is considered entitled by way of interim payment at such rates as decided by IIM Rohtak. The amount admissible shall be paid by 10th working day after the day of presentation of the bill by the Contractor to IIM Rohtak together with the account of the material issued by the Institute, or dismantled materials, if any.

All such interim payments shall be regarded as payment by way of advances against final payment only and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be rejected, removed, taken away and reconstructed or re-erected.

Any certificate given by IIM Rohtak relating to the work done or materials delivered forming part of such payment, may be modified or corrected by any subsequent such certificate(s) or by the final certificate and shall not by itself be conclusive evidence that any work or materials to which it relates is/are in accordance with the contract and specifications. Any such interim payment, or any part thereof shall not in any respect conclude, determine or affect in any way powers of IIM Rohtak under the contract or any of such payments be treated as final settlement and adjustment of accounts or in any way vary or affect the contract.

Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided without prejudice to the right of the Institute to take action under the terms of this contract for delay in the completion of work, if the extension of date of completion is not granted by the competent authority.

Each bill shall be accompanied by the following documents.

- Measurements and quantities of items of Work done since last bill.
- Physical Progress Report along with relevant Photographs.
- Copies of quality control tests in specified format covering the Work done since last bill.
- Copies of instructions recorded in the site instruction book containing the instructions and compliance made thereof, covering the Work done since last bill.

CLAUSE 8

Completion Certificate and Completion Plans

Within ten days of the completion of the work, the contractor shall give notice of such completion to Institute and within thirty days of the receipt of such notice, Institute shall inspect the work and if there is no defect in the work, shall furnish the contractor with a final certificate of completion, otherwise a provisional certificate of physical completion indicating defects (a) to be rectified by the contractor and/or (b) for which payment will be made at reduced rates, shall be issued. But no final certificate of completion shall be issued, nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall be executed all scaffolding, surplus materials, rubbish and all huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works as shall have been erected or constructed by the contractor(s) and cleaned off the dirt completely from all the places which he may have had possession for the purpose of the execution; thereof, and not until the work shall have been measured by Institute.

If the contractor shall fail to comply with the requirements of this Clause as to removal of scaffolding, surplus materials and rubbish and all huts and sanitary arrangements as aforesaid and cleaning off dirt on or before the date fixed for the completion of work, Institute may at the expense of the contractor remove such scaffolding, surplus materials

and rubbish etc., and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall have no claim in respect of scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

CLAUSE 8A

Contractor to Keep Site Clean

The contractor is required to keep site clean. When any repair or maintenance of works are carried out, the splashes and droppings from white washing, color washing, painting etc., on walls, floor, windows, etc. shall be removed and the surface cleaned simultaneously with the completion of these items of work in the individual rooms, quarters or premises etc. where the work is done: without waiting for the actual completion of all the other items of work in the contract. In case the contractor fails to comply with the requirements of this clause, the Engineer-in-Charge shall have the right to get this work done at the cost of the contractor or through any other agency. Before taking such action, the Engineer-in-Charge shall give ten days' notice in writing to the contractor.

CLAUSE 8B

Completion Plan to be submitted by the Contractor

The contractor shall submit completion plan within thirty days of the completion of the work.

In case, the contractor fails to submit the completion plan as aforesaid, he shall be liable to pay a sum equivalent to 2.5% of the value of the work subject to a ceiling of Rs. 15,000 (Rs. Fifteen thousand only) as may be fixed by the Institute and in this respect the decision of the Institute shall be final and binding on the contractor.

The contractor shall submit completion plan for water, sewerage and drainage line plan within thirty days of the completion of the work.

In case, the contractor fails to submit the completion plan as aforesaid, the department will get it done through other agency at his cost and actual expenses incurred plus Rs. 15,000/- for the same shall be recovered from the contractor.

CLAUSE 9

Payment of Final Bill

The final bill shall be submitted by the contractor in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final certificate of completion furnished by Institute whichever is earlier. No further claims shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by

Institute, will, as far as possible be made within the period specified hereinunder, the period being reckoned from the date of receipt of the bill by the Institute or his authorized Engineer/PMC, complete with account of materials issued by the Department and dismantled materials.

- | | | | |
|-------|--|---|----------|
| (i) | If the Tendered value of work is upto Rs. 45 lacs | : | 2 months |
| (ii) | If the Tendered value of work is more than 45 and upto Rs. 2.5 Crore | : | 3 months |
| (iii) | If the Tendered value of work exceeds Rs. 2.5 Crore | : | 6 months |

The final bill shall be accompanied by:

All technical documents on the basis of which the Work was carried out.

As-built drawings. Three sets of construction and installation drawings for all Works, including but not limited to, electrical, HVAC, Plumbing, Fire Systems and Site development, showing therein modifications, corrections and additions signed and confirmed by the Engineer-in-Charge to be "as built" drawings. The entire documentation shall be submitted in Compact Discs (CD), using latest version of AUTOCAD software.

1. Completion certificates for embedded and covered-up Works issued by the Engineer-in-Charge.
2. Certificates for tests carried out for various items of Work.
3. Manufacturer's operating and maintenance manuals as well as guarantee/warranty papers, commissioning and handing over reports for whatever equipment/Materials installed.

Security Deposit of 2.5% (Two and one-half percent) of the Contract Value in the form of bank guarantee valid for a Defect liability period from the date of certificate

CLAUSE 10

Materials supplied by Institute

Materials which Institute will supply are shown in Schedule 'B' which also stipulates quantum, place of issue and rate(s) to be charged in respect thereof. The contractor shall be bound to procure them from Institute.

As soon as the work is awarded, the contractor shall finalise the programme for the completion of work as per clause 5 of this contract and shall give his estimates of materials required on the basis of drawings/or schedule of quantities of the work. The Contractor shall give in writing his requirement to Institute which shall be issued to him keeping in view the progress of work as assessed by Institute, in accordance with the agreed phased programme of work indicating monthly requirements of various materials. The contractor shall place his indent in writing for issue of such materials at least 7 days in advance of his

requirement.

Such materials shall be supplied for the purpose of the contract only and the value of the materials so supplied at the rates specified in the aforesaid schedule shall be set off or deducted, as and when materials are consumed in items of work (including normal wastage) for which payment is being made to the contractor, from any sum then due or which may therefore become due to the contractor under the contract or otherwise or from the security deposit. At the time of submission of bills, the contractor shall certify that balance of materials supplied is available at site in original good condition.

The contractor shall submit along with every running bill (on account or interim bill) material-wise reconciliation statements supported by complete calculations reconciling total issue, total consumption and certified balance (diameter/section-wise in the case of steel) and resulting variations and reasons therefore. Institute shall (whose decision shall be final and binding on the contractor) be within his rights to follow the procedure of recovery in clause 42 at any stage of the work if reconciliation is not found to be satisfactory.

The contractor shall bear the cost of getting the material issued, loading, transporting to site, unloading, storing under cover as required, cutting assembling and joining the several parts together as necessary. Notwithstanding anything to the contrary contained in any other clause of the contract and (or the CPWD Accounts Code) all stores/materials so supplied to the contractor or procured with the assistance of the Institute shall remain the absolute property of Institute and the contractor shall be the trustee of the stores/materials, and the said stores/materials shall not be removed/disposed off from the site of the work on any account and shall be at all times open to inspection by Institute or his authorized agent. Any such stores/materials remaining unused shall be returned to Institute in as good a condition in which they were originally supplied at a place directed by him, at a place of issue or any other place specified by him as he shall require, but in case it is decided not to take back the stores/materials the contractor shall have no claim for compensation on any account of such stores/materials so supplied to him as aforesaid and not used by him or for any wastage in or damage to in such stores/materials.

On being required to return the stores/materials, the contractor shall hand over the stores/materials on being paid or credited such price as Institute shall determine, having due regard to the condition of the stores/materials. The price allowed for credit to the contractor, however, shall be at the prevailing market rate not exceeding the amount charged to him, excluding the storage charge, if any. The decision of Institute shall be final and conclusive. In the event of breach of the aforesaid condition, the contractor shall in addition to throwing himself open to account for contravention of the terms of the licences or permit and/or for criminal breach of trust, be liable to Institute for all advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach. Provided that the contractor shall in no case be entitled to any compensation or damages on account of any delay in supply or non-supply thereof all or any such materials

and stores provided further that the contractor shall be bound to execute the entire work if the materials are supplied by the Institute within the original scheduled time for completion of the work plus 50% thereof or schedule time plus 6 months whichever is more if the time of completion of work exceeds 12 months, but if a part of the materials only has been supplied within the aforesaid period, then the contractor shall be bound to do so much of the work as may be possible with the materials and stores supplied in the aforesaid period. For the completion of the rest of the work, the contractor shall be entitled to such extension of time as may be determined by Institute whose decision in this regard shall be final and binding on the contractor.

The contractor shall see that only the required quantities of materials are got issued. Any such material remaining unused and in perfectly good/original condition at the time of completion or determination of the contract shall be returned to Institute at the stores from which it was issued or at a place directed by him by a notice in writing. The contractor shall not be entitled for loading, transporting, unloading and stacking of such unused material except for the extra lead, if any involved, beyond the original place of issue.

CLAUSE 10 A

Materials to be provided by the Contractor

The contractor shall, at his own expense, provide all materials, required for the works. The contractor shall, at his own expense and without delay, supply to Institute samples of materials to be used on the work and shall get these approved in advance. All such materials to be provided by the Contractor shall be in conformity with the specifications laid down or referred to in the contract. The contractor shall, if requested by Institute furnish proof, to the satisfaction of Institute that the materials so comply. Institute shall within thirty days of supply of samples or within such further period as he may require intimate to the Contractor in writing whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to Institute for his approval, fresh samples complying with the specifications laid down in the contract. When materials are required to be tested in accordance with specifications, approval of Institute shall be issued after the test results are received.

The Contractor shall at his risk and cost submit the samples of materials to be tested or analyzed and shall not make use of or incorporate in the work any materials represented by the samples until the required tests or analysis have been made and materials finally accepted by Institute. The Contractor shall not be eligible for any claim or compensation either arising out of any delay in the work or due to any corrective measures required to be taken on account of and as a result of testing of materials.

The contractor shall, at his risk and cost, make all arrangements and shall provide all facilities as Institute may require for collecting, and preparing the required number of samples for such tests at such time and to such place or places as may be directed by Institute and bear all charges and cost of testing unless specifically provided for

otherwise elsewhere in the contract or specifications. Institute or his authorized representative shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the works and the contractor shall afford every facility and every assistance in obtaining the right to such access.

Institute shall have full powers to require the removal from the premises of all materials which in his opinion are not in accordance with the specifications and in case of default, Institute shall be at liberty to employ at the expense of the contractor, other persons to remove the same without being answerable or accountable for any loss or damage that may happen or arise to such materials. Institute shall also have full powers to require other proper materials to be substituted thereof and in case of default, Institute may cause the same to be supplied and all costs which may attend such removal and substitution shall be borne by the Contractor.

The contractor shall at his own expense, provide a material testing lab at the site for conducting routine field tests. The lab shall be equipped at least with the testing equipment as specified in schedule F.

CLAUSE 10 B

Secured Advance on Non-perishable Material

- (i) The contractor, on signing an indenture in the form to be specified by the Institute, shall be entitled to be paid during the progress of the execution of the work up to 90% of the assessed value of any materials which are in the opinion of the Institute non-perishable, non-fragile and non-combustible and are in accordance with the contract and which have been brought on the site in connection therewith and are adequately stored and/or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this sub-clause are incorporated in the work, the amount of such advance shall be recovered/deducted from the next payment made under any of the clause or clauses of this contract.

Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Institute provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Institute shall be final and binding on the contractor in this matter. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel etc.

Mobilization Advance

- (ii) Mobilization advance not exceeding 10% of the tendered value may be given, if requested by the contractor in writing within one month of the order to commence the

work. Such advance shall be in two or more installments to be determined by the Institute at his sole discretion. The first installment of such advance shall be released by the Institute to the contractor on a request made by the contractor to the Institute in this behalf. The second and subsequent installments shall be released by the Institute only after the contractor furnishes a proof of the satisfactory utilization of the earlier installment to the entire satisfaction of the Institute.

Before any installment of advance is released, the Contractor shall furnish Bank Guarantee Bonds aggregating to 110% of the installment amount and not exceeding three in number from any Scheduled Commercial Bank. Mobilisation Advance shall be released only after receipt of confirmation of the Bank Guarantee from the issuing Bank. The BG Bonds shall be furnished initially valid for the full contract period. If the contract period gets extended due to any reasons, the BG Bonds shall be kept renewed from time to time to cover the balance amount to be recovered together with interest @ 10% and valid for the likely period of complete recovery. The BG Bonds shall be discharged progressively depending upon the amount of mobilisation advance recovered along with interest.

Plant Machinery & Shuttering Material Advance

- (iii) An advance for plant, machinery & shuttering material required for the work and brought to site by the Contractor may be given if requested by the contractor in writing within one month of bringing such plant and machinery to site. Such advance shall be given on such expeditious execution of work and improve the quality of work. The amount of advance shall be restricted to 5% percent of the tender value. In the case of new plant and equipment to be purchased for the work, the advance shall be restricted to 90% of the price of such new plant and equipment paid by the contractor for which the contractor shall produce evidence satisfactory to the Institute. In the case of second hand and used plants and equipment, the amount of such advance shall be limited to 50% of the depreciated value of plant and equipment as may be decided by the Institute. The contractor shall, if so required by the Institute, submit the statement of value of such old plant and equipment duly approved by a Registered Valuer recognized by the Central Board of Direct Taxes under the Income-Tax Act, 1961. No such advance shall be paid on any plant and equipment of perishable nature and on any plant and equipment of a value less than Rs. 50,000/- Seventy five per cent of such amount of advance shall be paid after the plant & equipment is brought to site and balance twenty five percent on successfully commissioning the same.

Leasing of equipment shall be considered at par with purchase of equipment and shall be covered by tripartite agreement with the following:

1. Leasing company which gives certificate of agreeing to lease equipment to the contractor.
2. Institute, and
3. The contractor.

This advance shall further be subject to the condition that such plant and equipment (a) are considered by the Institute to be necessary for the works; (b) and are in working order and are maintained in working order; (c) hypothecated to the Government as specified by the Institute before the payment of advance is released. The contractor shall not be permitted to remove from the site such hypothecated plant and equipment without the prior written permission of the Institute. The contractor shall be responsible for maintaining such plant and equipment in good working order during the entire period of hypothecation failing which such advance shall be entirely recovered in lump sum. For this purpose, steel scaffolding and form work shall be treated as plant and equipment.

The contractor shall insure the Plant and Machinery for which mobilization advance is sought and given, for a sum sufficient to provide for their replacement at site. Any amounts not recovered from the insurer will be borne by the contractor.

- (iv) The mobilization advance and plant and machinery advance in (ii) & (iii) above shall bear simple interest at the rate of 12% per annum and shall be calculated from the date of payment to the date of recovery, both days inclusive, on the outstanding amount of advance.. Recovery of such sums advanced shall be made by the deduction from the contractors bills commencing after first ten per cent of the gross value of the work is executed and paid, on pro-rata percentage basis to the gross value of the work billed beyond 10% in such a way that the entire advance is recovered by the time eighty per cent of the gross value of the contract is executed and paid, together with interest due on the entire outstanding amount up to the date of recovery of the installment. However, in the event of determination of contract, the mobilization advance and plant and machinery advance will be recovered with simple interest at the rate of 12 per cent per annum and shall be calculated from the date of payment to the date of recovery, both days inclusive, on the outstanding amount of advance.
- (v) If the circumstances are considered reasonable by the Institute, the period mentioned in (ii) and (iii) for request by the contractor in writing for grant of mobilization advance and plant and equipment advance may be extended in the discretion of the Institute.

CLAUSE 10 C-

Payment on Account of Increase in Prices / Wages due to Statutory Order(s)

~~If after submission of the tender, the price of any material incorporated in the works (excluding the materials covered under Clause 10CA and not being a material supplied from the Institute's stores in accordance with Clause 10 thereof) and/or wages of labour increases as a direct result of the coming into force of any fresh law, or statutory rule or order (but not due to any changes of rate in GST) beyond the prices/wages prevailing at the time of the last stipulated date of receipt of tenders including extensions, if any, for the work during contract period including the justified period extended under the provisions of clause 5 of the~~

~~contract without any action under clause 2, then the amount of the contract shall accordingly be varied and provided further that any such increase shall be limited to the price/wages prevailing at the time of stipulated date of completion or as prevailing for the period under consideration, whichever is less.~~

~~If after submission of the tender, the price of any material incorporated in the works (excluding the materials covered under Clause 10CA and not being a material supplied from the Institute's stores in accordance with Clause 10 thereof) and/or wages of labour as prevailing at the time of last stipulated date of receipt of tender including extensions, if any, is decreased as a direct result of the coming into force of any fresh law or statutory rules or order (but not due to any changes of rate in GST), Government shall in respect of materials incorporated in the works (excluding the materials covered under Clause 10CA and not being material supplied from the Institute's stores in accordance with Clause 10 hereof) and/or labour engaged on the execution of the work after the date of coming into force of such law statutory rule or order be entitled to deduct from the dues of the contractor, such amount as shall be equivalent to the difference between the prices of the materials and/or wages as prevailed at the time of the last stipulated date for receipt of tenders including extensions if any for the work and the prices of materials and/or wages of labour on the coming into force of such law, statutory rule or order. This will be applicable for the contract period including the justified period extended under the provisions of clause 5 of the contract without any action under clause 2.~~

~~Institute may call books of account and other relevant documents from the contractor to satisfy himself about reasonability of increase in prices of materials and wages.~~

~~The contractor shall, within a reasonable time of his becoming aware of any alteration in the price of any such materials and/or wages of labour, give notice thereof to the Institute stating that the same is given pursuant to this condition together with all information relating thereto which he may be in position to supply.~~

~~For this purpose, the labour component of the work executed during period under consideration shall be the percentage as specified in Schedule F, of the value of work done during that period and the increase/decrease in labour shall be considered on the minimum daily wages in rupees of any unskilled adult male mazdoor, fixed under any law, statutory rule or order.~~

CLAUSE 10 CA

Payment due to variation in prices of materials after receipt of tender

~~If after submission of the tender, the price of materials specified in Schedule F increases/decreases beyond the base price(s) as indicated in Schedule F for the work, then the amount of the contract shall accordingly be varied and provided further that any such variations shall be effected for stipulated period of Contract including the justified period extended under the provisions of Clause 5 of the Contract without any action under Clause 2.~~

However for work done/during the justified period extended as above, it will be limited to indices prevailing at the time of updated stipulated date of completion considering the effect of extra work (to be calculated on pro rata basis as cost of extra work × stipulated period / tendered cost).

The increase/decrease in prices of cement, steel reinforcement and structural steel shall be determined by the Price indices issued by the Director General, CPWD. For other items provided in the Schedule 'F', this shall be determined by the All India Wholesale Price Indices of materials as published by Economic Advisor to Government of India, Ministry of Commerce and Industry. Base price for cement, steel reinforcement and structural steel shall be as issued under the authority of Director General, CPWD applicable for Delhi including Noida, Gurgaon, Faridabad & Ghaziabad and for other places as issued under the authority of Zonal Chief Engineer, CPWD and base price of other materials issued by concerned Zonal chief Engineer and as indicated in Schedule 'F' as valid on the last stipulated date of receipt of tender, including extension if any and for the period under consideration. In case, price index of a particular material is not issued by Ministry of Commerce and Industry, then the price index of nearest similar material as indicated in Schedule 'F' shall be followed.

The amount of the contract shall accordingly be varied for all such materials and will be worked out as per the formula given below for individual material:-

Adjustment for component of individual material

$$V = P \times Q_x \frac{CI - CI_0}{CI_0}$$

where,

V= Variation in material cost i.e. increase or decrease in the amount of rupees to be paid or recovered.

P= Base Price of material as issued under authority of DG, CPWD or concerned Zonal Chief Engineer and as indicated in Schedule 'F'.

For Projects and Original Works

Q= Quantity of material brought at site for bonafide use in the works since previous bill excluding any such quantity consumed in the deviated quantity of items beyond deviation limit and extra/substituted item, paid/to be paid at rates derived on the basis of market rate under Clause 12.2.

For Maintenance Works

Q= Quantity of material brought at site for bonafide use in the works since previous bill including any such quantity consumed in the deviated quantity of items beyond deviation limit paid at agreement rate and extra/substituted item being scheduled

~~items, but excluding non-schedule extra/substituted item paid /to be paid at market rate under Clause 12.2.~~

Note :-

- (i) ~~The date wise record of ready mix concrete shall be kept in a register and the cement consumption for the same shall be calculated accordingly.~~
- (ii) ~~If built up steel items are brought at site from workshop, then the variation shall be paid for the structural steel up to the period when the built up item / finished product is brought at site.~~

~~CI= Price Index for cement, steel reinforcement bars and structural steel as issued by the DG, CPWD and corresponding to the time and base price of respective material indicated in Schedule 'F'. For other items, if any, provided in Schedule 'F'. All India Wholesale Price Index for the material as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce and corresponding to the time of base price of respective material indicated in Schedule 'F'.~~

~~CI= Price Index for cement, steel reinforcement bars and structural steel as issued under the authority of DG, CPWD for period under consideration. For other items, if any, provided in Schedule 'F'. All India Wholesale Price Index for the material for period under consideration as published by Economic Advisor as published by Economic Advisor to Government of India, Ministry of Industry and Commerce.~~

~~Note (i) In respect of the justified period extended under the provisions of clause 5 of the contract without any action under clause 2, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration, whichever is less, shall be considered.~~

~~Provided always that provisions of the preceding Clause 10C shall not be applicable in respect of Materials covered in this Clause.~~

~~(ii) If during progress of work or at the time of completion of work, it is noticed that any material brought at site is in excess of requirement, then amount of escalation if paid earlier on such excess quantity of material shall be recovered on the basis of cost indices as applied at the time of payment of escalation or as prevailing at the time of effecting recovery, whichever is higher.~~

~~(iii) Cement mentioned wherever in this clause includes Cement component used in RMC brought at site from outside approved RMC plants, if any.~~

S. No.	Materials covered under this clause	Nearest materials other than cement*, steel reinforcement	Base price and its corresponding period of all the materials covered under clause 10 CA**
--------	-------------------------------------	---	---

		bars and structural steel for which All India Wholesale Price Index to be followed	Base Price	Corresponding Period

* includes Cement component used in RMC brought at site from outside approved RMC plants, if any.

** Base price and its corresponding period of all the materials covered under clause 10-CA is to be mentioned at the time of approval of NIT. In case of recall of tenders the base price may be modified by adopting latest base price, and its corresponding period.

CLAUSE 10-CC

Payment due to increase / decrease in Prices/Wages (excluding materials covered under Clause 10(CA) after Receipt of Tender for Works

If the prices of materials (not being materials supplied or services rendered at fixed prices by the department in accordance with clause 10 & 34 thereof) and/or wages of labour required for execution of the work increase, the contractor shall be compensated for such increase as per provisions detailed below and the amount of the contract shall accordingly be varied, subject to the condition that that such compensation for escalation in prices and wages shall be available only for the work done during the stipulated period of the contract including the justified period extended under the provisions of clause 5 of the contract without any action under clause 2. However, for the work done during the justified period extended as above, the compensation as detailed below will be limited to prices/wages prevailing at the time of updated stipulated date of completion considering the effect of extra work (to be calculated on pro rata basis as cost of extra work x stipulated period / tendered cost). No such compensation shall be payable for a work for which the stipulated period of completion is equal to or less than the time as specified in Schedule F. Such compensation for escalation in the prices of materials and labour, when due, shall be worked out based on the following provisions:

- (i) The base date for working out such escalation shall be the last stipulated date of receipt of tenders including extension, if any.

The cost of work on which escalation will be payable shall be reckoned as below :

- (a) Gross value of work done up to this quarter : _____ (A)
 (b) Gross value of work done up to the last quarter : _____ (B)
 (c) Gross value of work done since previous quarter (A - B) _____ (C)
 (d) Full assessed value of Secured Advance (excluding materials Covered under Clause 10-CA) fresh paid in this quarter : _____ (D)
 (e) Full assessed value of Secured Advance (excluding materials

- Covered under Clause 10 CA) recovered in this quarter : (E)
- (f) Full assessed value of Secured Advance for which escalation Payable in this quarter (D - E): (F)
- (g) Advance payment made during this quarter: (G)
- (h) Advance payment recovered during this quarter: (H)
- (i) Advance payment for which escalation is payable in this Quarter: (I)
- (j) Extra items/deviated quantities of items paid as per Clause 12 Based on prevailing market rates during this quarter: (J)
- Then, $M = C + F + I + J$
- $N = 0.85 M$
- (k) Less cost of material supplied by the department as per Clause 10 and recovered during the quarter (K)
- (l) Less cost of services rendered at fixed charges as per Clause 34 and recovered during the quarter (L)
- Cost of work for which escalation is applicable:
 $W = N - (K + L)$

(ii) Components for materials (except cement, reinforcement bars, structural steel or other materials covered under clause 10 CA) labour, P.O.L., etc. shall be pre-determined for every work and incorporated in the conditions of contract attached to the tender papers included in Schedule 'F'. The decision of the Institute in working out such percentage shall be binding on the contractors.

(iii) The compensation for escalation for other materials (excluding cement, reinforcement bars, structural steel or other materials covered under clause 10 CA) and P.O.L. shall be worked as per the formula given below:-

- (a) Adjustment for civil component (except cement, structural steel, reinforcement bars and other materials covered under clause 10CA) / electrical component of construction 'Materials'

$$V_N = W \times \frac{X_N - M_I - M_{I_0}}{100 \times M_{I_0}}$$

V_m = Variation in material cost i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = Cost of Work done worked out as indicated in sub-para (ii) of Clause 10CC.

X_m = Component of 'materials' (except cement, structural steel, reinforcement bars and other materials covered under clause 10CA) expressed as percent of the total value of work.

M_I = All India Wholesale Price Index for civil component/electrical component* of construction material as worked out on the basis of All India Wholesale Price Index for Individual Commodities/ Group Items for the period under consideration as published by Economic Advisor to Govt. of India, Ministry of Industry & Commerce and applying weightages to the Individual Commodities/Group Items. (In respect of the justified period extended under the provisions of clause 5 of the contract without any action under clause 2,

the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration, whichever is less, shall be considered.)

Mlo = All India Wholesale Price Index for civil component/electrical component* of construction material as worked out on the basis of All India Wholesale Price Index for Individual Commodities/Group Items valid on the last stipulated date of receipt of tender including extension, if any, as published by the Economic Advisor to Govt. of India, Ministry of Industry & Commerce and applying weightages to the Individual Commodities/Group items.

*Note: relevant component only will be applicable.

(b) — Adjustment for component of 'POL'

$$Vf = W \times \frac{Z}{100} \times \frac{FI - FIo}{FIo}$$

Vf = ——— Variation in cost of Fuel, Oil & Lubricant i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = ——— Cost of Work done worked out as indicated in sub para (ii) of Clause 10CC.

Z = ——— Component of Fuel, Oil & Lubricant expressed as percent of the total value of work.

FI = ——— All India Wholesale Price Index for Fuel, Oil & Lubricant for the period under consideration as published by Economic Advisor to Govt. of India, Ministry of Industry & Commerce, New Delhi. (In respect of the justified period extended under the provisions of clause 5 of the contract without any action under clause 2, the index prevailing at the time of stipulated date of completion or the prevailing index of the period under consideration, whichever is less, shall be considered.)

FIo = ——— All India Wholesale Price Index for Fuel, Oil & Lubricant valid on the last stipulated date of receipt of tender including extension, if any.

(iv) The following principles shall be followed while working out the indices mentioned in para (iii) above.

(a) The compensation for escalation shall be worked out at quarterly intervals and shall be with respect to the cost of work done during the three calendar months of the said quarter. The dates of preparation of bills as finally entered in the Measurement Book by the Institute/date of submission of bill finally by the contractor to the department in case of computerized measurement books shall be the guiding factor to decide the bills relevant to the quarterly interval. The first such payment shall be made at the

~~end of three months after the month (excluding the month in which tender was accepted) and thereafter at three months' interval. At the time of completion of the work, the last period for payment might become less than 3 months, depending on the actual date of completion.~~

~~(b) The index (MI/FI etc.) relevant to any quarter/period for which such compensation is paid shall be the arithmetical average of the indices relevant to the three calendar months. If the period up to date of completion after the quarter covered by the last such instalment of payment, is less than three months, the index MI and FI shall be the average of the indices for the months falling within that period.~~

~~(v) The compensation for escalation for labour shall be worked out as per the formula given below:-~~

$$VL = W \times \frac{Y}{100} \times \frac{LI - LLo}{LLo}$$

~~VL : Variation in labour cost i.e. amount of increase or decrease in rupees to be paid or recovered.~~

~~W : Value of work done, worked out as indicated in sub para (ii) above.~~

~~Y : Component of labour expressed as a percentage of the total value of the work.~~

~~LI : Minimum wage in rupees of an unskilled adult male mazdoor, fixed under any law, statutory rule or order as applicable on the last date of the quarter previous to the one under consideration. (In respect of the justified period extended under the provisions of clause 5 of the contract without any action under clause 2, the minimum wage prevailing on the last date of quarter previous to the quarter pertaining to stipulated date of Completion or the minimum wage prevailing on the last date of the quarter previous to the one under consideration, whichever is less, shall be considered.)~~

~~Llo : Minimum daily wage in rupees of an unskilled adult male mazdoor, fixed under any law, statutory rule or order as on the last stipulated date of receipt of tender including extension, if any.~~

~~(vi) The following principles will be followed while working out the compensation as per sub para (v) above.~~

~~(a) The minimum wage of an unskilled male mazdoor mentioned in sub para (vi) above shall be the higher of the wage notified by Government of India, Ministry of Labour and that notified by the local administration both relevant to the place of work and the period of reckoning.~~

- ~~(b) The escalation for labour also shall be paid at the same quarterly intervals when escalation due to increase in cost of materials and/or P.O.L. is paid under this clause. If such revision of minimum wages takes place during any such quarterly intervals, the escalation compensation shall be payable at revised rates only for work done in subsequent quarters;~~
- ~~(c) Irrespective of variations in minimum wages of any category of labour, for the purpose of this clause, the variation in the rate for an unskilled adult male mazdoor alone shall form the basis for working out the escalation compensation payable on the labour component.~~
- ~~(vii) In the event the price of materials and/or wages of labour required for execution of the work decrease/s, there shall be a downward adjustment of the cost of work so that such price of materials and/or wages of labour shall be deductible from the cost of work under this contract and in this regard the formula herein before stated under this Clause 10CC shall mutatis mutandis apply, provided that:~~
- ~~(a) no such adjustment for the decrease in the price of materials and/or wages of labour aforementioned would be made in case of contracts in which the stipulated period of completion of the work is equal to or less than the time as specified in Schedule 'F'.~~
- ~~(b) The escalation for labour also shall be paid at the same quarterly intervals when escalation due to increase in cost of materials and/or P.O.L. is paid under this clause. If such revision of minimum wages takes place during any such quarterly intervals, the escalation compensation shall be payable at revised rates only for work done in subsequent quarters;~~
- ~~(c) Irrespective of variations in minimum wages of any category of labour, for the purpose of this clause, the variation in the rate for an unskilled adult male mazdoor alone shall form the basis for working out the escalation compensation payable on the labour component.~~
- ~~(viii) In the event the price of materials and/or wages of labour required for execution of the work decrease/s, there shall be a downward adjustment of the cost of work so that such price of materials and/or wages of labour shall be deductible from the cost of work under this contract and in this regard the formula herein before stated under this Clause 10CC shall mutatis mutandis apply, provided that:~~
- ~~(a) no such adjustment for the decrease in the price of materials and/or wages of labour aforementioned would be made in case of contracts in which the stipulated period of completion of the work is equal to or less than the time as specified in Schedule 'F'.~~
- ~~(b) the Institute shall otherwise be entitled to lay down the procedure by which the provision of this sub clause shall be implemented from time to time and the decision of the Institute in this behalf shall be final and binding on the contractor.~~
- ~~(ix) Provided always that:-~~

- ~~(a) Where provisions of clause 10CC are applicable, provisions of clause 10C will not be applicable but provisions of clause 10CA will be applicable.~~
- ~~(b) Where provisions of clause 10CC are not applicable, provisions of clause 10C and 10CA will become applicable.~~

CLAUSE 10 D

Dismantled Material to be Institute's Property

The contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work, etc. as Institute's property and such materials shall be disposed off to the best advantage of Institute according to the instructions in writing issued by Institute.

CLAUSE 11

Work to be Executed in Accordance with Specifications, Drawings, Orders etc.

The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner both as regards materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing in respect of the work signed by Institute.

The contractor shall comply with the provisions of the contract and with the care and diligence execute and maintain the works and provide all labour and materials, tools and plants including for measurements and supervision of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The Contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

The contractor shall have to produce and take an approval of the required shop drawings to execute the work. The MPD-PA as per requirements will give the conceptual drawing in AutoCAD format to the contractor to produce the detailed shop drawings. Contractor has to plan a schedule in advance for the necessary Shop Drawing and has to submit to the Engineer-In-Charge or any other official designated to represent IIM Rohtak to get approval from Design Consultant if required for an approval of execution at-least fifteen days before the actual execution day.

CLAUSE 12

Deviations/Variations Extent and Pricing

Institute shall have power (i) to make alteration in, omissions from, additions to, or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and (ii) to omit a part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by Institute and such alterations, omissions,

additions or substitutions shall form part of the contract as if originally provided therein and any altered, additional or substituted work which the contractor may be directed to do in the manner specified above as part of the works, shall be carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.

12.1 The time for completion of the works shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered, be extended, if requested by the contractor, as follows :

- (i) In the proportion which the additional cost of the altered, additional or substituted work, bears to the original tendered value plus
- (ii) 25% of the time calculated in (i) above or such further additional time as may be considered reasonable by Institute.

Deviation, Extra Items and Pricing

12.2 A. For Project and Original Works :

In the case of Extra item(s) (items that are completely new, and are in addition to the items contained in the contract), the contractor may within fifteen days of receipt of order or occurrence of the item(s) claim rates, supported by proper analysis, for the work and Institute shall within prescribed time limit of the receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determined the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

B. For Maintenance works including works of upgradation, aesthetic, special repair, addition / alteration :

In the case of Extra item(s) being the schedule items (Delhi Schedule of Rates items), these shall be paid as per the schedule rate plus cost index (at the time of tender) plus / minus percentage above /below quoted contract amount.

Payment of Extra items in case of non-schedule items (Non-DSR items) shall be made as per the prevailing market rate.

Deviation, Substituted Items, Pricing

A. For Project and Original Works :

In the case of Substituted items (items that are taken up with partial substitution or in lieu of items of work in the contract), the rate for the agreement item (to be substituted) and substituted item shall also be determined in the manner as mentioned in the following para.

- a) If the market rate for the substituted item so determined is more than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so increased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).
- b) If the market rate for the substituted item so determined is less than the market rate of the agreement item (to be substituted), the rate payable to the contractor for the substituted item shall be the rate for the agreement item (to be substituted) so decreased to the extent of the difference between the market rates of substituted item and the agreement item (to be substituted).

B. For Maintenance works including works of upgradation, aesthetic, special repair, addition / alteration :

In the case of Substituted item(s) being the schedule items (Delhi Schedule of Rates items), these shall be paid as per the schedule rate plus cost index (at the time of tender) plus /minus percentage above /below quoted contract amount.

Payment of Substitute in case of non-scheduled items (Non-DSR items) shall be made as per the prevailing market rate.

Deviation Deviated Quantities, Pricing

A. For Project and Original Works :

In the case of contract items, substituted items, contract cum substituted items, which exceed the limits laid down in schedule F, the contractor may within fifteen days of receipt of order or occurrence of the excess, claim revision of the rates, supported by proper analysis for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the schedule of quantities, Institute shall within prescribed time limit of receipt of the claims supported by analysis, after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.

B. For Maintenance works including works of upgradation, aesthetic, special repair, addition /alternation :

In the case of contract items, which exceed the limits laid down in Schedule F, the contractor shall be paid rates specified in the schedule of quantities.

In prescribed time limits for finalizing rates for Extra Item(s), Substitute Item(s) and Deviated Quantities of contract items are as under:

- | | |
|---|-----------|
| (i) If the Tendered value of work is upto Rs. 45 lacs | :30 days |
| (ii) If the Tendered value of work is more than 45 and upto Rs. 2.5 crore | : 45 days |
| (iii) If the Tendered value of work exceeds Rs. 2.5 crore | : 60 days |

12.3 A. For Project and Original Works:

The provisions of the preceding paragraph shall also apply to the decrease in the rates of items for the work in excess of the limits laid down in Schedule F, and Institute shall after giving notice to the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice, revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

B. For Maintenance works including works of upgradation, aesthetic, special repair, addition /alternation :

In the case of decrease in the rates prevailing in the market of items for the work in excess of the limits laid down in Schedule F, the Institute shall after giving notice to the contractor within one month of occurrence of the excess and after taking into consideration any reply received from him within fifteen days of the receipt of the notice, revise the rates for the work in question within one month of the expiry of the said period of fifteen days having regard to the market rates.

12.4 The contractor shall send to Institute once every three months, an up to date account giving complete details of all claims for additional payments to which the contractor may consider himself entitled and of all additional work ordered by Institute which he has executed during the preceding quarter failing which the contractor shall be deemed to have waived his right. However, the Accepting Authority may authorise consideration of such claims on merits.

12.5 For the purpose of operation of Schedule "F", the following works shall be treated as works relating to foundation unless & otherwise defined in the contract:

- (i) For Buildings : All works up to 1.2 metres above ground level or up to floor 1 level whichever is lower.
- (ii) For abutments, piers and well staining : All works up to 1.2 m above the bed level.
- (iii) For retaining walls, wing walls, compound walls, chimneys, over head reservoirs/tanks and other elevated structures : All works up to 1.2 metres above the ground level.
- (iv) For reservoirs/tanks (other than overhead reservoirs/tanks) : All works up to 1.2 metres above the ground level.
- (v) For basement: All works up to 1.2 m above ground level or up to floor 1 level whichever is lower.
- (vi) For Roads, all items of excavation and filling including treatment of sub base.

12.6 Any operation incidental to or necessarily has to be in contemplation of tenderer

while filing tender, or necessary for proper execution of the item included in the Schedule of quantities or in the schedule of rates mentioned above, whether or not, specifically indicated in the description of the item and the relevant specifications, shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said schedule of rates, as the case may be. Nothing extra shall be admissible for such operations.

CLAUSE 13

Foreclosure of Contract due to Abandonment or Reduction in Scope of Work

If at any time after acceptance of the tender, Institute shall decide to abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole or any part of the works to be carried out, Institute shall give notice in writing to that effect to the contractor and the contractor shall act accordingly in the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the works in full but which he did not derive in consequence of the foreclosure of the whole or part of the works.

The contractor shall be paid at contract rates, full amount for works executed at site and, in addition, a reasonable amount as certified by Institute for the items hereunder mentioned which could not be utilized on the work to the full extent in view of the foreclosure;

- (i) Any expenditure incurred on preliminary site work, e.g. temporary access roads, temporary labour huts, staff quarters and site office; storage accommodation and water storage tanks.
- (ii) Institute shall have the option to take over contractor's materials or any part thereof either brought to site or of which the contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work) provided. For materials taken over or to be taken over by Institute, cost of such materials as detailed by Institute shall be paid. The cost shall, however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the contractor.
- (iii) If any materials supplied by Institute are rendered surplus, the same except normal wastage shall be returned by the contractor to Institute at rates not exceeding those at which these were originally issued, less allowance for any deterioration or damage which may have been caused whilst the materials were in the custody of the contractor. In addition, cost of transporting such materials from site to Institute stores, if so required by Institute, shall be paid.
- (iv) Reasonable compensation for transfer of T & P from site to contractor's permanent stores or to his other works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable.
- (v) Reasonable compensation for repatriation of contractor's site staff and imported labour to the extent necessary.

The contractor shall, if required by Institute, furnish to him, books of account, wage books, time sheets and other relevant documents and evidence as may be necessary to enable him to certify the reasonable amount payable under this condition.

The reasonable amount of items on (i), (iv) and (v) above shall not be in excess of 2% of the cost of the work remaining incomplete on the date of closure, i.e. total stipulated cost of the work as per accepted tender less the cost of work actually executed under the contract and less the cost of contractor's materials at site taken over by Institute as per item (ii) above. Provided always that against any payments due to the contractor on this account or otherwise, Institute shall be entitled to recover or be credited with any outstanding balances due from the contractor for advance paid in respect of any tool, plants and materials and any other sums which at the date of termination were recoverable by the Institute from the contractor under the terms of the contract.

A compensation for such eventuality, on account of damages etc. shall be payable @0.5% of cost of work remaining incomplete on date of closure i.e. total stipulated cost of the work less the cost of work actually executed under the contract shall be payable.

CLAUSE 14

Carrying out part work at risk & cost of contractor

If contractor:

- (i) At any time makes default during currency of work or does not execute any part of the work with due diligence and continues to do so even after a notice in writing of 7 days in this respect from Institute; or
- (ii) Commits default in complying with any of the terms and conditions of the contract and does not remedy it or takes effective steps to remedy it within 7 days even after a notice in writing is given in that behalf by Institute; or
- (iii) Fails to complete the work(s) or items of work with individual dates of completion, on or before the date(s) so determined, and does not complete them within the period specified in the notice given in writing in that behalf by Institute.

Institute without invoking action under Clause 3 may, without prejudice to any other right or remedy against the contractor which have either accrued or accrue thereafter to Institute, by a notice in writing to take the part work/part incomplete work of any item(s) out of his hands and shall have powers to:

- (a) Take possession of the site and any materials, constructional plant, implements, stores, etc., thereon; and/or
- (b) Carry out the part work/part incomplete work of any item(s) by any means at the risk and cost of the contractor.

Institute shall determine the amount, if any, is recoverable from the contractor for completion of the part work/part incomplete work of any item(s) taken out of his hands and

execute at the risk and cost of the contractor, the liability of contractor on account of loss or damage suffered by Institute because of action under this clause shall not exceed 10% of the tendered value of the work.

In determining the amount, credit shall be given to the contractor with the value of work done in all respect in the same manner and at the same rate as if it had been carried out by the original contractor under the terms of his contract, the value of contractor's materials taken over and incorporated in the work and use of plant and machinery belonging to the contractor. The certificate of Institute as to the value of work done shall be final and conclusive against the contractor provided always that action under this clause shall only be taken after giving notice in writing to the contractor. Provided also that if the expenses incurred by the Institute are less than the amount payable to the contractor at his agreement rates, the difference shall not be payable to the contractor.

Any excess expenditure incurred or to be incurred by Institute in completing the part work/part incomplete work of any item(s) or the excess loss of damages suffered or may be suffered by Institute as aforesaid after allowing such credit shall without prejudice to any other right or remedy available to Institute in law or per as agreement be recovered from any money due to the contractor on any account, and if such money is insufficient, the contractor shall be called upon in writing and shall be liable to pay the same within 30 days.

If the contractor fails to pay the required sum within the aforesaid period of 30 days, Institute shall have the right to sell any or all of the contractors' unused materials, constructional plant, implements, temporary building at site, etc. and adjust the proceeds of sale thereof towards the dues recoverable from the contractor under the contract and if thereafter there remains any balance outstanding, it shall be recovered in accordance with the provisions of the contract.

In the event of above course being adopted by Institute, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any engagements or made any advance on any account or with a view to the execution of the work or the performance of the contract.

CLAUSE 15

Suspension of work

- (i) The contractor shall, on receipt of the order in writing of Institute, (whose Suspension of decision shall be final and binding on the contractor) suspend the progress of the works or any part thereof for such time and in such manner as Institute may consider necessary so as not to cause any damage or injury to the work already done or endanger the safety thereof for any of the following reasons:
 - (a) on account of any default on the part of the contractor or;
 - (b) for proper execution of the works or part thereof for reasons other than the default

- of the contractor; or
(c) for safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by Institute.

- (ii) If the suspension is ordered for reasons (b) and (c) in sub-para (i) above:
- (a) the contractor shall be entitled to an extension of time equal to the period of every such suspension PLUS 25%, for completion of the item or group of items of work for which a separate period of completion is specified in the contract and of which the suspended work forms a part, and;
- (b) If the total period of all such suspensions in respect of an item or group of items or work for which a separate period of completion is specified in the contract exceeds thirty days, the contractor shall, in addition, be entitled to such compensation as Institute may consider reasonable in respect of salaries and/or wages paid by the contractor to his employees and labour at site, remaining idle during the period of suspension, adding thereto 2% to cover indirect expenses of the contractor provided the contractor submits his claim supported by details to Institute within fifteen days of the expiry of the period of 30 days.
- (iii) If the works or part thereof is suspended on the orders of Institute for more than three months at a time, except when suspension is ordered for reason (a) in sub-para (i) above, the contractor may after receipt of such order serve a written notice on Institute requiring permission within fifteen days from receipt by Institute of the said notice, to proceed with the work or part thereof in regard to which progress has been suspended and if such permission is not granted within that time, the contractor, if he intends to treat the suspension, where it affects only a part of the works as an omission of such part by Institute or where it affects whole of the works, as an abandonment of the works by Institute, shall within ten days of expiry of such period of 15 days give notice in writing of his intention to Institute. In the event of the contractor treating the suspension as an abandonment of the contract by Institute, he shall have no claim to payment of any compensation on account of any profit or advantage which he might have derived from the execution of the work in full but which he could not derive in consequence of the abandonment. He shall, however, be entitled to such compensation, as Institute may consider reasonable, in respect of salaries and/or wages paid by him to his employees and labour at site, remaining idle in consequence adding to the total thereof 2% to cover indirect expenses of the contractor provided the contractor submits his claim supported by details to Institute within 30 days of the expiry of the period of 3 months.

CLAUSE 15A

The contractor shall not be entitled to claim any compensation from Institute for the loss suffered by him on account of delay by Institute in the supply of materials in schedule

'B' where such delay is covered by difficulties relating to the supply of wagons, force majeure including non-allotment of such materials by controlling authorities, Act of God, Acts of enemies of the State/country or any reasonable cause beyond the control of the Institute.

This Clause 15A will not be applicable for works where no material is stipulated.

CLAUSE 16

Action in case work not done as per Specifications

All works under or in course of execution or executed in pursuance of the contract, shall at all times be open and accessible to the inspection and supervision of Institute, his authorized subordinates in charge of the work and all the superior officers, or any organization engaged by the Institute for Quality Assurance and of the Chief Technical Examiner's Office, and the contractor shall, at all times, during the usual working hours and at all other times at which reasonable notice of the visit of such officers has been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing, present for that purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

If it appears to Institute or to the officers of the organization engaged by the Institute for Quality Assurance or to the Chief Technical Examiner or his subordinate officers, that any work has been executed with unsound, imperfect, or unskillful workmanship, or with materials or articles provided by the contractor for the execution of the work which are unsound or of a quality inferior to that contracted or otherwise not in accordance with the contract, the contractor shall, on demand in writing which shall be made within twelve months of the completion of the work from Institute specifying the work, materials or articles complained of notwithstanding that the same may have been passed, certified and paid for forthwith rectify, or remove and reconstruct the work so specified in whole or in part, as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost. In the event of the failing to do so within a period specified by Institute in his demand aforesaid, then the contractor shall be liable to pay compensation at the same rate as under Clause 2 of the contract (for non-completion of the work in time) for this default.

In such case Institute may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the authority specified in schedule 'F' may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment and/or get it and other connected and incidental items rectified, or removed and re-executed at the risk and cost of the contractor. Decision of Institute to be conveyed in writing in respect of

the same will be final and binding on the contractor.

CLAUSE 17

Contactors Liable for Damages, defects during maintenance period

If the contractor or his working people or servants shall break, deface, injure or destroy any part of building in which they may be working, or any building, road, road kerb, fence, enclosure, water pipe, cables, drains, electric or telephone post or wires, trees, grass or grassland, or cultivated ground contiguous to the premises on which the work or any part is being executed, or if any damage shall happen to the work while in progress, from any cause whatever or if any defect, shrinkage or other faults appear in the work within twelve months after a certificate, final or otherwise of its completion shall have been given by Institute as aforesaid arising out of defect or improper materials or workmanship the contractor shall upon receipt of a notice in writing on that behalf make the same good at his own expense or in default Institute cause the same to be made good by other workmen and deduct the expense from any sums that may be due or at any time thereafter may become due to the contractor, or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof. The security deposit of the contractor shall not be refunded before the expiry of twelve months after the issue of the certificate final or otherwise, of completion of work, or till the final bill has been prepared and passed whichever is later.

Provided that in the case of road work, if in the opinion of Institute, half of the security deposit is sufficient, to meet all liabilities of the contractor under this contract, half of the security deposit will be refundable after six months and the remaining half after twelve months of the issue of the said certificate of completion or till the final bill has been prepared and passed whichever is later.

In case of Maintenance and Operation works of E&M services, the security deposit deducted from contractors shall be refunded within one month from the date of final payment or within one month from the date of completion of the maintenance contract whichever is earlier.

CLAUSE 18

Contractor to Supply Tools & Plants, etc.

The contractor shall provide at his own cost all materials (except such special materials, if any, as may in accordance with the contract be supplied from Institute's stores), machinery, tools & plants as specified in Schedule F. In addition to this, appliances, implements, other plants, ladders, cordage, tackle, scaffolding and temporary works required for the proper execution of the work, whether original, altered or substituted and whether included in the specifications or other documents forming part of the contract or referred to in these conditions or not, or which may be necessary for the

purpose of satisfying or complying with the requirements of Institute as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage therefor to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials, necessary for the purpose of setting out works, and counting, weighing and assisting the measurement for examination at any time and from time to time of the work or materials.

Failing his so doing, the same may be provided by Institute at the expense of the contractor and the expenses may be deducted, from any money due to the contractor, under this contract or otherwise and/or from his security deposit or the proceeds of sale thereof, or of a sufficient portions thereof.

CLAUSE 18A

Recovery of Compensation paid to workmen

In every case in which by virtue of the provisions sub-section (1) of Section 12, of the Workmen's Compensation Act, 1923, Institute is obliged to pay compensation to a workman employed by the contractor, in execution of the works, Institute will recover from the contractor, the amount of the compensation so paid; and, without prejudice to the rights of the Institute under sub-section (2) of Section 12, of the said Act, Institute shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by Institute to the contractor whether under this contract or otherwise. Institute shall not be bound to contest any claim made against it under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon his giving to Institute full security for all costs for which Government might become liable in consequence of contesting such claim.

CLAUSE 18B

Ensuring Payment and Amenities to Workers if Contractor fails

In every case in which by virtue of the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and of the Contract Labour (Regulation and Abolition) Central Rules, 1971, Institute is obliged to pay any amounts of wages to a workman employed by the contractor in execution of the works, or to incur any expenditure in providing welfare and health amenities required to be provided under the above said Act and the rules under Clause 19 (H) or under any relevant Contractor's Labour Regulations, or under the Rules framed by Government from time to time for the protection of health and sanitary arrangements for workers employed by Institute's Contractors, Institute will recover from the contractor, the amount of wages so paid or the amount of expenditure so incurred; and without prejudice to the rights of the Institute under sub-section(2) of Section 20, and sub-section (4) of Section 21, of the Contract Labour (Regulation and Abolition) Act, 1970, Institute shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum

due by Institute to the contractor whether under this contract or otherwise Institute shall not be bound to contest any claim made against it under sub-section (1) of Section 20, sub-section (4) of Section 21, of the said Act, except on the written request of the contractor and upon his giving to the Institute full security for all costs for which Institute might become liable in contesting such claim.

CLAUSE 19

Labour Laws to be complied by the Contractor

The contractor shall obtain a valid licence under the Contract Labour (R&A) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, before the commencement of the work, and continue to have a valid license until the completion of the work. The contractor shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act, 1986.

The contractor shall also comply with the provisions of the Building and other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 and the Building and other Construction Workers Welfare Cess Act, 1996 and any Rules frame thereunder.

Any failure to fulfil these requirements shall attract the penal provisions of this contract arising out of the resultant non-execution of the work.

CLAUSE 19A

No labour below the age of fourteen years shall be employed on the work.

CLAUSE 19B

Payment of Wages

Payment of wages:

- (i) The contractor shall pay to labour employed by him either directly or through sub-contractors, wages not less than fair wages as defined in the Contractor's Labour Regulations or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970 and the contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.
- (ii) The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.
- (iii) In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with the Contractor's Labour Regulations made by Government from time to time in regard to payment of wages, wage period, deductions from wages recovery of wages not paid and deductions unauthorizedly made, maintenance of

wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act, 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

- (iv) (a) Institute concerned shall have the right to deduct from the moneys due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the Regulations.
- (b) Under the provision of Minimum Wages (Central) Rules, 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, Institute shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labours and pay the same to the persons entitled thereto from any money due to the contractor by Institute concerned.
- (v) The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits Act, 1961, and the Contractor's Labour (Regulation and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made thereunder from time to time.
- (vi) The contractor shall indemnify and keep indemnified Institute against payments to be made under and for the observance of the laws aforesaid and the Contractor's Labour Regulations without prejudice to his right to claim indemnity from his sub-contractors.
- (vii) The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.
- (viii) Whatever is the minimum wage for the time being, or if the wage payable is higher than such wage, such wage shall be paid by the contractor to the workmen directly without the intervention of Jamadar and that Jamadar shall not be entitled to deduct or recover any amount from the minimum wage payable to the workmen as and by way of commission or otherwise.
- (ix) The contractor shall ensure that no amount by way of commission or otherwise is deducted or recovered by the Jamadar from the wage of workmen.

CLAUSE 19C

In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this contract, the contractor shall at his own expense arrange for the safety provisions as per Safety Code framed from time to time and shall at his own expense provide for all facilities in connection therewith. In case the contractor fails to make

arrangement and provide necessary facilities as aforesaid, he shall be liable to pay a penalty of Rs.200/- for each default and in addition, Institute shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in that behalf from the contractor.

CLAUSE 19D

The contractor shall submit by the 4th and 19th of every month, to Institute, a true statement showing in respect of the second half of the preceding month and the first half of the current month respectively:-

- (1) the number of labourers employed by him on the work,
- (2) their working hours,
- (3) the wages paid to them,
- (4) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them, and
- (5) the number of female workers who have been allowed maternity benefit according to Clause 19F and the amount paid to them.

Failing which the contractor shall be liable to pay to Institute, a sum not exceeding Rs. 200/- for each default or materially incorrect statement. The decision of Institute shall be final in deducting from any bill due to the contractor, the amount levied as fine and be binding on the contractor.

CLAUSE 19E

In respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with all the rules framed by Institute from time to time for the protection of health and sanitary arrangements for workers employed by the Institute and its contractors.

CLAUSE 19F

Leave and pay during leave shall be regulated as follows:-

1. Leave :
 - (i) in the case of delivery - maternity leave not exceeding 8 weeks, 4 weeks up to and including the day of delivery and 4 weeks following that day,
 - (ii) in the case of miscarriage - upto 3 weeks from the date of miscarriage.
2. Pay :
 - (i) in the case of delivery - leave pay during maternity leave will be at the rate of the women's average daily earnings, calculated on total wages earned on the days when full time work was done during a period of three months immediately preceding the date on which she gives notice that she expects to be confined or at the rate of Rupee one only a day whichever is greater.
 - (ii) in the case of miscarriage - leave pay at the rate of average daily earning calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of such miscarriage.

3. Conditions for the grant of Maternity Leave:

No maternity leave benefit shall be admissible to a woman unless she has been employed for a total period of not less than six months immediately preceding the date on which she proceeds on leave.

4. The contractor shall maintain a register of Maternity (Benefit) in the Prescribed Form as shown in Appendix -I and II, and the same shall be kept at the place of work.

CLAUSE 19G

In the event of the contractor(s) committing a default or breach of any of the provisions of the Contractor's Labour Regulations and Model Rules for the protection of health and sanitary arrangements for the workers as amended from time to time or furnishing any information or submitting or filing any statement under the provisions of the above Regulations and Rules which is materially incorrect, he/they shall, without prejudice to any other liability, pay to the Institute a sum not exceeding Rs.200/- for every default, breach or furnishing, making, submitting, filing such materially incorrect statements and in the event of the contractor(s) defaulting continuously in this respect, the penalty may be enhanced to Rs.200/- per day for each day of default subject to a maximum of 5 per cent of the estimated cost of the work put to tender. The decision of Institute shall be final and binding on the parties.

Should it appear to Institute that the contractor(s) is/are not properly observing and complying with the provisions of the Labour Regulations and Model Rules and the provisions of the Contract Labour (Regulation and Abolition) Act 1970, and the Contract Labour (R&A) Central Rules 1971, for the protection of health and sanitary arrangements for work-people employed by the contractor(s) (hereinafter referred as "the said Rules") Institute shall have power to give notice in writing to the contractor(s) requiring that the said Rules be complied with and the amenities prescribed therein be provided to the work-people within a reasonable time to be specified in the notice. If the contractor(s) shall fail within the period specified in the notice to comply with and/observe the said Rules and to provide the amenities to the work-people as aforesaid, Institute shall have the power to provide the amenities hereinbefore mentioned at the cost of the contractor(s). The contractor(s) shall erect, make and maintain at his/their own expense and to approved standards all necessary huts and sanitary arrangements required for his/their work-people on the site in connection with the execution of the works, and if the same shall not have been erected or constructed, according to approved standards, Institute shall have power to give notice in writing to the contractor(s) requiring that the said huts and sanitary arrangements be remodeled and/or reconstructed according to approved standards, and if the contractor(s) shall fail to remodel or reconstruct such huts and sanitary arrangements according to approved standards within the period specified in the notice,

Institute shall have the power to remodel or reconstruct such huts and sanitary arrangements according to approved standards at the cost of the contractor(s).

CLAUSE 19H

The contractor(s) shall at his/their own cost provide his/their labour with a sufficient number of huts (hereinafter referred to as the camp) of the following specifications on a suitable plot of land to be approved by Institute.

- (i)
 - (a) The minimum height of each hut at the eaves level shall be 2.10m (7 ft.) and the floor area to be provided will be at the rate of 2.7 sq.m. (30 sq.ft.) for each member of the worker's family staying with the labourer.
 - (b) The contractor(s) shall in addition construct suitable cooking places having a minimum area of 1.80m x 1.50m (6'x5') adjacent to the hut for each family.
 - (c) The contractor(s) shall also construct temporary latrines and urinals for the use of the labourers each on the scale of not less than four per each one hundred of the total strength, separate latrines and urinals being provided for women.
 - (d) The contractor(s) shall construct sufficient number of bathing and washing places, one unit for every 25 persons residing in the camp. These bathing and washing places shall be suitably screened.

- (ii)
 - (a) All the huts shall have walls of sun-dried or burnt-bricks laid in mud mortar or other suitable local materials as may be approved by Institute. In case of sun-dried bricks, the walls should be plastered with mud gobi on both sides. The floor may be kutchra but plastered with mud gobi and shall be at least 15 cm (6") above the surrounding ground. The roofs shall be laid with thatch or any other materials as may be approved by Institute and the contractor shall ensure that throughout the period of their occupation, the roofs remain water-tight.
 - (b) The contractor(s) shall provide each hut with proper ventilation.
 - (c) All doors, windows, and ventilators shall be provided with suitable leaves for security purposes.
 - (d) There shall be kept an open space of at least 7.2m (8 yards) between the rows of huts which may be reduced to 6m (20 ft.) according to the availability of site with the approval of Institute. Back to back construction will be allowed.

- (iii) **Water Supply** - The contractor(s) shall provide adequate supply of water for the use of labourers. The provisions shall not be less than two gallons of pure and wholesome water per head per day for drinking purposes and three gallons of clean water per head per day for bathing and washing purposes. Where piped water supply is available, supply shall be at stand posts and where the supply is from wells or river, tanks which may be of metal or masonry, shall be provided. The contractor(s) shall also at his/their own cost make arrangements for laying pipe lines for water supply to his/their labour camp from the existing mains wherever available, and shall pay all fees and charges therefore.

- (iv) The site selected for the camp shall be high ground, removed from jungle.
- (v) **Disposal of Excreta** - The contractor(s) shall make necessary arrangements for the disposal of excreta from the latrines by trenching or incineration which shall be according to the requirements laid down by the Local Health Authorities. If trenching or incineration is not allowed, the contractor(s) shall make arrangements for the removal of the excreta through the Municipal Committee/authority and inform it about the number of labourers employed so that arrangements may be made by such Committee/authority for the removal of the excreta. All charges on this account shall be borne by the contractor and paid direct by him to the Municipality/authority. The contractor shall provide one sweeper for every eight seats in case of dry system.
- (vi) **Drainage** - The contractor(s) shall provide efficient arrangements for draining away sullage water so as to keep the camp neat and tidy.
- (vii) The contractor(s) shall make necessary arrangements for keeping the camp area sufficiently lighted to avoid accidents to the workers.
- (viii) **Sanitation** - The contractor(s) shall make arrangements for conservancy and sanitation in the labour camps according to the rules of the Local Public Health and Medical Authorities.

CLAUSE 19I

Institute may require the contractor to dismiss or remove from the site of the work any person or persons in the contractors' employ upon the work who may be incompetent or misconduct himself and the contractor shall forthwith comply with such requirements. In respect of maintenance/repair or renovation works etc. where the labour have an easy access to the individual houses, the contractor shall issue identity cards to the labourers, whether temporary or permanent and he shall be responsible for any untoward action on the part of such labour.

CLAUSE 19J

It shall be the responsibility of the contractor to see that the building under construction is not occupied by anybody unauthorisedly during construction, and is handed over to Institute with vacant possession of complete building. If such building though completed is occupied illegally, then Institute shall have the option to refuse to accept the said building/buildings in that position. Any delay in acceptance on this account will be treated as the delay in completion and for such delay, a levy upto 5% of tendered value of work may be imposed by the Accepting Authority whose decision shall be final both with regard to the justification and quantum and be binding on the

contractor.

However, the Accepting Authority, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery.

CLAUSE 19K

Employment of skilled / semi-skilled workers

The contractor shall, at all stages of work, deploy skilled/semi skilled tradesmen who are qualified and possess certificate in particular trade from Industrial Training Institute/National Institute of construction Management and Research (NICMAR)/ National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Institute for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Institute. Failure on the part of contractor to obtain approval of Institute or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Institute as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.

CLAUSE 19L

The ESI and EFP contributions on the part of employer in respect of this contract shall be paid by the contractor. These contributions on the part of the employer paid by the contractor shall be reimbursed by the Institute to the contractor on actual basis.

The applicable and eligible amount of ESIC and EFP shall be reimbursed preferably within 7 seven days but not later than 30 days on submission of documentary proof of payment provided same are in order with declaration that claim is as per provisions of contract and contractor had complied all the due provisions of EPF and ESI Act.

CLAUSE 20

Minimum Wages Act to be Complied with

The contractor shall comply with all the provisions of the Minimum Wages Act, 1948, and Contract Labour (Regulation and Abolition) Act, 1970, amended from time to time and rules framed thereunder and other labour laws affecting contract labour that may be brought into force from time to time.

CLAUSE 21

Work not to be sublet. Action in case of insolvency

The contract shall not be assigned or sublet without the written approval of the Institute And if the contractor shall assign or sublet his contract, or attempt to do so, or become insolvent or commence any insolvency proceedings or make any composition with his

creditors or attempt to do so, or if any bribe, gratuity, gift, loan, perquisite, reward or advantage pecuniary or otherwise, shall either directly or indirectly, be given, promised or offered by the contractor, or any of his servants or agent to any public officer or person in the employ of Institute in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract, Institute shall have power to adopt the course specified in Clause 3 hereof in the interest of Institute and in the event of such course being adopted, the consequences specified in the said Clause 3 shall ensue.

CLAUSE 22

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of Institute without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

CLAUSE 23

Changes in firm's Constitution to be intimated

Where the contractor is a partnership firm, the previous approval in writing of Institute shall be obtained before any change is made in the constitution of the firm. Where the contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall likewise be obtained before the contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the contractor. If previous approval as aforesaid is not obtained, the contract shall be deemed to have been assigned in contravention of Clause 21 hereof and the same action may be taken, and the same consequences shall ensue as provided in the said Clause 21.

CLAUSE 24

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of Institute who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on.

CLAUSE 25

Settlement of Disputes & Arbitration

Except where otherwise provided in the contract, all questions and disputes relating to the meaning of the specifications, design, drawings and instructions here-in before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the works or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter:

- (i) If the contractor considers any work demanded of him to be outside the requirements of the contract, or disputes any drawings, record or decision given in writing by

Institute on any matter in connection with or arising out of the contract or carrying out of the work, to be unacceptable, he shall promptly within 15 days request the Director, Institute in writing for written instruction or decision. Thereupon, the Director shall give his written instructions or decision within a period of one month from the receipt of the contractor's letter.

If the Director fails to give his instructions or decision in writing within the aforesaid period or if the contractor is dissatisfied with the instructions or decision of the Director, the contractor may within 30 days from the receipt of the Director's decision, appeal before the Dispute Redressal Committee (DRC) along with a list of disputes with amounts claimed in respect of each such dispute and giving reference to the rejection of his disputes by the Director. The Dispute Redressal Committee (DRC) shall give his decision within a period of 90 days from the receipt of Contractor's appeal. The constitution of Dispute Redressal Committee (DRC) shall be as indicated in Schedule 'F'. If the Dispute Redressal Committee (DRC) fails to give his decision within the aforesaid period or any party is dissatisfied with the decision of Dispute Redressal Committee (DRC), then either party may within a period of 30 days from the receipt of the decision of Dispute Redressal Committee (DRC), give notice to the Director for appointment of arbitrator on prescribed proforma as per Appendix XV, failing which, the said decision shall be final binding and conclusive and not referable to adjudication by the arbitrator.

- (ii) Except where the decision has become final, binding and conclusive in terms of Sub Para (i) above, disputes or difference shall be referred for adjudication through arbitration by a sole arbitrator appointed by the Director, Institute. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever, another sole arbitrator shall be appointed in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each such dispute along with the notice for appointment of arbitrator and giving reference to the rejection by the Director of the appeal.

It is also a term of this contract that no person, other than a person appointed by Director of the Institute, as aforesaid, should act as arbitrator and if for any reason that is not possible, the matter shall not be referred to arbitration at all.

It is also a term of this contract that if the contractor does not make any demand for appointment of arbitrator in respect of any claims in writing as aforesaid within 120 days of receiving the intimation from Institute that the final bill is ready for payment, the claim of the contractor shall be deemed to have been waived and absolutely barred and the Institute shall be discharged and released of all liabilities

under the contract in respect of these claims.

The arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 (Act 26 of 1996) or any statutory modifications or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause.

It is also a term of this contract that the arbitrator shall adjudicate on only such disputes as are referred to him by the appointing authority and give separate award against each dispute and claim referred to him and in all cases the arbitrator shall give reasons for the award.

It is also a term of the contract that if any fees are payable to the arbitrator, these shall be paid equally by both the parties. It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any, of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof shall be paid and fix or settle the amount of costs to be so paid.

CLAUSE 26

Contractor to Indemnify Institute against Patent Rights

The contractor shall fully indemnify and keep indemnified Institute against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claims made under or action brought against Institute in respect of any such matters as aforesaid, the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expense, to settle any dispute or to conduct any litigation that may arise therefrom, provided that the contractor shall not be liable to indemnify the Institute if the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by Institute in this behalf.

CLAUSE 27

Lumpsum Provisions in Tender

When the estimate on which a tender is made includes lump sum in respect of parts of the work, the contractor shall be entitled to payment in respect of the items of work involved or the part of the work in question at the same rates as are payable under this contract for such items, or if the part of the work in question is not, in the opinion of Institute payable of

measurement, Institute may at his discretion pay the lump-sum amount entered in the estimate, and the certificate in writing of Institute shall be final and conclusive against the contractor with regard to any sum or sums payable to him under the provisions of the clause.

CLAUSE 28

Action where no Specifications are specified

In the case of any class of work for which there is no such specifications as referred to in Clause 11, such work shall be carried out in accordance with the Bureau of Indian Standards Specifications. In case there are no such specifications in Bureau of Indian Standards, the work shall be carried out as per manufacturers' specifications, if not available then as per District Specifications. In case there are no such specifications as required above, the work shall be carried out in all respects in accordance with the instructions and requirements of Institute.

CLAUSE 29

Withholding and lien in respect of sum due from contractor

(i) Whenever any claim or claims for payment of a sum of money arises out of or under the contract or against the contractor, Institute shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any deposited by the contractor and for the purpose aforesaid, Institute shall be entitled to withhold the security deposit, if any, furnished as the case may be and also have a lien over the same pending finalisation or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor, Institute shall be entitled to withhold and have a lien to retain to the extent of such claimed amount or amounts referred to above, from any sum or sums found payable or which may at any time thereafter become payable to the contractor under the same contract or any other contract with Institute of the Institute or any contracting person through Institute pending finalization of adjudication of any such claim.

It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to above by Institute or Institute will be kept withheld or retained as such by Institute till the claim arising out of or under the contract is determined by the arbitrator (if the contract is governed by the arbitration clause) or by the competent court, as the case may be and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to above and duly notified as such to the contractor. For the purpose of this clause, where the contractor is a partnership firm or a limited company, Institute shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company as the case may be, whether in his individual capacity or otherwise.

(ii) Institute shall have the right to cause an audit and technical examination of the works and the final bills of the contractor including all supporting vouchers, abstract, etc., to be made after payment of the final bill and if as a result of such audit and technical examination any sum is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed to have been done by him under the contract and found not to have been executed, the contractor shall be liable to refund the amount of over-payment and it shall be lawful for Institute to recover the same from him in the manner prescribed in sub-clause (i) of this clause or in any other manner legally permissible; and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by Institute to the contractor, without any interest thereon whatsoever.

Provided that the Institute shall not be entitled to recover any sum overpaid, nor the contractor shall be entitled to payment of any sum paid short where such payment has been agreed upon between the Institute on the one hand and the contractor on the other under any term of the contract permitting payment for work after assessment by the Institute.

CLAUSE 29 A

Lien in respect of claims in other Contracts

Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by Institute or any other contracting person or persons through Institute against any claim of Institute or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the contractor with Institute or with such other person or persons.

It is an agreed term of the contract that the sum of money so withheld or retained under this clause by Institute will be kept withheld or retained as such by Institute or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the arbitration clause or by the competent court, as the case may be and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

CLAUSE 30

Employment of Coal Mining or controlled area labour not permissible

The contractor shall not employ coal mining or controlled area labour falling under any category whatsoever on or in connection with the work or recruit labour from area within a radius of 32 km (20 miles) of the controlled area. Subject as above the contractor shall employ imported labour only i.e., deposit imported labour or labour imported by contractors from area, from which import is permitted.

Where ceiling price for imported labour has been fixed by State or Regional Labour Committees not more than that ceiling price shall be paid to the labour by the contractor. The contractor shall immediately remove any labourer who may be pointed out by the Institute as being a coal mining or controlled area labourer. Failure to do so shall render the contractor liable to pay to Government a sum calculated at the rate of Rs.10/- per day per labourer. The certificate of the Institute about the number of coal mining or controlled area labourer and the number of days for which they worked shall be final and binding upon all parties to this contract.

It is declared and agreed between the parties that the aforesaid stipulation in this clause is one in which the public are interested within the meaning of the exception in Section 74 of Indian Contract Act, 1872.

Explanation:- Controlled Area means the following areas:

Districts of Dhanbad, Hazaribagh, Jamtara - a Sub-Division under Santhal Pargana Commissionery, Districts of Bankuara, Birbhum, Burdwan, District of Bilaspur.

Any other area which may be declared a Controlled Area by or with the approval of the Central Government.

CLAUSE 31

Unfiltered water supply

The contractor(s) shall make his/their own arrangements for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

- (i) That the water used by the contractor(s) shall be fit for construction purposes to the satisfaction of Institute.
- (ii) Institute shall make alternative arrangements for supply of water at the risk and cost of contractor(s) if the arrangements made by the contractor(s) for procurement of water are in the opinion of Institute, unsatisfactory.
- (iii) The Contractor shall permit all Sub-Contractors to use his water storage and distribution facilities for their respective Work. Any additional or special arrangements needed by Sub-Contractors shall be made by them at their own cost.
- (iv) Upon completion of the Works, the Contractor shall remove temporary storage tanks, piping network built or installed on the site so as to restore the site back to its original condition.
- (v) Insufficiency or non-availability of water shall not be cited by the Contractor as an excuse for delays, or deficiencies in the Work or a reason for claiming extra payments.
- (vi) The Contractor shall, in all eventualities incorporate in his costing for making arrangements with necessary approval from relevant authority if any for the water requirements to be used for construction at his own cost at the time of tendering.

CLAUSE 31A

Departmental water supply if available

Water if available may be supplied to the contractor by the Institute subject to the following conditions:-

- (i) The water charges @ 1 % shall be recovered on gross amount of the work done.
- (ii) The contractor(s) shall make his/their own arrangement of water connection and laying of pipelines from existing main of source of supply.

The Institute do not guarantee to maintain uninterrupted supply of water and it will be incumbent on the contractor(s) to make alternative arrangements for water at his/their own cost in the event of any temporary break down in the Institute water main so that the progress of his/their work is not held up for want of water. No claim of damage or refund of water charges will be entertained on account of such break down.

CLAUSE 32

Alternate water arrangements

- (i) Where there is no piped water supply arrangement and the water is taken by the contractor from the wells or hand pump constructed by the Institute, no charge shall be recovered from the contractor on that account. The contractor shall, however, draw water at such hours of the day that it does not interfere with the normal use for which the hand pumps and wells are intended. He will also be responsible for all damage and abnormal repairs arising out of his use, the cost of which shall be recoverable from him. Institute shall be the final authority to determine the cost recoverable from the contractor on this account and his decision shall be binding on the contractor.
- (ii) The contractor shall be allowed to construct temporary wells in Institute land for taking water for construction purposes only after he has got permission of Institute in writing. No charges shall be recovered from the contractor on this account, but the contractor shall be required to provide necessary safety arrangements to avoid any accidents or damage to adjacent buildings, roads and service lines and shall be required to maintain the facility at his cost. He shall be responsible for any accidents or damage caused due to construction and subsequent maintenance of the wells and shall restore the ground to its original condition after the wells are dismantled on completion of the work.

CLAUSE 33

Return of Surplus materials

Notwithstanding anything contained to the contrary in this contract, where any materials for the execution of the contract are procured with the assistance of Institute either by issue from Institute's stocks or purchase made under orders or permits or licences issued by Institute, the contractor shall hold the said materials economically and solely for the purpose of the contract and not dispose of them without the written permission of the Institute and return, if required by Institute, all surplus or unserviceable materials that may be left with him after the completion of the contract or at its termination for any

reason whatsoever on being paid or credited such price as Institute shall determine having due regard to the condition of the materials. The price allowed to the contractor however shall not exceed the amount charged to him excluding the element of storage charges. The decision of Institute shall be final and conclusive. In the event of breach of the aforesaid condition, the contractor shall in addition to throwing himself open to action for contravention of the terms of the licence or permit and/or for criminal breach of trust, be liable to Institute for all moneys, advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach.

CLAUSE 34

Hire of Plant & Machinery

The contractor shall arrange at his own expense all tools, plant, machinery and equipment (hereinafter referred to as T&P) required for execution of the work.

CLAUSE 35

Condition relating to use of asphaltic materials

- (i) The contractor undertakes to make arrangement for the supervision of the work by the firm supplying the tar or bitumen used.
- (ii) The contractor shall collect the total quantity of tar or bitumen required for the work as per standard formula, before the process of painting is started and shall hypothecate it to Institute. If any bitumen or tar remains unused on completion of the work on account of lesser use of materials in actual execution for reasons other than authorized changes of specifications and abandonment of portion of work, a corresponding deduction equivalent to the cost of unused materials as determined by Institute shall be made and the material returned to the contractors. Although the materials are hypothecated to Institute, the contractor undertakes the responsibility for their proper watch, safe custody and protection against all risks. The materials shall not be removed from site of work without the consent of Institute in writing.
- (iii) The contractor shall be responsible for rectifying defects noticed within a year from the date of completion of the work and the portion of the security deposit relating to asphaltic work shall be refunded after the expiry of this period.

CLAUSE 36

Employment of Technical staff and employees

Contractors Superintendence, Supervision, Technical Staff & Employees

- (i) The contractor shall provide all necessary superintendence during execution of the work and all along thereafter as may be necessary for proper fulfilling of the obligations under the contract.

The contractor shall immediately after receiving letter of acceptance of the tender and before commencement of the work, intimate in writing to Institute, the name(s), qualifications, experience, age, address(s) and other particulars along with

certificates, of the principal technical representative to be in charge of the work and other technical representative(s) who will be supervising the work. Minimum requirement of such technical representative(s) and their qualifications and experience shall not be lower than specified in Schedule 'F'. Institute shall within 3 days of receipt of such communication intimate in writing his approval or otherwise of such a representative(s) to the contractor. Any such approval may at any time be withdrawn and in case of such withdrawal, the contractor shall appoint another such representative(s) according to the provisions of this clause. Decision of the tender accepting authority shall be final and binding on the contractor in this respect. Such a principal technical representative and other technical representative(s) shall be appointed by the contractor soon after receipt of the approval from Institute and shall be available at site before start of work.

All the provisions applicable to the principal technical representative under the Clause will also be applicable to other technical representative(s). The principal technical representative and other technical representative(s) shall be present at the site of work for supervision at all times when any construction activity is in progress and also present himself/themselves, as required, to Institute and/or his designated representative to take instructions. Instructions given to the principal technical representative or other technical representative(s) shall be deemed to have the same force as if these have been given to the contractor. The principal technical representative and other technical representative(s) shall be actually available the decision of Institute as recorded in the site order book and measurement recorded checked/test checked in Measurement Books shall be final and binding on the contractor. Further if the contractor fails to appoint suitable technical Principal technical representative and/or other technical representative(s) and if such appointed persons are not effectively present or are absent by more than two days without duly approved substitute or do not discharge their responsibilities satisfactorily, Institute shall have full powers to suspend the execution of the work until such date as suitable other technical representative(s) is/are appointed and the contractor shall be held responsible for the delay so caused to the work. The contractor shall submit a certificate of employment of the technical representative(s) alongwith every on-account bill/ final bill and shall produce evidence if at any time so required by Institute at site fully during all stages of execution of work, during recording/checking/test checking of measurements of works and whenever so required by Institute and shall also note down instructions conveyed by the Institute or his designated representative(s) in the site order book and shall affix his/their signature in token of noting down the instructions and in token of acceptance of measurements/checked measurements/test checked measurements. The representative(s) shall not look after any other work. Substitutes, duly approved by Institute of the work in similar manner as aforesaid shall be provided in event of absence of any of the representative(s) by more than two days.

If Institute, whose decision in this respect is final and binding on the contractor, is convinced that no such technical representative(s) is/are effectively appointed or is/are effectively attending or fulfilling the provision of this clause, a recovery (non-refundable) shall be effected from the contractor as specified in Schedule 'F' and the contractor shall be held responsible for the delay so caused to the work. The contractor shall submit a certificate of employment of the technical representative(s) (in the form of copy of Form-16 or CPF deduction issued to the Engineers employed by him) along with every account bill/final bill and shall produce evidence if at any times so required by the Institute.

- (ii) The contractor shall provide and employ on the site only such technical assistants as are skilled and experienced in their respective fields and such foremen and supervisory staff as are competent to give proper supervision to the work.

The contractor shall provide and employ skilled, semiskilled and unskilled labour as is necessary for proper and timely execution of the work.

Institute shall be at liberty to object to and require the contractor to remove from the works any person who in his opinion misconducts himself, or is incompetent or negligent in the performance of his duties or whose employment is otherwise considered by Institute to be undesirable. Such person shall not be employed again at works site without the written permission of Institute and the persons so removed shall be replaced as soon as possible by the competent substitute.

CLAUSE 37

Levy/Taxes payable by Contractor

- (i) GST, Building and other Construction Workers Welfare Cess or any other tax, levy or Cess in respect of input for or output by this contract shall be payable by the contractor and Institute shall not entertain any claim whatsoever in this respect except as provided under Clause 38. The contractor shall deposit royalty and obtain necessary permit for supply of the red bajri, stone, kankar, etc. from local authorities.
- (ii) If pursuant to or under any law, notification or order any royalty, cess or the like becomes payable by the Government of India and does not any time become payable by the contractor to the State Government, Local authorities in respect of any material used by the contractor in the works, then in such a case, it shall be lawful to the Government of India and it will have the right and be entitled to recover the amount paid in the circumstances as aforesaid from dues of the contractor.

CLAUSE 38

Conditions for reimbursement of levy/taxes if levied after receipt of tenders

- (i) All tendered rates shall be inclusive any tax, levy or cess applicable on last stipulated date of receipt of tender including extension if any. No adjustment i.e. increase or decrease shall be made for any variation in the rate of GST, Building and Other Construction Workers Welfare Cess or any tax, levy or cess applicable on inputs. However, effect of variation in rates of GST or Building and Other Construction Workers Welfare Cess or imposition or repeal of any other tax, levy or cess applicable on output of the works contract shall be adjusted on either side, increase or decrease. Provided further that for Building and Other Construction Workers Welfare Cess or any tax (other than GST), levy or cess varied or imposed after the last date of receipt of tender including extension if any, any increase shall be reimbursed to the contractor only if the contractor necessarily and properly pays such increased amount of taxes/levies/ cess. Provided further that such increase including GST shall not be made in the extended period of contract for which the contractor alone is responsible for delay as determined by authority for extension of time under Clause 5 in Schedule F.
- (ii) The contractor shall keep necessary books of accounts and other documents for the purpose of this condition as may be necessary and shall allow inspection of the same by a duly authorized representative of the Institute and shall also furnish such other information/document as Institute may require from time to time.
- (iii) The contractor shall, within a period of 30 days of the imposition of any such further tax or levy or cess, give a written notice thereof to Institute that the same is given pursuant to this condition, together with all necessary information relating thereto.

CLAUSE 39

Termination of Contract on death of contractor

Without prejudice to any of the rights or remedies under this contract, if the contractor dies, the Director of Institute on behalf of Institute shall have the option of terminating the contract without compensation to the contractor. However, if the contractor is succeeded by his legal heir or legally assigned successors who are willing to continue the work under the same terms and conditions as in the original contract, Institute shall have the option to continue the work with such heirs or successors with the same obligations to the heirs or successors as with the original contractor. The decision of Institute in this regard shall be final and binding.

CLAUSE 40

If relative working in Institute then the contractor not allowed to tender

The contractor shall not be permitted to tender for works, if any of his near relative(s) is in the employment of the Institute or its agent/representative. He shall also intimate the names of persons who are working with him or are subsequently employed by him and who are near relatives to any of the employee of Institute. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Institute. If however the contractor is registered in any other department, he shall be debarred from tendering in the Institute for any breach of this condition.

NOTE: By the term “near relatives” is meant wife, husband, parents and grand parents, children and grandchildren, brothers and sisters, uncles, aunts and cousins and their corresponding in-laws.

CLAUSE 41

No Gazetted Engineer to work as contractor within one year of retirement

No engineer of gazetted rank or other gazetted officer employed in engineering or administrative duties in an engineering department of the Government of India or Govt of Haryana shall work as a contractor or employee of a contractor for a period of one year after his retirement from government service without the previous permission of respective Government in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of Government as aforesaid, before submission of the tender or engagement in the contractor's service, as the case may be.

CLAUSE 42

Return of material & recovery for excess material used

- (i) After completion of the work and also at any intermediate stage in the event of non-reconciliation of materials issued, consumed and in balance - (see Clause 10), theoretical quantity of materials issued by the Institute for use in the work shall be calculated on the basis and method given hereunder:-
 - (a) Quantity of cement & bitumen shall be calculated on the basis of quantity of cement & bitumen required for different items of work as shown in the Schedule of Rates mentioned in Schedule 'F'. In case any item is executed for which standard constants for the consumption of cement or bitumen are not available in the above mentioned schedule/statement or cannot be derived from the same shall be calculated on the basis of standard formula to be laid down by Institute.
 - (b) Theoretical quantity of steel reinforcement or structural steel sections shall be taken as the quantity required as per design or as authorized by Institute, including authorized lappages, chairs etc. plus 3% wastage due to cutting into pieces, such theoretical quantity being determined and compared with the actual issues each diameter wise, section wise and category wise separately.
 - (c) Theoretical quantity of G.I. & C.I. or other pipes, conduits, wires and cables, pig lead and G.I./M.S. sheets shall be taken as quantity actually required and measured plus 5% for wastage due to cutting into pieces (except in the case of G.I./M.S. sheets it shall be 10%), such determination & comparison being made diameter wise & category wise.
 - (d) For any other material as per actual requirements.
- (ii) Over the theoretical quantities of materials so computed a variation shall be allowed as

specified in Schedule 'F'. The difference in the net quantities of material actually issued to the contractor and the theoretical quantities including such authorized variation, if not returned by the contractor or if not fully reconciled to the satisfaction of Institute within fifteen days of the issue of written notice by Institute to this effect shall be recovered at the rates specified in Schedule 'F', without prejudice to the provision of the relevant conditions regarding return of materials governing the contract. Decision of Institute in regard to theoretical quantities of materials, which should have been actually used as per the Annexure of the standard schedule of rates and recovery at rates specified in Schedule 'F', shall be final & binding on the contractor. For non-scheduled items, the decision of Institute regarding theoretical quantities of materials which should have been actually used, shall be final and binding on the contractor.

- (iii) The said action under this clause is without prejudice to the right of the Institute to take action against the contractor under any other conditions of contract for not doing the work according to the prescribed specifications.

CLAUSE 43

Compensation during warlike situations

The work (whether fully constructed or not) and all materials, machines, tools and plants, scaffolding, temporary buildings and other things connected therewith shall be at the risk of the contractor until the work has been delivered to Institute and a certificate from him to that effect obtained. In the event of the work or any materials properly brought to the site for incorporation in the work being damaged or destroyed in consequence of hostilities or warlike operation, the contractor shall when ordered (in writing) by Institute to remove any debris from the site, collect and properly stack or remove in store all serviceable materials salvaged from the damaged work and shall be paid at the contract rates in accordance with the provision of this agreement for the work of clearing the site of debris, stacking or removal of serviceable material and for reconstruction of all works ordered by Institute, such payments being in addition to compensation upto the value of the work originally executed before being damaged or destroyed and not paid for. In case of works damaged or destroyed but not already measured and paid for, the compensation shall be assessed by the Director, Institute. The contractor shall be paid for the damages/destruction suffered and for restoring the material at the rate based on analysis of rates tendered for in accordance with the provision of the contract. The certificate of Institute regarding the quality and quantity of materials and the purpose for which they were collected shall be final and binding on all parties to this contract.

Provided always that no compensation shall be payable for any loss in consequence of hostilities or warlike operations (a) unless the contractor had taken all such precautions against air raid as are deemed necessary by the A.R.P. Officers or Institute (b) for any material etc. not on the site of the work or for any tools, plant, machinery, scaffolding, temporary building and other things not intended for the work.

In the event of the contractor having to carry out reconstruction as aforesaid, he shall be allowed such extension of time for its completion as is considered reasonable by the Director.

CLAUSE 44

Apprentices Act provisions to be complied with

The contractor shall comply with the provisions of the Apprentices Act, 1961 and the rules and orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Director, Institute may, in his discretion, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

CLAUSE 45

Release of Security Deposit of the work shall not be refunded till the contractor produces a clearance certificate from the Labour Officer. As soon as the work is virtually complete the contractor shall apply for the clearance certificate to the Labour Officer under intimation to Institute. Institute, on receipt of the said communication, shall write to the Labour Officer to intimate if any complaint is pending against the contractor in respect of the work. If no complaint is pending, on record till after 3 months after completion of the work and/or no communication is received from the Labour Officer to this effect till six months after the date of completion, it will be deemed to have received the clearance certificate and the Security Deposit will be released if otherwise due.

SAFETY CODES

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ to $1\frac{1}{4}$ horizontal and 1 vertical.)
2. Scaffolding of staging more than 3.6 m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.
4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm. (3ft.)
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30ft.) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11½") for ladder upto and including 3 m. (10 ft.) in length. For longer ladders, this width should be increased at least $\frac{1}{4}$ " for each additional 30 cm. (1 foot) of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit; action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.

6. a. Excavation and Trenching - All trenches 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof, Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting shall be done.
 - b. Safety Measures for digging bore holes:
 - (i) If the bore well is successful, it should be safely capped to avoid caving and collapse of the bore well. The failed and the abandoned ones should be completely refilled to avoid caving and collapse;
 - (ii) During drilling, sign boards should be erected near the site with the address of the drilling contractor and the Institute of the work;
 - (iii) Suitable fencing should be erected around the well during the drilling and after the installation of the rig on the point of drilling, flags shall be put 50 m around the point of drilling to avoid entry of people;
 - (iv) After drilling the borewell, a cement platform (0.50 m x 0.50 m x 1.20 m) 0.60 m above ground level and 0.60 m below ground level should be constructed around the well casing;
 - (v) After the completion of the borewell, the contractor should cap the bore well properly by welding steel plate, cover the bore well with the drilled wet soil and fix thorny shrubs over the soil. This should be done even while repairing the pump;
 - (vi) After the borewell is drilled the entire site should be brought to the ground level.
7. Demolition - Before any demolition work is commenced and also during the progress of the work,
 - (i) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
 - (ii) No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.
 - (iii) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.
8. All necessary personal safety equipment as considered adequate by Institute should be kept available for the use of the person employed on the site and maintained in a

condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned:- The following safety equipment shall invariably be provided.

- i) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
- ii) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes, shall be provided with protective goggles.
- iii) Those engaged in welding works shall be provided with welder's protective eye-shields.
- iv) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- v) When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated atleast for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to :-
 - a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.
 - b) At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.
 - c) Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.
 - d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.
 - e) Safety belt with rope should be provided to the workers. While working inside the manholes, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.
 - f) The area should be barricaded or cordoned off by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.
 - g) No smoking or open flames shall be allowed near the blocked manhole being cleaned.
 - h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.
 - i) Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. Institute may decide the time up to which a worker may be allowed to work continuously inside the manhole.

- j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.
 - k) Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.
 - l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.
 - m) The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.
 - n) Workmen descending a manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.
 - o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.
 - p) The extent to which these precautions are to be taken depend on individual situation but the decision of Institute regarding the steps to be taken in this regard in an individual case will be final.
- vi) The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:-
- a) No paint containing lead or lead products shall be used except in the form of paste or ready made paint.
 - b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.
 - c) Overalls shall be supplied by the contractors to the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.
9. The Contractor shall not employ women and men below the age of 18 years on the work with product containing lead in any form, wherever men above the age of 18 years are employed on the work with product containing lead, the following principles must be observed for such use :
- i) White lead, sulphate of lead or product containing these pigment, shall not be used in painting operation except in the form of pastes or paint ready for use.
 - ii) Measures shall be taken, wherever required in order to prevent danger arising from

- the application of a paint in the form of spray.
- iii) Measures shall be taken, wherever practicable, to prevent danger arising out of from dust caused by dry rubbing down and scraping.
 - iv) Adequate facilities shall be provided to enable working painters to wash during and on cessation of work.
 - v) Overall shall be worn by working painters during the whole of working period.
 - vi) Suitable arrangement shall be made to prevent clothing put off during working hours being spoiled by painting materials.
 - vii) Cases of lead poisoning and suspected lead poisoning shall be notified and shall be subsequently verified by medical man appointed.
 - viii) Institute may require, when necessary medical examination of workers.
 - ix) Instructions with regard to special hygienic precautions to be taken in the painting trade shall be distributed to working painters.
10. When the work is done near any place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.
11. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions:-
- (i) (a) These shall be of good mechanical construction, sound materials and adequate.
 - (a) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
 - (ii) Every crane driver or hoisting appliance operator, shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding winch or give signals to operator.
 - (iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
 - (iv) In case of departmental machines, the safe working load shall be notified by the Electrical Institute. As regards contractor's machines the contractors shall notify the safe working load of the machine to Institute whenever he

brings any machinery to site of work and get it verified by the Electrical Engineer concerned.

12. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.
13. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.
14. These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.
15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer or Institute of the department or their representatives.
16. Notwithstanding the above clauses from (1) to (15), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

**MODEL RULES TO BE FOLLOWED BY CONTRACTORS FOR THE PROTECTION
OF HEALTH AND SANITARY ARRANGEMENTS OF WORKERS EMPLOYED**

1. APPLICATION

These rules shall apply to all buildings and construction works in which twenty or more workers are ordinarily employed or are proposed to be employed in any day during the period during which the contract work is in progress.

2. DEFINITION

Work place means a place where twenty or more workers are ordinarily employed in connection with construction work on any day during the period during which the contract work is in progress.

3. FIRST-AID FACILITIES

- (i) At every work place, there shall be provided and maintained, so as to be easily accessible during working hours, first-aid boxes at the rate of not less than one box for 150 contract labour or part thereof ordinarily employed.
- (ii) The first-aid box shall be distinctly marked with a red cross on white background and shall contain
 - a) For work places in which the number of contract labour employed does not exceed 50-the following equipment:-

Each first-aid box shall contain the following equipments :-

- 1. 6 small sterilized dressings.
- 2. 3 medium size sterilized dressings.
- 3. 3 large size sterilized dressings.
- 4. 3 large sterilized burn dressings.
- 5. 1 (30 ml.) bottle containing a two per cent alcoholic solution of iodine.
- 6. 1 (30 ml.) bottle containing salvolatile having the dose and mode of administration indicated on the label.
- 7. 1 snakebite lancet.
- 8. 1 (30 gms.) bottle of potassium permanganate crystals.
- 9. 1 pair scissors.
- 10. 1 copy of the first-aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
- 11. 1 bottle containing 100 tablets (each of 5 gms.) of aspirin.
- 12. Ointment for burns.
- 13. A bottle of suitable surgical antiseptic solution.

- b) For work places in which the number of contract labour exceed 50. Each first-aid box shall contain the following equipments.
 - 1. 12 small sterilized dressings.

2. 6 medium size sterilized dressings.
3. 6 large size sterilized dressings.
4. 6 large size sterilized burn dressings.
5. 6 (15 gms.) packets sterilized cotton wool.
6. 1 (60 ml.) bottle containing a two per cent alcoholic solution iodine.
7. 1 (60 ml.) bottle containing salvolatile having the dose and mode of administration indicated on the label.
8. 1 roll of adhesive plaster.
9. 1 snake bite lancet.
10. 1 (30 gms.) bottle of potassium permanganate crystals.
11. 1 pair scissors.
12. 1 copy of the first-aid leaflet issued by the Director General Factory Advice Service and Labour Institutes/Government of India.
13. A bottle containing 100 tablets (each of 5 gms.) of aspirin.
14. Ointment for burns.
15. A bottle of suitable surgical antiseptic solution.

- (iii) Adequate arrangements shall be made for immediate recoupment of the equipment when necessary.
- (iv) Nothing except the prescribed contents shall be kept in the First-aid box.
- (v) The first-aid box shall be kept in charge of a responsible person who shall always be readily available during the working hours of the work place.
- (vi) A person in charge of the First-aid box shall be a person trained in First-aid treatment in the work places where the number of contract labour employed is 150 or more.
- (vii) In work places where the number of contract labour employed is 500 or more and hospital facilities are not available within easy distance from the works. First-aid posts shall be established and run by a trained compounder. The compounder shall be on duty and shall be available at all hours when the workers are at work.
- (viii) Where work places are situated in places which are not towns or cities, a suitable motor transport shall be kept readily available to carry injured person or person suddenly taken ill to the nearest hospital.

4. DRINKING WATER

- (i) In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

- (ii) Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where such drinking water shall be stored.
- (iii) Every water supply or storage shall be at a distance of not less than 50 feet from any latrine drain or other source of pollution. Where water has to be drawn from an existing well which is within such proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and waterproof.
- (iv) A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

5. WASHING FACILITIES

- (i) In every work place adequate and suitable facilities for washing shall be provided and maintained for the use of contract labour employed therein.
- (ii) Separate and adequate cleaning facilities shall be provided for the use of male and female workers.
- (iii) Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition.

6. LATRINES AND URINALS

- (i) Latrines shall be provided in every work place on the following scale namely :-
 - (a) Where female are employed, there shall be at least one latrine for every 25 females.
 - (b) Where males are employed, there shall be at least one latrine for every 25 males.

Provided that, where the number of males or females exceeds 100, it shall be sufficient if there is one latrine for 25 males or females as the case may be upto the first 100, and one for every 50 thereafter.
- (ii) Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings.
- (iii) Construction of latrines: The inside walls shall be constructed of masonry or some suitable heat-resisting nonabsorbent materials and shall be cement washed inside and outside at least once a year, Latrines shall not be of a standard lower than borehole system.
- (iv) (a) Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men only" or "For Women Only" as the case may be.
 - (b) The notice shall also bear the figure of a man or of a woman, as the case may be.

- (v) There shall be at least one urinal for male workers upto 50 and one for female workers upto fifty employed at a time, provided that where the number of male or female workmen, as the case may be exceeds 500, it shall be sufficient if there is one urinal for every 50 males or females upto the first 500 and one for every 100 or part thereafter.
- (vi) (a) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.
(b) Latrines and urinals other than those connected with a flush sewage system shall comply with the requirements of the Public Health Authorities.
- (vii) Water shall be provided by means of tap or otherwise so as to be conveniently accessible in or near the latrines and urinals.
- (viii) Disposal of excreta :- Unless otherwise arranged for by the local sanitary authority, arrangements for proper disposal of excreta by incineration at the work place shall be made by means of a suitable incinerator. Alternately excreta may be disposed of by putting a layer of night soil at the bottom of a pucca tank prepared for the purpose and covering it with a 15 cm. layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn to manure).
- (ix) The contractor shall at his own expense, carry out all instructions issued to him by Institute to effect proper disposal of night soil and other conservancy work in respect of the contractor's workmen or employees on the site. The contractor shall be responsible for payment of any charges which may be levied by Municipal or Cantonment Authority for execution of such on his behalf.

7. PROVISION OF SHELTER DURING REST

At every place there shall be provided, free of cost, four suitable sheds, two for meals and the other two for rest separately for the use of men and women labour. The height of each shelter shall not be less than 3 metres (10 ft.) from the floor level to the lowest part of the roof. These shall be kept clean and the space provided shall be on the basis of 0.6 sq.m. (6 sqft) per head.

8. CRECHES

- (i) At every work place, at which 20 or more women worker are ordinarily employed, there shall be provided two rooms of reasonable dimensions for the use of their children under the age of six years. One room shall be used as a play room for the children and the other as their bedroom. The rooms shall be constructed with specifications as per clause 19H (ii) a, b & c.
- (ii) The rooms shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the places clean.

- (iii) The contractor shall supply adequate number of toys and games in the play room and sufficient number of cots and beddings in the bed room.
- (iv) The contractor shall provide one ayaa to look after the children in the creche when the number of women workers does not exceed 50 and two when the number of women workers exceed 50.
- (v) The use of the rooms earmarked as creches shall be restricted to children, their attendants and mothers of the children.

9. CANTEENS

- (i) In every work place where the work regarding the employment of contract labour is likely to continue for six months and where in contract labour numbering one hundred or more are ordinarily employed, an adequate canteen shall be provided by the contractor for the use of such contract labour.
- (ii) The canteen shall be maintained by the contractor in an efficient manner.
- (iii) The canteen shall consist of at least a dining hall, kitchen, storeroom, pantry and washing places separately for workers and utensils.
- (iv) The canteen shall be sufficiently lighted at all times when any person has access to it.
- (v) The floor shall be made of smooth and impervious materials and inside walls shall be lime-washed or colour washed at least once in each year.
Provided that the inside walls of the kitchen shall be lime-washed every four months.
- (vi) The premises of the canteen shall be maintained in a clean and sanitary condition.
- (vii) Waste water shall be carried away in suitable covered drains and shall not be allowed to accumulate so as to cause a nuisance.
- (viii) Suitable arrangements shall be made for the collection and disposal of garbage.
- (ix) The dining hall shall accommodate at a time 30 per cent of the contract labour working at a time.
- (x) The floor area of the dining hall, excluding the area occupied by the service counter and any furniture except tables and chairs shall not be less than one square metre (10 sqft) per diner to be accommodated as prescribed in sub-Rule 9.
- (xi) (a) A portion of the dining hall and service counter shall be partitioned off and reserved for women workers in proportion to their number.
(b) Washing places for women shall be separate and screened to secure privacy.
- (xii) Sufficient tables stools, chair or benches shall be available for the number of diners to be accommodated as prescribed in sub-Rule 9.
- (xiii) (a) 1. There shall be provided and maintained sufficient utensils crockery, furniture and any other equipments necessary for the efficient running of the

canteen.

2. The furniture utensils and other equipment shall be maintained in a clean and hygienic condition.

(b) 1. Suitable clean clothes for the employees serving in the canteen shall be provided and maintained.

2. A service counter, if provided, shall have top of smooth and impervious material.

3. Suitable facilities including an adequate supply of hot water shall be provided for the cleaning of utensils and equipments.

(xiv) The food stuffs and other items to be served in the canteen shall be in conformity with the normal habits of the contract labour.

(xv) The charges for food stuffs, beverages and any other items served in the canteen shall be based on 'No profit, No loss' and shall be conspicuously displayed in the canteen.

(xvi) In arriving at the price of foodstuffs, and other article served in the canteen, the following items shall not be taken into consideration as expenditure namely:-

(a) The rent of land and building.

(b) The depreciation and maintenance charges for the building and equipments provided for the canteen.

(c) The cost of purchase, repairs and replacement of equipments including furniture, crockery, cutlery and utensils.

(d) The water charges and other charges incurred for lighting and ventilation.

(e) The interest and amounts spent on the provision and maintenance of equipments provided for the canteen.

(xvii) The accounts pertaining to the canteen shall be audited once every 12 months by registered accountants and auditors.

10. ANTI-MALARIAL PRECAUTIONS

The contractor shall at his own expense, conform to all anti-malarial instructions given to him by Institute including the filling up of any borrow pits which may have been dug by him.

11. The above rules shall be incorporated in the contracts and in notices inviting tenders and shall form an integral part of the contracts.

12. AMENDMENTS

Institute, from time to time, add to or amend these rules and issue directions - it may consider necessary for the purpose of removing any difficulty which may arise in the administration thereof.

CONTRACTOR'S LABOUR REGULATIONS

1. SHORT TITLE

These regulations may be called the Contractors Labour Regulations.

2. DEFINITIONS

i) **Workman** means any person employed by contractor directly or indirectly through a subcontractor to do any skilled, semiskilled or unskilled manual, supervisory, technical or clerical work for hire or reward, whether the terms of employment are expressed or implied but does not include any person:-

- a) Who is employed mainly in a managerial or administrative capacity : or
- b) Who, being employed in a supervisory capacity draws wages exceeding five hundred rupees per mensem or exercises either by the nature of the duties attached to the office or by reason of powers vested in him, functions mainly of managerial nature: or
- c) Who is an out worker, that is to say, person to whom any article or materials are given out by or on behalf of the principal employers to be made up cleaned, washed, altered, ornamental finished, repaired adopted or otherwise processed for sale for the purpose of the trade or business of the principal employers and the process is to be carried out either in the home of the out worker or in some other premises, not being premises under the control and management of the principal employer.

No person below the age of 14 years shall be employed to act as a workman.

ii) **Fair Wages** means wages whether for time or piece work fixed and notified under the provisions of the Minimum Wages Act from time to time.

iii) **Contractors** shall include every person who undertakes to produce a given result other than a mere supply of goods or articles of manufacture through contract labour or who supplies contract labour for any work and includes a subcontractor.

iv) **Wages** shall have the same meaning as defined in the Payment of Wages Act.

- 3.
- i) Normally working hours of an adult employee should not exceed 9 hours a day. The working day shall be so arranged that inclusive of interval for rest, if any, it shall not spread over more than 12 hours on any day.
 - ii) When an adult worker is made to work for more than 9 hours on any day or for more than 48 hours in any week, he shall be paid over time for the extra hours put in by him at double the ordinary rate of wages.
 - iii) a) Every worker shall be given a weekly holiday normally on a Sunday, in accordance with the provisions of the Minimum Wages (Central) Rules 1960

as amended from time to time irrespective of whether such worker is governed by the Minimum Wages Act or not.

b) Where the minimum wages prescribed by the Government under the Minimum Wages Act are not inclusive of the wages for the weekly day of rest, the worker shall be entitled to rest day wages at the rate applicable to the next preceding day, provided he has worked under the same contractor for a continuous period of not less than 6 days.

c) Where a contractor is permitted by Institute to allow a worker to work on a normal weekly holiday, he shall grant a substituted holiday to him for the whole day on one of the five days immediately before or after the normal weekly holiday and pay wages to such worker for the work performed on the normal weekly holiday at overtime rate.

4. DISPLAY OF NOTICE REGARDING WAGES ETC.

The contractor shall before he commences his work on contract, display and correctly maintain and continue to display and correctly maintain in a clear and legible condition in conspicuous places on the work, notices in English and in the local Indian languages spoken by the majority of the workers giving the minimum rates of wages fixed under Minimum Wages Act, the actual wages being paid, the hours of work for which such wage are earned, wages periods, dates of payments of wages and other relevant information as per Appendix 'III'.

PAYMENT OF WAGES

- i) The contractor shall fix wage periods in respect of which wages shall be payable.
- ii) No wage period shall exceed one month.
- iii) The wages of every person employed as contract labour in an establishment or by a contractor where less than one thousand such persons are employed shall be paid before the expiry of seventh day and in other cases before the expiry of tenth day after the last day of the wage period in respect of which the wages are payable.
- iv) Where the employment of any worker is terminated by or on behalf of the contractor the wages earned by him shall be paid before the expiry of the second working day from the date on which his employment is terminated.
- v) All payment of wages shall be made on a working day at the work premises and during the working time and on a date notified in advance and in case the work is completed before the expiry of the wage period, final payment shall be made within 48 hours of the last working day.
- vi) Wages due to every worker shall be paid to him direct or to other person authorized by him in this behalf.
- vii) All wages shall be paid in current coin or currency or in both.
- viii) Wages shall be paid without any deductions of any kind except those specified by the Central Government by general or special order in this behalf

or permissible under the Payment of Wages Act 1956.

- ix) A notice showing the wages period and the place and time of disbursement of wages shall be displayed at the place of work and a copy sent by the contractor to Institute under acknowledgment.
- x) It shall be the duty of the contractor to ensure the disbursement of wages in the presence of the Junior Engineer or any other authorized representative of Institute who will be required to be present at the place and time of disbursement of wages by the contractor to workmen.
- xi) The contractor shall obtain from the Junior Engineer or any other authorized representative of Institute as the case may be, a certificate under his signature at the end of the entries in the "Register of Wages" or the "Wage-cum-Muster Roll" as the case may be in the following form:-
"Certified that the amount shown in column Nohas been paid to the workman concerned in my presence on at" "

5. FINES AND DEDUCTIONS WHICH MAY BE MADE FROM WAGES

- (i) The wages of a worker shall be paid to him without any deduction of any kind except the following :-
 - (a) Fines
 - (b) Deductions for absence from duty i.e. from the place or the places where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.
 - (c) Deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money or any other deduction which he is required to account, where such damage or loss is directly attributable to his neglect or default.
 - (d) Deduction for recovery of advances or for adjustment of overpayment of wages, advances granted shall be entered in a register.
 - (e) Any other deduction which the Central Government may from time to time allow.
- (ii) No fines should be imposed on any worker save in respect of such acts and omissions on his part as have been approved of by the Chief Labour Commissioner.
Note :- An approved list of Acts and Omissions for which fines can be imposed is enclosed at Appendix-X
- (iii) No fine shall be imposed on a worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity of showing cause against such fines or deductions.
- (iv) The total amount of fine which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paise in a rupee of the total wages, payable to him in respect of that wage period.
- (v) No fine imposed on any worker shall be recovered from him by installment, or

after the expiry of sixty days from the date on which it was imposed.

- (vi) Every fine shall be deemed to have been imposed on the day of the act or omission in respect of which it was imposed.

6. LABOUR RECORDS

- (i) The contractor shall maintain a Register of persons employed on work on contract in Form XIII of the CL (R&A) Central Rules 1971 (Appendix IV)
- (ii) The contractor shall maintain a Muster Roll register in respect of all workmen employed by him on the work under Contract in Form XVI of the CL (R&A) Rules 1971 (Appendix V).
- (iii) The contractor shall maintain a Wage Register in respect of all workmen employed by him on the work under contract in Form XVII of the CL (R&A) Rules 1971 (Appendix VI).
- (iv) Register of accident - The contractor shall maintain a register of accidents in such form as may be convenient at the work place but the same shall include the following particulars:
- a) Full particulars of the labourers who met with accident.
 - b) Rate of Wages.
 - c) Sex
 - d) Age
 - e) Nature of accident and cause of accident.
 - f) Time and date of accident.
 - g) Date and time when admitted in Hospital,
 - h) Date of discharge from the Hospital.
 - i) Period of treatment and result of treatment.
 - j) Percentage of loss of earning capacity and disability as assessed by Medical Officer.
 - k) Claim required to be paid under Workmen's Compensation Act.
 - l) Date of payment of compensation.
 - m) Amount paid with details of the person to whom the same was paid.
 - n) Authority by whom the compensation was assessed.
 - o) Remarks
- (v) The contractor shall maintain a Register of Fines in the Form XII of the CL (R&A) Rules 1971 (Appendix-XI)
The contractor shall display in a good condition and in a conspicuous place of work the approved list of acts and omissions for which fines can be imposed (Appendix-X).
- (vi) The contractor shall maintain a Register of deductions for damage or loss in Form XX of the CL (R&A) Rules 1971 (Appendix-XII)
- (vii) The contractor shall maintain a Register of Advances in Form XXIII of the CL (R&A) Rules 1971 (Appendix-XIII)
- (viii) The contractor shall maintain a Register of Overtime in Form XXIII of the CL

7. ATTENDANCE CARD-CUM-WAGE SLIP

- (i) The contractor shall issue an Attendance card-cum-wage slip to each workman employed by him in the specimen form (Appendix-VII)
- (ii) The card shall be valid for each wage period.
- (iii) The contractor shall mark the attendance of each workman on the card twice each day, once at the commencement of the day and again after the rest interval, before he actually starts work.

- (iv) The card shall remain in possession of the worker during the wage period under reference.
- (v) The contractor shall complete the wage slip portion on the reverse of the card at least a day prior to the disbursement of wages in respect of the wage period under reference.
- (vi) The contractor shall obtain the signature or thumb impression of the worker on the wage slip at the time of disbursement of wages and retain the card with himself.

8. EMPLOYMENT CARD

The contractor shall issue an Employment Card in Form XIV of the CL (R&A) Central Rules 1971 to each worker within three days of the employment of the worker (Appendix-VIII).

9. SERVICE CERTIFICATE

On termination of employment for any reason whatsoever the contractor shall issue to the workman whose services have been terminated, a Service certificate in Form XV of the CL (R&A) Central Rules 1971 (Appendix-IX)

10. PRESERVATION OF LABOUR RECORDS

All records required to be maintained under Regulations Nos. 6 & 7 shall be preserved in original for a period of three years from the date of last entries made in them and shall be made available for inspection by Institute or Labour Officer or any other officers authorized by the Ministry of Urban Development in this behalf.

11. POWER OF LABOUR OFFICER TO MAKE INVESTIGATIONS OR ENQUIRY

The Labour Officer or any person authorized by Central Government on their behalf shall have power to make enquires with a view to ascertaining and enforcing due and proper observance of Fair Wage Clauses and the Provisions of these Regulations. He shall investigate into any complaint regarding the default made by the contractor or subcontractor in regard to such provision.

12. REPORT OF LABOUR OFFICER

The Labour Officer or other persons authorized as aforesaid shall submit a report of result of his investigation or enquiry to the Institute indicating the extent, if any, to which the default has been committed with a note that necessary deductions from the contractor's bill be made and the wages and other dues be paid to the labourers concerned. In case an appeal is made by the contractor under Clause 13 of these regulations, actual payment to labourers will be made by Institute after his decision on such appeal.

(i) Institute shall arrange payments to the labour concerned within 45 days from the receipt of the report from the Labour Officer.

13. PROHIBITION REGARDING REPRESENTATION THROUGH LAWYER

i) A workman shall be entitled to be represented in any investigation or enquiry under these regulations by:-

a) An officer of a registered trade union of which he is a member.

b) An officer of a federation of trade unions to which the trade union referred to in clause (a) is affiliated.

c) Where the employer is not a member of any registered trade union, by an officer of a registered trade union, connected with the industry in which the worker is employed or by any other workman employed in the industry in which the worker is employed.

ii) An employer shall be entitled to be represented in any investigation or enquiry under these regulations by :-

a) An officer of an association of employers of which he is a member.

b) An officer of a federation of associations of employers to which association referred to in clause (a) is affiliated.

c) Where the employers is not a member of any association of employers, by an officer of association of employer connected with the industry in which the employer is engaged or by any other employer, engaged in the industry in which the employer is engaged.

iii) No party shall be entitled to be represented by a legal practitioner in any investigation or enquiry under these regulations.

14. INSPECTION OF BOOKS AND SLIPS

The contractor shall allow inspection of all the prescribed labour records to any of his workers or to his agent at a convenient time and place after due notice is received or to the Labour Officer or any other person, authorized by the Central Government on his behalf.

15. SUBMISSIONS OF RETURNS

The contractor shall submit periodical returns as may be specified from time to time.

16. AMENDMENTS

The Central Government may from time to time add to or amend the regulations and on any question as to the application/Interpretation or effect of those regulations the decision of the Superintending Engineer concerned shall be final.

REGISTER OF MEDICAL BENEFITS

Name and address of the contractor

Name and location of the work

Name of the employee	Father's/Husband's Name	Nature of Employment	Period of actual employment	Date on which notice of confinement given
1	2	3	4	5

Date on which maternity leave commenced and ended

Date of delivery / miscarriage	In case of delivery		In case of miscarriage	
	Commenced	Ended	Commenced	Ended
6	7	8	9	10

Leave pay paid to the employee

In case of delivery		In case of miscarriage		Remarks
Rate of leave pay	Amount paid	Rate of leave pay	Amount Paid	
11	12	13	14	15

**SPECIMEN FORM OF THE REGISTER, REGARDING MATERNITY BENEFIT
ADMISSIBLE TO THE CONTRACTOR'S LABOUR**

Name and address of the contractor.....

Name and location of the work

1. Name of the woman and her husband's name.
2. Designation
3. Date of appointment.
4. Date with months and years in which she is employed.
5. Date of discharged/dismissal, if any.
6. Date of production of certificates in respect of pregnancy.
7. Date on which the woman informs about the expected delivery.
8. Date of delivery/miscarriage/death.
9. Date of production of certificate in respect of delivery/miscarriage.
10. Date with the amount of maternity/death benefit paid in advance of expected delivery.
11. Date with amount of subsequent payment of maternity benefit.
12. Name of the person nominated by the woman to receive the payment of the maternity benefit after her death.
13. If the woman dies, the date of her death, the name of the person to whom maternity benefit amount was paid, the month thereof and the date of payment.
14. Signature of the contractor authenticating entries in the register.
15. Remarks column for the use of Inspecting Officer.

Appendix 'III'

Labour Board

Name of work

Name of Contractor

Address of Contractor

Name of Labour Enforcement Officer

Address of Labour Enforcement Officer

Sl. No.	Category	Minimum Wage fixed	Actual Wage paid	Number present	Remarks

Weekly holiday

Wage period

Date of payment of wages

Working hours

Rest interval

Appendix 'IV'
FORM XIII (See Rule 75)
Register of workmen Employed by Contractor

Name and address of contractor

Name and address of establishment under which contact is carried on

Nature and location of work

Name and address of Principal Employer

Sl. No.	Name and Surname of workman	Age and Sex	Father's/ Husband's Name	Nature of employment/ Designation	Permanent home address of the workman (Village and Tehsil, Taluk and District)	Local Address	Date of commencement of employment	Signature or Thumb impression of the workman	Date of termination of employment	Reasons for termination	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

FORM XVI (See Rule 78(2)(a))
Muster Roll

Name and address of contractor

Name and address of establishment under which contact is carried on

Nature and location of work

Name and address of Principal Employer for the month of fortnight

Sl. No.	Name of workman	Sex	Father's / Husband's Name	Dates					Remarks
				1	2	3	4	5	
1	2	3	4	5					6
				1	2	3	4	5	

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Appendix 'VI'

FORM XVII (See Rule 78(2)(a))

Register of Wages

Name and address of contractor

Name and address of establishment under which contact is carried on

Nature and location of work

Name and address of Principal Employer Wages Period Monthly / Fortnight

Sl. No.	Name of workman	Serial no. in the register of workman	Designation/nature of work done	No. of days worked	Units of work done	Daily rate of wages/ piece rate	Amount of wages earned					Deductions if any (indicate nature)	Net amount paid	Signature/thumb impression of the workman	Initial of contractor or its representative
							Basic Wages	Dearness Allowances	Overtime	Other cash payments (indicate nature)	Total				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

WAGE CARD

Wage Card no.

Name and Address of the Contractor Date of Issue

Name and location of work Designation

Name of workman Month / Fortnight

Rate of wages

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Morning																																Rate
Evening																																Amount
Initial																																

..... the sum of Rs..... on account of my wages

Received from

The Wage Card is valid for one month from the date of issue

Signature

WAGES SLIP

Name and Address of contractor

Name and Father's/husband's name of workman

Nature and location of work

For the Week/Fortnight/Month ending

1. No. of days worked
2. No. of units worked in case of piece rate workers.....
3. Rate of daily wages/piece rate
4. Amount of overtime wages
5. Gross wages payable
6. Deduction, if any
7. Net amount of wages paid

Initials of the contractor or his representative

Form-XIV

EMPLOYMENT CARD

- Name and Address of contractor
- Name and address of establishment under which contract is carried on
- Name of work and location of work
- Name and address of Principal Employer
- 1. Name of the workman
- 2. Sl. No. in the register of workman employed
- 3. Nature of employment/designation
- 4. Wage rate (with particulars of unit in case of piece work)
- 5. Wage period
- 6. Tenure of employment
- 7. Remarks

Signature of contractor

FORM XV (See Rule 77)
Service Certificate

Name and Address of contractor

Name of work and location of work

Name and address of workman.....

Age or Date of Birth

Identification Marks

Father's / Husband's Name

Name and address of establishment in under which contract is carried on,.....

Name and address of the Principal Employer

Sl. No.	Total period for which employed		Nature of work done	Rate of wages (with particulars of unit in case of piece work)	Remarks
	From	To			
1	2	3	4	5	6

LIST OF ACTS AND OMISSIONS FOR WHICH FINES CAN BE IMPOSED

In accordance with rule 7(v) of the Contractor's Labour Regulations to be displayed prominently at the site of work both in English and local Language.

1. Willful insubordination or disobedience, whether alone or in combination with other.
2. Theft fraud or dishonesty in connection with the contractors or property of Institute.
3. Taking or giving bribes or any illegal gratifications.
4. Habitual late attendance.
5. Drunkenness lighting, riotous or disorderly or indifferent behaviour.
6. Habitual negligence.
7. Smoking near or around the area where combustible or other materials are locked.
8. Habitual indiscipline.
9. Causing damage to work in the progress or to property of Institute or of the contractor.
10. Sleeping on duty.
11. Malingering or slowing down work.
12. Giving of false information regarding name, age father's name, etc,.
13. Habitual loss of wage cards supplied by the employers.
14. Unauthorised use of employer's property.
15. Bad workmanship in construction and maintenance by skilled workers which is not approved by the Department and for which the contractors are compelled to undertake rectifications.
16. Making false complaints and/or misleading statements.
17. Engaging on trade within the premises of the establishments.
18. Any unauthorised divulgence of business affairs of the employees.
19. Collection or canvassing for the collection of any money authorised by the employer.
20. Holding meeting inside the premises without previous sanction of the employers.
21. Threatening or intimidating any workman or employer during the working hours within the premises.

FORM XII (See Rule 78(2)(d))

Register of Fines

Name and Address of contractor

Name and address of establishment in under which contract is carried on

Nature and location of work

Name and address of Principal Employer

Sl. No.	Name of workman	Father's/Husband's name	Designation/ Nature of employment	Act Omission for which fine imposed	Date of Offence	Whether workman showed cause against fine	Name of person in whose presence employee's explanation was heard	Wage period and wages payable	Amount of fine imposed	Date on which fine realized	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

FORM XX (See Rule 78(2)(d))
Register of Deduction for Damage or Loss

Name and Address of contractor

Name and address of establishment in under which contract is carried on

Nature and location of work

Name and address of Principal Employer

Sl. No.	Name of workman	Father's/ Husband's name	Designation/ Nature of employment	Particulars of damage or loss	Date of damage or loss	Whether workman showed cause against deduction	Name of person in whose presence employee's explanation was	Amount of deduction imposed	No. of installments	Date of recovery		Remarks
										First installment	Last installment	
1	2	3	4	5	6	7	8	9	10	11	12	13

FORM XXII (See Rule 78(2)(d))
Register of Advances

Name and Address of contractor

Name and address of establishment in under which contract is carried on

Nature and location of work

Name and address of Principal Employer

S. No.	Name of workman	Father's/ Husband's name	Designation/ nature of employment	Wage period and wages payable	Date and amount of advance given	Purpose(s) for which advance made	Number of installments by which advance to be repaid	Date and amount of each installment repaid	Date and which last installment was repaid	Remarks
1	2	3	4	5	6	7	8	9	10	11

FORM XXIII (See Rule 78(2)(e))
Register of Overtime

Name and Address of contractor

Name and address of establishment in under which contract is carried on

Nature and location of work

Name and address of Principal Employer

Sl. No.	Name of workman	Father's / Husband's name	Sex	Designation / nature of employment	Date on which overtime worked	Total overtime or worked production in case of piece rated	Normal rate of wages	Overtime rate of wages	Overtime earning	Rate on which overtime paid	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

**Notice for appointment of Arbitrator
[Refer Clause 25]**

To
Director,
Indian Institute of Management Rohtak
Rohtak

Dear Sir,

In terms of clause 25 of the agreement, particulars of which are given below, I/we hereby give notice to you to appoint an arbitrator for settlement of disputes mentioned below:

1. Name of applicant
2. Whether applicant is Individual/Prop. Firm/Partnership Firm/Ltd. Co.
3. Full address of the applicant
4. Name of the work and contract number in which arbitration sought
5. Contract/Agreement No
6. Contract amount in the work
7. Date of contract
8. Date of contract Date of initiation of work
9. Stipulated date of completion of work
10. Actual date of completion of work (if completed)
11. Total number of claims made
12. Total amount claimed
13. Date of intimation of final bill (if work is completed)
14. Date of payment of final bill (if work is completed)
15. Amount of final bill (if work is completed)
16. Date of request made to Director for decision
17. Date of receipt of Director's decision

Specimen signatures of the applicant
(only the person/authority who signed the contract should sign)

I/We certify that the information given above is true to the best of my/our knowledge. I/We enclose following documents.

1. Statement of claims with amount of claims.
- 2.
- 3.
- 4.

Yours faithfully,

(Signatures)

(Part-A) : GCC

Page 109

**FORM OF PERFORMANCE SECURITY (GUARANTEE)
BANK GUARANTEE BOND**

In consideration of the Director, Indian Institute of Management Rohtak (hereinafter called "The Institute") having offered to accept the terms and conditions of the proposed agreement between.....and (hereinafter called "the said Contractor(s)") for the work.....
(hereinafter called "the said agreement") having agreed to production of an irrevocable Bank Guarantee for Rs. (Rupees only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We, (hereinafter referred to as "the Bank") hereby undertake to pay to the Institute an amount not exceeding Rs. (RupeesOnly) on demand by the Institute.
2. We, (indicate the name of the Bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Institute stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. (Rupees only).
3. We, the said bank further undertake to pay the Institute any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.
4. We, (indicate the name of the Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Institute under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Institute on behalf of the Institute certified that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.
5. We, (indicate the name of the Bank) further agree with

the Institute that the Institute shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Institute against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Institute or any indulgence by the Institute to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
7. We, (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Institute in writing.
8. This guarantee shall be valid up tounless extended on demand by the Institute. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs.....(Rupees) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated theday offor.....(indicate the name of the Bank)

Annexure to clause 34 (x) showing quantities of materials of areas of surfacing to be considered for working out minimum period for which hire charges of road roller are to be recovered.

Sl. No.	Material of surfacing	Quantity or areas
1.	Consolidation of earth sub grade	1860 sqm
2.	Consolidation of stone soling 15 cm to 22.5 cm thick	170 cum
3.	Consolidation of brick soling 10 cm to 20 cm thick	230 cum
4.	Consolidation of wearing coat of stone ballast 7.5 cm to 11.5 cm thick	30 cum
5.	Consolidation of wearing cost of brick ballast 10 cm, thick	60 cum
6.	Spreading and consolidation of red bajri 6 mm	1860 sqm
7.	Painting one coat using stone aggregate 12.5 mm nominal size (a) @ 1.65 m ³ per 100 m ² and paving bitumen A-90 or S-90 @ 2.25 kg per sqm (b) @ 1.50 m ³ per 100 m ² and bitumen emulsion or Road tar @ 2.25 Kg per sqm	930 sqm
8.	Painting two coats using : (a) For first coat, stone aggregate 12.5 mm nominal size: (i) @ 1.50m ² per 100m ² with paving bitumen A-90 or S-90 @ 2 Kg per sqm OR (ii) @1.35m ³ per 100m ² with bitumen emulsion @ 2 Kg per sqm OR (iii) @1.25m ³ per 100m ² with road tar @ 2.25 Kg per sqm (b) For 2 nd coat, stone aggregate 10 mm nominal size 0.9 cum per 100 sqm with (i) 1 kg of paving bitumen A-90 or S-90 or bitumen	600 sqm 600 sqm

	<p>emulsion per Sqm</p> <p>OR</p> <p>(ii) 1.25 kg of road tar, per sqm.</p>	
9.	<p>Re-painting with stone aggregate 10 mm nominal size 0.9 cum per 100 Sqm with</p> <p>(a) 1 kg. of paving bitumen A-90 of S-90 per Sqm</p> <p>OR</p> <p>(b) 1.25 kg of bitumen emulsion per Sqm</p>	1670 sqm
10.	<p>2 cm premix carpet surfacing using 2.4 m³ of stone aggregate 10 mm nominal size per 100 m² and binder including tack coat, the binder being hot cut back bitumen or bitumen emulsion specified quantities.</p>	930 sqm
11.	<p>2.5 cm premix carpet surfacing using 3 m³ of stone aggregate 10 mm nominal size per 100 m² and binder including tack coat, the binder being hot cut back Bitumen or bitumen emulsion in specified quantities.</p>	930 sqm
12.	<p>4 cm thick bitumen concrete surfacing using stone aggregate 3.8 cum (60% 20mm nominal size and 40% 12.5 mm nominal size) per 100 m² and coarse sand 1.9 cum per 100 m² and hot cut back bitumen over a tack coat of hot cut back bitumen.</p>	460 sqm
13.	<p>5 cm thick bitumen concrete surfacing using stone aggregate 4.8 cum (60% 25 mm nominal size and 40% 20mm nominal size) per 100m² and coarse sand 2.4 cum per 100 Sqm and hot cut back bitumen over a tack coat of hot cut back bitumen</p>	370 sqm
14.	<p>6 cm thick bitumen concrete surfacing using stone aggregate 5.8 cum (60% 40mm nominal size and 40% 25mm nominal size) per 100 Sqm and coarse sand 2.9 cum per 100 Sqm and hot cut back bitumen over a tack coat of hot cut back bitumen.</p>	280 sqm
15.	<p>7.5 cm thick bitumen concrete surfacing using stone aggregate 7.3 cum (60% 50mm nominal size and 40% 40mm nominal size) per 100 Sqm and coarse sand 3.65 cum per 100 Sqm and hot cut back bitumen over a tack coat of hot cut back bitumen.</p>	230 sqm

16.	2.5 cm bitumastic sheet using stone aggregate 1.65 cum (60% 12.5mm nominal size and 40% 10mm nominal size) per 100 Sqm and coarse sand 1.65 cum per 100 Sqm and hot cut back bitumen over a tack coat of hot cut backbitumen.	750 sqm
17.	4 cm bitumastic sheet, using stone aggregate 2.6 cum (60% 12.5mm nominal size and 40% 10mm nominal size) per 100 Sqm and coarse sand 2.5 cum per 100 Sqm and hot cut back bitumen over a tack coat of hot bitumen.	560 sqm
18.	Laying full grouted surface using stone aggregate 40 mm nominal size 6.10cum per 100 Sqm with binder, binding with 20mm to 12.5mm nominal size stone grit. 1.83 cum per 100 Sqm and seal coat of binder and stone grit 10mm nominal size, 1.07cum per 100 Sqm, the binder being hot bitumen or tar as specified.	460 sqm
19.	Laying full grouted surface using stone aggregate 50mm nominal size 9.14 cum per 100 Sqm grouting with binder with stone grit 20 mm to 12.5 mm nominal size, 1.83 cum per 100 Sqm and seal coat of binder and stone grit 10mm nominal size 1.07 cum/100 Sqm the binder being hot bitumen or tar.	370 sqm
20.	4 cm thick premix macadam surfacing using stone aggregate 25mm nominal size 4.57 cum per 100 Sqm and hot bitumen binding with stone aggregate 12.5 mm nominal size 1.52 cum per 100 Sqm and seal coat of hot bitumen and stone aggregate 10mm nominal size 1.07 cum per 100 Sqm.	560 sqm
21.	5 cm thick premix macadam surfacing with stone aggregate 25 mm nominal size, 6.10 cum per 100 Sqm and hot bitumen binding with stone aggregate 12.5 mm nominal size 1.52 cum per 100 Sqm and seal coat of hot bitumen and stone aggregate 10mm nominal size 1.07 cum per 100Sqm.	460 sqm

PART-B

**SPECIAL CONDITIONS &
ADDITIONAL CONDITIONS**

SPECIAL CONDITIONS OF CONTRACT

1.0 SPECIAL CONDITIONS OF CONTRACT

1.1 SUB-CONTRACTORS

Where and when the appointment of specialist Sub-Contractors is indicated, such Sub-Contractors shall be appointed only with the prior written approval of the Institute upon recommendation of Engineer-in-Charge on the following conditions:-

- (A) The Contractor shall enter into written agreements with Sub-Contractors and ensure that the Sub-Contractors perform their Work in accordance with and subject to the terms and conditions of these Contract Documents. A copy of each such Agreement shall be furnished to the Engineer-in-Charge.
- (B) The Contractor shall remain fully responsible to the Institute for the performance and workmanship and all actions of all sub-Contractors and persons directly or indirectly employed by them.
- (C) The Contractor shall supply and permit all Sub-Contractors to avail of site facilities and services to enable them to complete their Work safely and without hindrance or delay and conducive to produce the highest quality of Work required.
- (D) The Contractor shall upon receipt of instruction from the Engineer-in-Charge, terminate and remove from site forthwith such Sub-Contractor or their persons whose Work may be considered unsatisfactory.
- (E) The Contractor shall make regular and prompt payment to each Sub-Contractor not later than one week after receipt of payment from the Institute for their measured Works certified by the Engineer-in-Charge. If the Contractor fails to make payments to Sub-Contractors as aforesaid, the Institute may, without any obligation or prejudice to its rights and with prior intimation to the Contractor may make direct payments to Sub-Contractors for and on behalf and from the account of the Contractor and recover such sums from the account of the Contractor out of the amounts due and payable under the bills raised by the Contractor. Such direct payments to Sub-Contractors shall be on behalf of the Contractor and shall in no way relieve the Contractor of his responsibilities or create a contractual relationship between the Owner and Sub-Contractor.
- (F) Any Subcontractor that has been approved by the Institute shall neither be removed nor replaced without the prior written consent of the Institute.

1.2 PROTECTION OF PERSONS, WORKS AND PROPERTY ACCIDENT OR INJURY TO WORKMEN

The Institute shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or any Subcontractor.

Accident Prevention:

(A) General:

In performing this contract, the Contractor shall provide for protecting the lives and health of employees and other persons preventing damage to or theft or loss of property, materials, supplies, and equipment; and avoiding Work interruptions. For these purposes, the Contractor shall

- Provide appropriate safety barricades, signs, and signal lights.
- Comply with the standards issued by any statutory bodies having jurisdiction over occupational health and safety and Ensure that any additional measures as required by the Engineer-in-Charge for this purpose.

(B) Records.

The Contractor shall maintain an accurate record of exposure data on all accidents taken place incidental to performance of Work(s) under this contract resulting in death, traumatic injury, occupational disease, or damage to or theft/loss of property, materials, supplies, or equipment. The Contractor shall report this data in the manner prescribed by Engineer-in-charge.

(C) Sub-Contractors:

The Sub-Contractors shall be bound to comply with the clause in the same manner as complied with by the Contractor. In the event of non-compliance by the Sub-Contractor of such clause, the Contractor shall be responsible for compliance of the Sub-Contractor.

(D) Written program:

Before commencing the Work, the Contractor shall submit to the Institute a written proposal for implementing this clause,

1.3 HAZARDOUS MATERIAL IDENTIFICATION

(A) Notification:

The Contractor shall notify Engineer-in-charge in writing of all hazardous material 5 days before delivery of the material. This obligation applies to all materials delivered under this contract, which will involve exposure to hazardous materials or items containing these materials.

(B) Responsibility of Contractor:

Neither the requirement of this clause nor any act or failure to act by the Institute shall relieve the Contractor of any responsibility or liability for the safety of the Institute, Contractor, or Sub-Contractor's personnel or property.

(C) Compliance with laws:

The Contractor shall comply with applicable laws, including the Public Liability Insurance Act 1991, Fatal Accident Act 1855, codes, ordinances, and regulations (Including the obtaining of licenses and permits) in connection with hazardous materials. Contractor shall pay fees and other expenses for obtaining such permission or licenses.

Sub-Contractors:

The Contractor shall insert these above clauses, relating to hazardous material, with appropriate changes on entering into contracts or agreements with Sub-Contractors and the sub-contractors shall be bound and be liable to comply with the same, and in the event of non-compliance of the same, the Contractor shall be held liable for damages or otherwise on the acts of the Sub-Contractor in this regard.

The chemicals shall be tested in an independent laboratory as approved by the Engineer-in-charge at the frequency as specified. If required, more samples may have to be tested as per the directions of the Engineer-in-Charge.

1.4 PROTECTION OF PROPERTY

1. Vegetation, structures and equipment:

The Contractor shall preserve and protect all structures, equipment, and vegetation on or adjacent to the Work site, and which do not unreasonably interfere with the Work required under this contract and shall not be removed by the Contractor. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place.

2. Utilities and improvements:

The Contractor shall protect from damage and have all existing improvements and utilities at or near the Work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall be liable to repair any damage caused to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the Work. If the Contractor fails or refuses to repair the damage promptly, the Engineer-in-Charge may have the necessary Work performed and charge the cost to the Contractor or reduce such amounts from the bills of the Contractor due and payable by the Institute.

3. Contractor shall be required to work within specified areas and they shall be allowed to use only those areas around the works under their scope, for storage of their materials, construction of site offices, erection of batching plant etc. at predetermined locations as shown on the plans. The area so demarcated, shall be barricaded in such a way that the construction activities or the moving vehicular traffic involved in carriage of construction materials/construction waste etc. do not create interference with any other areas within the premises or activities of the Institute or the activities of other contractor/s working within the premises.

4. The contractor shall provide suitable barricading approximately 2.0 m high, with suitably painted with three rows of G.I. Sheets about 2'6" to 3'0" wide (75 cms to 90 cms.) nailed or bolted with wooden poles spaced 2 to 3 meter apart and each pole 1.6 m to 2 m long 8 cm. to 10 cm. dia. The poles will be embedded

in mobile iron pedestal rings suitably framed for giving stable support as per direction of the Engineer-in-charge. All management (including watch and ward) of barricades shall be the full responsibility of the contractor. The barricades shall be removed only after completion of the work or part of the work. The contractor's rate shall include all above items of work and nothing extra shall be paid to the contractor over and above his quoted rates.

5. The positioning of barricading will be reviewed from time to time and necessary shifting barricading as directed by Engineer -in-charge shall be done forthwith by the contractor and nothing extra shall be paid to the contractor.
6. Contractor will make his own arrangements for making temporary roads and approaches to various locations of work under their scope and up to disposal sites marked on the drawing. These internal approaches and temporary roads shall be made in such a way that they do not affect construction activities of permanent roads within the premises at any time.

1.5 Watchmen and Security

The Contractor shall provide sufficient personnel and materials to provide adequate protection to the property and personnel at the site, in transit and stored goods/materials including but not limited to measures specifically required by and under the Contract Documents and any security requirements under this contract.

1.6 CORRECTIVE ACTION

(A) Authority to Stop Work:

Engineer-in-charge shall notify the Contractor of any non-compliance with the safety and property protection measures as required under this contract of which Institute becomes aware and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's authorized representative at the site of the Work shall be deemed sufficient notice of non-compliance and corrective action required. After receiving the notice, the Contractor shall immediately take necessary steps to correct the action. If the Contractor fails or refuses to take corrective action promptly, the Engineer-in-Charge shall at his discretion may issue an order stopping all or part of the Work(s) until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop Work order issued under these circumstances.

(B) Rectification:

The Contractor shall be solely responsible to make good at his cost any damage to the Works, property of the Institute and/or any adjacent property, to the satisfaction of the Engineer-in-Charge. In case the contractor fails to do so within a reasonable time the Engineer-in-Charge shall get the same executed at the risk & cost of the contractor & deduct the same from his due payments.

1.7 SITE SECURITY

The Contractor shall be deemed to be in possession of the Works site and shall be responsible for its total security, and shall ensure that all materials, sheds,

equipment, plant, tools, etc; whether his own or belonging to any Sub-Contractor, are well protected.

- (A) The Contractor shall at his own cost install and maintain sufficient security fences and gates and employ full time round-the-clock security personnel to prevent the Works site from and against the intrusion of the public or any other unauthorized persons or vehicles.
- (B) Total security of the site, property, and materials shall be the sole responsibility of the Contractor. The presence of his consultant's representatives or IIM Rohtak's security personnel shall in no way relieve or absolve the Contractor of his responsibilities in ensuring the security and protection of the site and everything stored or lying thereon.

1.8 WARRANTY/Guarantee

The Contractor shall be responsible for the proper performance of the Work(s), including installations and systems, as specified under the Contract Documents.

Subject to Clause the Contractor shall, at his own cost and in the shortest possible time, repair and remove any defect or deficiency in the Works, which may appear prior to or during the defect liability period, to the satisfaction of the Engineer-in-Charge.

A guarantee will be given by the Contractor for the complete installation of the Works including its functioning, replacement of parts etc. as specified under the Contract Documents.

1.9 CONTRACTOR'S RESPONSIBILITIES AND WORK CONTROL

The Contractor shall have complete control of the Works and shall effectively and diligently control, direct and supervise his employees, supervisors, subordinates and Sub-Contractor(s) so as to ensure timely completion of the Works in order and in conformity with the Contract Documents. It shall be the sole responsibility of the Contractor for construction means, methods, techniques, sequences and procedures, and for coordinating the various parts of the Work, whether carried out by the Contractor or any Sub-Contractor.

The Contractor shall provide adequate, qualified and experienced personnel for the proper superintendence and execution of the Works until completion. The category and strength of such personnel shall be determined by the Engineer-in-Charge, and such approved site organization strength shall be maintained by the Contractor at all times until completion of Work(s), and also during defects liability period and as may be decided by the Engineer-in-Charge.

The Contractor shall be responsible for the design, erection, operation, maintenance and removal of temporary structures and other facilities at his own cost during completion of the Works. Any approval sought, given or implied, regarding sufficiency, stability and safety of temporary staging and facilities shall in any way not relieve the Contractor of his responsibility.

- (A) The Contractor shall study all Contract Documents and promptly report to the Engineer-in-Charge any non-conformity, discrepancy, inconsistency or omission he may discover in the same. In the event of such discovery, the Contractor shall not proceed with the affected Works until he has received due corrections and clearances from the Engineer-in-Charge.
- (B) The Contractor shall be deemed to have thoroughly studied and satisfied himself regarding Contract Documents and particularly all drawings before commencement of the Work(s). Should any discrepancy or error be discovered during execution of parts of the Work(s) necessitating demolition, repairs or reconstruction, all such remedial measures shall be carried out only with the approval of the Engineer-in-Charge and entirely at the cost of the Contractor. In such an event the Contractor shall neither claim any extra payment nor any extension of time for any delay caused by virtue of such demolition, repairs and reconstruction.

Any instructions given to the Contractor's supervisory staff by the Engineer-in-Charge shall be deemed to have been given to the Contractor. Instructions that involve any variations in design or specifications and which may have a bearing on time and cost shall be through a written Change Order by the Engineer-in-Charge and at rates agreed in writing prior to implementation.

The Contractor shall at his own cost, obtain any permits or authorizations necessary for the execution of the Work and obtaining any permits or approvals for the works executed by him, from all concerned statutory and Institute Authorities/Authority's, including but not limited to Municipal bodies, Electrical Authority, Fire Service Authorities etc.

The Contractor shall not be entitled to claim additional sums on account of having to work overtime in order to complete an operation that cannot be interrupted, for working in extended shifts/night shifts/holidays.

In the event the Contractor chooses to work overtime, in extended night shifts as and by way of overtime either by working extended/night shifts or morning or holidays in order to complete the Work(s) within the specified period or on holidays, he shall do so by obtaining prior written approval from the Engineer-in-Charge at least twenty-four hours in advance. The Contractor moreover shall ensure that in any of the above circumstances he maintains the full-agreed strength of his supervisory staff.

The Contractor shall take all necessary precautions to protect the site and Works, materials, plant and equipment, whether his own or belonging to the Institute or any Sub-Contractors, against hazards of fire, rains, floods, landslides, underground water, accidents, etc.

The Contractor shall not be permitted to replace nor remove his Project Head/Project Engineer/Site Engineer etc. from the site without the prior written approval of the Engineer-in-Charge.

Submittals

- (C) "Shop drawings" means those drawings or other documents, which are specifically prepared by or on behalf of the Contractor to illustrate details of construction for the purpose of fabrication or installation and are submitted to the Owner to indicate the Contractor's intended method of achieving the end result required by the Contract Drawings and Specifications.
- (D) "Project data" includes standard drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the Work required by the Contract.
- (E) "Samples" are physical examples, which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- (F) "Other submittals" includes progress schedules, setting drawings, testing and inspection reports, and other information required by the Contract Documents to be submitted by the Contractor for information or approval by the Institute.

Schedules of Submittals

Promptly after contract award the Contractor shall submit to the Engineer-in-Charge the submittal schedule showing when shop drawings, product data, samples and other submittals required by and under the Tender Documents would be submitted for the approval of the Engineer-in-Charge.

Review and approval of submittals by Contractor

The Contractor shall co-ordinate and compile all submittals required by and under the Contract Documents, and thoroughly check them for accuracy, completeness, and compliance in accordance with contract requirements and shall indicate his approval thereon in the form required by the Contract Documents as evidence of such co-ordination and checking. Submittals to the Engineer-in-Charge without the approval of the Contractor shall be returned by the Engineer-in-Charge for resubmission. Submission of shop drawings, product data or samples shall constitute a representation that the Contractor has agreed to, asserted and guaranteed that the assemblies, products or materials indicated therein will be available in a timely manner and in the quantities required for the project as set out under the Contract Documents.

Submission

All submittals shall be in English language, and any system of dimensions (i.e.; English or metric) shown shall be consistent with that used in the Contract Documents. The Contractor shall submit all Submittals in the form and number required by the Contract Documents within required time limits and sufficiently in advance of construction requirements to permit adequate review by the Institute for correction, approval and resubmission if required. No extension of time shall be allowed on account of any delay by the Institute in approving such submittals, if the Contractor has failed to act promptly and responsively in making his submissions. Each submittal shall be identified as required by the Contract Documents.

Action on Submittals

The Engineer-in-Charge will indicate an approval or disapproval of the Submittals for and on behalf of the Institute requiring approval by the Institute and if not approved as submitted shall indicate the Institute's reasons thereof. Approval by the Engineer-in-Charge shall not relieve the Contractor from responsibility for any errors or omissions in his submittals, nor from responsibility for complying with the requirements of this contract, except with respect to variations described by the Contractor and approved in accordance with "Variations in Submittals" Clause. The approval of the Engineer-in-Charge on the submittals will be for general compliance with the intent of the Contract Documents and with the information given therein, and shall not be construed

- (A) As permitting any departure from the contract requirements
- (B) As relieving the Contractor of responsibilities for any error including details, dimensions, materials, etc. and
- (C) As approving departures from details appearing on Contract Drawings and Specifications.

Where approval of Submittals is required, the Contractor shall perform the Work in accordance with such approved Submittals. Any Work performed by the Contractor prior to such approval by the Engineer-in-Charge shall be at the sole risk and liability of the Contractor.

Variation in Submittals

If Submittals contain any variations from the contract requirements, other than those requested on previous submittals, the Contractor shall specifically describe such variations in writing and the reasons thereof to the Engineer-in-Charge. If the approval of any such variation affects the Contract Price or the Completion time of the Contract, the Engineer-in-Charge shall issue an appropriate Contract modification. Otherwise, the variation may be approved by the Engineer-in-Charge, only by specific reference thereto in writing. The Contractor shall not be entitled to rely on general approval of a submittal as an approval of variations of requirements of the Contractor. If the Contractor fails to describe such variations and shall not be relieved from the responsibilities of executing the Work in accordance with the contract, notwithstanding a general approval of such submittals. Nothing contained herein shall relieve the Contractor of the responsibility of notifying the Engineer-in-Charge of any part of the Contract Drawings or Specifications, which the Contractor knows or reasonably should have known which could result in defects under construction.

Use of submittals

The Owner shall not duplicate, use, and disclose in any manner and for any purpose shop drawings, product data and other submittals delivered under this contract.

Placement of Orders

The Contractor shall place orders for items requiring a sample or product data submittal promptly after receiving the written approval of the submittal by the Engineer-in-Charge. No such materials or products shall be ordered or used in the

Work until such written approval by the Engineer-in-Charge has been given. In the event such materials or products pre ordered or used in the Works without the written approval of the Engineer-in-Charge, the same shall be at the risks, consequences, liability and costs of the Contractor.

Use and testing of samples

(A) Use:

Approved samples not destroyed in testing will be sent to Engineer-in-Charge. Those samples, which are in good condition, will be marked for identification and may be used in the Works. Materials and equipment incorporated in the Work shall match the approved samples within any specified tolerances. Other samples not destroyed in testing nor approved will be returned to the Contractor at the expense of the Contractor if so requested at the time of submission.

Failure of samples to pass specified tests:

Failure of any material to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material or equipment which previously has proved unsatisfactory in service.

(B) Taking and testing of samples:

Samples of various materials or equipment delivered on the site or in place may be taken by the Engineer-in-Charge for additional testing by the Institute outside of those found not to have met contract requirements, unless the Engineer-in-Charge determines it to be in the Institute's interest to accept the non-conforming materials or equipment with an appropriate adjustment of the Contract Price/Value as determined by the Engineer-in-Charge.

(C) Cost of additional testing:

Unless otherwise specified, when additional tests are made, only one test of each set of sample proposed for use will be made at the expense of the Contractor. Samples, which do not meet contract requirements, will be rejected. Further testing of additional samples, if required, will be made at the expense and costs of the Contractor.

1.10 Co-operation with other contractors/specialized agencies/sub-contractors

- (1) 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 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 attendee by the environmental related restrictions imposed by Govt. of Haryana as well as prevent any pollution of streams, ravines, river bed and waterways. All waste or superfluous materials shall be transported 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, inadequate availability of skilled, semi-skilled or unskilled workers in the near vicinity, non-availability of construction machinery spare parts and any other constraints not specifically stated here, shall be entertained from the Contractor. Therefore, the Tenderers 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.

- (2) The Contractor shall cooperate with and provide the facilities to the sub-Contractors and other agencies working at site for smooth execution of the work. The contractor shall indemnify the Owner against any claim(s) arising out of such disputes. The Contractor shall:
 - (i) Allow use of scaffolding, toilets, sheds etc.
 - (ii) Properly co-ordinate their work with the work of other Contractors.
 - (iii) Provide control lines and benchmarks to his Sub-Contractors and the other Contractors.
 - (iv) Provide electricity and water at mutually agreed rates.
 - (v) Provide hoist and crane facilities for lifting material at mutually agreed rates.
 - (vi) Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.
 - (vii) Adjust work schedule and site activities in consultation with the Engineer-in-Charge and other Contractors to suit the overall schedule completion.
 - (viii) Resolve the disputes with other Contractors/sub-contractors amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator.
- (3) The work should be planned in a systematic manner so as to ensure proper co-ordination of various disciplines viz. sanitary & water supply, drainage, rain water harvesting, electrical, and firefighting, information technology, communication & electronics and any other services.
- (4) Other agencies will also simultaneously execute and install the works of sub-station / generating sets, air-conditioning, lifts, etc. for the work 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 supplied free of cost by the Institute unless otherwise specifically mentioned) and the contractor shall fix the same at time of casting of concrete,

stone work and brick work, if required, and nothing extra shall be payable on this account.

- (5) 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 of 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 in a proper co-ordination manner and shall perform it in proper sequence to the complete satisfaction of others.

1.11 RATES

1. The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, setting lay out on ground, establishment of reference bench mark(s), installing various signage, taking spot levels, survey with total station, construction of all safety and protection devices, compulsory use of helmet and safety shoes, and other appropriate safety gadgets by workers, imparting continuous training for all the workers, barriers, preparatory works, construction of clean, hygienic and well ventilated workers housings in sufficient numbers as per drawing supplied by Engineer in charge, working during monsoon or odd season, working beyond normal hours, working at all depths, height, lead, lift, levels and location etc. and any other unforeseen but essential incidental works required to complete this work. Nothing extra shall be payable on this account and no extension of time for completion of work shall be granted on these accounts.
2. The rates quoted by the tenderer, shall be firm and inclusive of all taxes and levies as applicable
3. No foreign exchange shall be made available by the Owner 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.
4. 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, 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.

5. 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.
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.
7. Rate shall including of Liaison work required, if any, in this regard with the local bodies. Nothing extra shall be payable on this account. Statutory charges, fees etc. required to be paid to the local bodies in this connection shall only be payable by the Owner or shall be reimbursable to the contractor on production of proof of actual payment made by him.
8. It is clarified that the contractor shall be responsible for obtaining all the no objection certificate (NOCs) and relevant licenses for services like lift installation, electrical installation, fire installation and like. Nothing extra shall be payable on this account.

1.12 Inspection and Rectification of Works

Access:

The Institute and their authorized agents and representatives shall at all times have access to the site and other locations where parts of the Work are under preparation.

Contractor tests:

The Contractor shall notify the Engineer-in-Charge well in advance, of tests and inspections to be carried out, and shall obtain his written approval wherever so stipulated before proceeding with the Works.

Inspections:

The Contractor shall maintain an adequate inspection system and perform such inspections from time to time as will ensure that the Work called for by this contract conforms to contract requirements and does not result in any deviation. The Contractor shall maintain complete inspection records and make them available to the Institute. All Work shall be conducted under the general direction of the Contractor and is subject to Institute's inspection and test at all places and at all reasonable times before final completion and acceptance with a view to ensure strict compliance with the terms and conditions of the contract.

Owner's inspections and tests:

Inspections and tests conducted by or on behalf of the Institute are for the sole

benefit of the Institute and do not:-

- (A) Relieve the Contractor of responsibility for providing adequate quality control measures,
- (B) Relieve the Contractor of responsibility for damage to or loss of the material before final completion and acceptance of the Work;
- (C) Constitute or imply acceptance. Or.
- (D) Affect the continuing rights of the Owner after acceptance of completed Work.

Owner inspectors:

The presence or absence of Institute's inspector does not relieve the Contractor from any of the obligations under the contract nor is the inspector authorized to change any term or condition of the contract.

Performance of inspections and tests:

The Contractor shall promptly furnish, without an additional charge all facilities, labour, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Engineer-in-Charge as per the terms of the Contract and CPWD specifications. The Institute may charge to the Contractor any additional cost of inspection or testing when work is not ready at the time specified by the Contractor for inspection or testing, when prior rejection makes re inspection or retesting necessary. The Institute shall perform all its inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the Contract Documents and CPWD specifications.

The Contractor shall be solely responsible for the protection of all finished surfaces and Works so as to avoid any repairs and shall deliver to the Institute upon final completion the Works free of any blemish, defect or damage.

1. In addition to the provisions of relevant clauses of the contract, the work shall also be open to inspection by the other agency as and when required by Institute in addition of the Engineer-in-charge and his authorized representative. The contractor shall at times during the usual working hours and at all times at which reasonable notices of the intention of the Engineer-in-charge to visit the works shall have been given to the contractor, either himself be present to receive the orders and instructions or have a responsible representative duly accredited in writing, to be present for that purpose.
2. Inspection of the work by Project Management Consultant / Master Plan Designer – Project Architect appointed by Institute.
 - (i) The Project Management Consultant / Master Plan Designer – Project Architect appointed by Institute shall be inspecting the works frequently to ensure that the works are in general being executed according to the design, drawings and specifications laid down in the contract.
 - (ii) The Project Management Consultant / Master Plan Designer – Project Architect appointed by Institute shall certify on completion of particular building that it has been constructed according to the approved drawings design and specifications.

1.13 Rejected Work

The Engineer-in-Charge or Owner shall be authorized to reject any Work, which in their/his opinion is not in conformity to the specifications set out in the Contract Documents. The decision of the Engineer-in-Charge in this regard shall be final and binding on the Contractor.

Defective Work whether caused due to poor workmanship, use of sub-standard materials, or use of materials without approval of Engineer in charge or on account of damage or for any other reason whatsoever, whether caused by the Contractor and/or the Sub-Contractor may be rejected by the Engineer-in-Charge or Owner and shall be demolished by the Contractor and removed promptly from the site and replaced or re-executed expeditiously by the Contractor at his own cost. The Institute, Engineer-in-Charge, Project Management Consultant or Master Plan Designer – Project Architect shall in no event be responsible to bear any costs/liability arising on account of such defective workmanship.

If in the opinion of the Engineer-in-Charge or Owner, it is not expedient nor feasible to correct the defective Work, the Owner shall be entitled to deduct or not pay any monies due to the Contractor or the difference in value between the executed Work and that required under the Contract, such amount of which shall be determined by the Engineer-in-Charge.

1.14 Limit of Price Adjustment

In determining all Price Adjustments in accordance with the conditions of contract:

- (A) No account will be taken of any amount by which any cost incurred by the contractor has been increased by default or negligence of the contractor.
- (B) If the contractor fails to complete the work within time for completion, increase or decrease of cost of specified materials shall be made using either the indices or prices relating to prescribed time for completion, or the current indices or prices, relating to prescribed time for completion, or the current indices or prices, whichever is more favorable to the Institute, provided that if an extension of time is granted, the above position shall apply to the adjustment made after expiry of such extension of time.
- (C) On completion of the works and before final payment the contractor shall give a certificate that he has made full and complete disclosure to the Engineer-in-Charge of every increase or decrease in price obtained by him on materials affected by this clause.

1.15 Exemption from price Adjustment

The following items shall not be included in the price adjustment calculation:

- (A) Liquidated damages:
- (B) Retention withheld and released:
- (C) Advance payments in the form of loans and their repayments:
- (D) The value of any additional or varied work valued at current market prices:

ADDITIONAL CONDITIONS

1.0 ADDITIONAL CONDITIONS

1.1 GENERAL

- 1.1.1 The Contractors are advised to inspect and examine the site and its surroundings and satisfy themselves with the nature of site, the means of access to the site, the constraints of space for stacking material / machinery, labour etc. constraints put by local regulations, if any, weather conditions at site, general ground / subsoil conditions etc. or any other circumstances which may affect or influence their tenders. The site is available for work. The contractor shall carry out survey of the work area, at his own cost, setting out the layout and fixing of alignment of the building as per architectural and Structural drawings in consultation with the Engineer-in-Charge and proceed further ensuring full structural continuity and integrated and monolithic construction. Any discrepancy between the architectural drawings and actual layout at site shall be brought to the notice of the Engineer-in-charge.
- 1.1.2 The Contractor shall, if required by him, before submission of the tender, inspect the drawings in the Office of the **Indian Institute of Management, Rohtak at Sunaria Village, Rohtak, Haryana**. The Institute shall not bear any responsibility for the lack of knowledge and also the consequences, thereof to the Contractor. The information and data shown in the drawings and mentioned in the tender documents have been furnished, in good faith, for general information and guidance only. The Engineer-in-Charge, in no case, shall be held responsible for the accuracy thereof and/or interpretations or conclusions drawn there from by the Contractor and all consequences shall be borne by the Contractor. No claim, whatsoever, shall be entertained from the Contractor, if the data or information furnished in tender document is different or in-correct otherwise or actual working drawings are at variance with the drawings available for inspection or attached to the tender documents. It is presumed that the Contractor shall satisfy himself for all possible contingencies, incidental charges, wastages, bottlenecks etc. likely during execution of work and acts of coordination, which may be required between different agencies. Nothing extra shall be payable on this account.
- 1.1.3 The nomenclature of the item given in the schedule of quantities gives in general the work content but is not exhaustive i.e. does not mention all the incidental works required to be carried out for complete execution of the item of work. The work shall be carried out, all in accordance with true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and/or described in the specifications, provided that the same can be reasonably inferred there from may be several incidental works, which are not mentioned in the nomenclature of each item but will be necessary to complete the item in all respect. All these incidental works / costs which are not mentioned in item nomenclature but are necessary to complete the item shall be deemed to have been included in the rates quoted by the contractor for various items in the schedule of quantities. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation / change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental

works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-Charge. Nothing extra shall be payable on this account.

- 1.1.4 The contractor(s) shall give to the local body, police and other authorities all necessary notices etc. that may be required by law and obtain all requisite licenses for temporary obstructions, enclosures etc. and pay all fee, taxes and charges which may be leviable on account of these operations in executing the contract. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night.

Proper temporary barricading by fencing with agro-shade net shall be carried out by the Contractor at the start of phased works created as per direction of Engineer-in-charge work to physically define the boundaries of the plot for restricted entry to only those involved in the work and also to prevent any accidents, at the same time without causing any inconvenience to the traffic and the users of the handed over buildings in the adjacent plots. It shall be done by providing, erecting, maintaining temporary protective barricading of minimum 3.90 metres above ground in height, made in panels, with each panel having MS frames / MS scaffolding pipes of suitable size and stiffness, with agro-shade net fixed on frames. Such panels shall be suitably connected to each other for stability with nuts and bolts, hooks, clamps etc. and fixed firmly to the ground at about 2 metres spacing, for the entire duration till completion of the work. He shall also provide and erect temporary protective barricades within the plot, if required, to prevent any accident. Temporary protective roofing near the Entrance to the building, under construction, shall be made to protect the visiting officials from getting hurt by falling debris etc. Also, one or more coat of enamel paint of shade as approved and directed by the Engineer-in-Charge shall be applied on the panels. It shall be dismantled and taken away by the Contractor after the completion of work at his own cost with the approval of the Engineer-in- Charge. Nothing extra shall be payable on this account.

All work shall conform to the statutory Bye-laws and Regulations of the concerned authority/Municipality, Haryana Fire Services as applicable to the Project. If the tender specifications and drawings are more stringent than required as per the Local Authorities then the tender specifications and drawings shall be followed. In the other case, if the local authorities more stringent specifications than those specified in the tender specifications, then the set by-laws and regulations shall be followed at no extra cost.

- 1.1.5 The Contractor(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night. In case of any accident of labours/ contractual staffs the entire responsibility will rest on the part of the contractor and any compensation under such circumstances, if becomes payable, shall be entirely borne by the contractor.

- 1.1.6 The work shall generally be carried out in accordance with the “CPWD Specifications 2009 Vol. I & II” with up to date correction slips, additional/Particular Specifications, architectural/Structural drawings and as per instructions of Engineer-in-Charge. Any additional item of the work, if taken up subsequently, shall also confirm to the relevant CPWD specifications as mentioned above. Working (both Architect and structural) drawings will be released progressively to the contractor commensurate to the construction schedule approved by Engineer-in-Charge.
- a) 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 scale dimensions.
 - b) In the event of 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 items as given in Schedule of quantities
 - (ii) Particular specifications
 - (iii) Special conditions
 - (iv) Additional Conditions
 - (v) Tender drawings attached
 - (vi) CPWD Specifications including up-to-date correction slips.
 - (vii) General Conditions of Contract (GCC).
 - (viii) Indian Standards Specifications of B.I.S.
 - (ix) ASTM, BS, or other foreign origin codes mentioned in tender document.
 - (x) Manufacturer’s specifications and as decided by the Engineer-in-Charge.
 - (xi) Sound Engineering practices or well established local construction practices.
 - c) The works to be governed by this contract shall cover delivery and transportation up to destination, safe custody at site, insurance, erection, testing and commissioning of the entire works.

The works to be undertaken by the contractor shall inter-alia 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 equipments 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 of 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.

- 1.1.7 The work shall be carried out in accordance with the approved architectural drawings, structural drawings, service 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, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available from there is complete and unambiguous. The figure and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in- charge 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 by the department on this account.

The delay caused on account of non-timely action by the contractor in resolution of the differences whatsoever shall not be considered as valid ground for extension of time unless otherwise accepted by Engineer-in-Charge.

- 1.1.8 Unless otherwise provided in the Schedule of Quantities, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the building and nothing extra shall be payable to him on this account. Payment for centering, shuttering, however, if required to be done for floor heights greater than 3.5m shall be admissible at rates arrived in accordance with clause 12 of the agreement if not already specified.
- 1.1.9 The Contractor(s) 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, services and compound walls are to be constructed. The stacking shall take place as per stacking plan. However, if any change is required, the same shall be done with the approval of Engineer-in-Charge.
- 1.1.10 The Contractor shall bear all incidental charges for cartage, storage and safe custody of materials, if any, issued by Institute as well as to those materials also arranged by the contractor.

Wherever the BOQ item stipulates design, the contractor shall have to supply designs and shop drawings which shall have to be vetted by any other Institute/Agency of repute as approved by Engineer-in-Charge, and all costs towards the same, including charges for vetting shall be deemed to have been included in the quoted rates.

- 1.1.11 Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable or extra cement considered in consumption on this account.
- 1.1.12 The contractor shall give performance test of the entire installation(s) as per the specifications in the presence of the Engineer-in-charge or his authorized representative before the work is finally accepted and nothing extra what-so-ever shall be payable to the contractor for such test.

- 1.1.13 Water tanks, taps, sanitary, water supply & drainage pipes, fittings & accessories should conform to bye-laws of local body/corporation, where CPWD specifications are not available. The Contractor should engage approved, licensed plumbers for the work and get the materials (fixtures/fittings) tested, by the municipal Body/ Corporation authorities wherever required at his own cost.
- 1.1.14 The contractor shall make his own arrangements for water and for obtaining electric connections if required and make necessary payments directly to the State Govt. departments concerned. Contractor shall get the water tested from laboratory approved by the Engineer-in-charge at regular interval as per the CPWD Specifications 2009. All expenses towards collection of samples, packing, transportation etc. shall be borne by the contractor.

Work shall normally be done in a single shift/day. However if the work is required to be executed in more than one shift in a day for meeting the time lines, the Contractor with prior approval of the Engineer-in-charge, shall have to make necessary arrangements for the same and all costs towards the same shall be deemed to have been included in the quoted rates.

1.2 PREVENTION OF NUISANCE AND POLLUTION CONTROL

- 1.2.1 The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupiers of adjacent properties and to the public in general and to prevent any damage to such properties from pollutants like smoke, dust, noise. The contractor shall use such methodology and equipment so as to cause minimum environmental pollution of any kind during construction and minimum hindrance to road users and to occupants of the adjacent properties or other services running adjacent/near vicinity. The contractor shall make good at his cost and to the 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. All waste or superfluous materials shall be carried away by the contractor, without any reservation, entirely to the satisfaction of the Engineer-in-Charge.
- 1.2.2 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 nearby occupants/users of building(s), if any.

1.3 SECURITY AND TRAFFIC ARRANGEMENTS

- 1.3.1 In the event of any restrictions being imposed by IIMR/ Municipal body / Police/ NHAI or any other authority having jurisdiction in the area on the working or movement of labour /material, the contractor shall strictly follow such restrictions and nothing extra shall be payable to the contractor on such accounts. The loss of time on these accounts, if any, shall have to be made up by augmenting additional resources whatever required.
- 1.3.2 If as per the rules of the local authority, the huts for labour are not to be erected at the site by the contractor, the contractor is required to make his own arrangements to provide huts for labourers as is acceptable to local bodies and nothing extra shall be paid on this account. He shall make his own arrangements for stores, field office etc.

Before tendering, he shall visit the site and assess the manner in which he is able to arrange the above facilities. The Engineer-in-Charge shall in no way be responsible for any delay on this account and no claim, whatsoever, on this account shall be entertained.

- 1.3.3 No payment shall be made for any damage caused by rain, snowfall, flood or any other natural calamity, whatsoever during the execution of the work. The contractor shall be fully responsible for any damage to the Institute's property and the work for which payment has been advanced to him under the contract and he shall make good the same at his risk and cost. The contractor shall be fully responsible for safety and security of his material, T&P/Machinery brought to the site by him.
- 1.3.4 The contractor shall construct suitable godowns, yard at the site of work for storing all other materials so as to be safe against damage by sun, rain, damages, fire, theft etc. at his own cost and also employ necessary watch and ward establishment for the purpose at his cost.
- 1.3.5 All materials obtained from contractor shall be got checked by the representative of Engineer-in-Charge on receipt of the same at site before use.
- 1.3.6 Royalty at the prevalent rates shall have to be paid by the contractor on all the boulders, metals, shingle sand and bajri etc. collected by him for the execution of the work, direct to the Revenue authority or authorized agent of the State Government concerned or Central Government.
- 1.3.7 The contractor shall be responsible for the watch and ward/guard of the buildings, safety of all fittings and fixtures including all equipments, services provided by him against pilferage and breakage during the period of Installations and thereafter till the building is physically handed over to the Institute. No extra payment shall be made on this account and no claim shall be admissible on this account.
- 1.3.8 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 / Haryana State Govt. 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. 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 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. 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 Institute 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 Institute.

- 1.3.9 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 the same at his own cost and nothing extra shall be paid except otherwise provided in the items of Schedule of Quantities.
- 1.3.10 The Contractor shall make all necessary arrangements for protecting from rains, fog or likewise extreme weather conditions, the work already executed and for carrying out further work, during monsoon including providing and fixing temporary shelters, protections etc. Nothing extra shall be payable on this account and also no claims for hindrance shall be entertained on this account.
- 1.3.11 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. Further, no claims for hindrance shall be entertained on this account.
- 1.3.12 The contractor will take reasonable precautions to prevent his workman and employees from removing and damaging any flora (plant/vegetation) from the project area.

1.4 SETTING OUT

- (i) The Contractor shall carry out survey of the work area, at his own cost, setting out the layout of building in consultation with the Engineer –in-Charge & proceed further. Any discrepancy between architectural drawings and actual layout at site shall be brought to the notice of the Engineer –in-charge. It shall be responsibility of the Contractor to ensure correct setting out of alignment. Total station survey instruments only shall be used for layout, fixing boundaries, and centre lines, etc., Nothing extra shall be payable on this account.
- (ii) The Contractor shall establish, maintain and assume responsibility for grades, lines, levels and benchmarks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions etc. to the Engineer –in-Charge before commencing work. Commencement of work shall be regarded as the Contractor’s acceptance of such grades, lines, levels, and dimensions and no claim shall be entertained at a later date for any errors found.
- (iii) If at any time, any error appears due to grades, lines, levels and benchmarks during the progress of the work, the Contractor shall, at his own expense rectify such error, if so required, to the satisfaction of the Engineer –in-Charge. Nothing extra shall be payable on this account.

- (iv) Though the site levels are indicated in the drawings the Contractor shall ascertain and confirm the site levels with respect to benchmark from the concerned authorities. The Contractor shall protect and maintain temporary/ permanent benchmarks at the site of work throughout the execution of work. These benchmarks shall be got checked by the Engineer-in-Charge or his authorized representatives. The work at different stages shall be checked with reference to bench marks maintained for the said purpose. Nothing extra shall be payable on this account.
- (v) The approval by the Engineer-in-Charge, of the setting out by the Contractor, shall not relieve the Contractor of any of his responsibilities and obligation to rectify the errors/ defects, if any, which may be found at any stage during the progress of the work or after the completion of the work.
- (vi) The Contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignments, the level and correctness of every part of the work and shall rectify effectively any errors or imperfections therein. Such rectifications shall be carried out by the Contractor at his own cost to the entire satisfaction of the Engineer-in-Charge.
- (vii) The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work (including marking of reference points, center lines of buildings), construction and maintenance of reference bench mark(s), taking spot levels, construction of all safety and protection devices, barriers, barricading, signage, labour safety, labour welfare and labour training measures, preparatory works, working during monsoon, working at all depths, height and location etc. and any other incidental works required to complete this work. Nothing extra shall be payable on this account, unless otherwise mentioned in the schedule of quantities.

1.4.1 The rate of items of flooring is inclusive of providing sunken flooring in bathrooms, kitchen etc. and nothing extra on this account is admissible.

1.4.2 A site laboratory with the minimum equipments as specified in CPWD specifications/in this agreement shall be established, made functional and maintained within one month from the award of work as per Annexure-I at page no.44 without any extra cost to the Institute. In case of non compliance / delay in compliance in this, a recovery @ Rs. 1000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.

The agency should make temporary arrangement for sewage disposal, water supply and electricity for completed building to make them to functional in case permanent arrangements are not ready.

1.5 INTEGRATED SERVICE DRAWINGS

- (i) Before taking up the work, the contractor shall be provided with integrated drawings for various civil and electrical services showing details of lay out plan including sectional elevations and contractor shall plan and mobilize his resources as per the Integrated drawings and as per the site conditions to

facilitate convenient execution, installation as well as maintenance of these services. Nothing extra shall be payable on this account.

(ii) Shop drawings

The bill of quantities, technical specifications and drawings together shall be considered as a tender requirement and the work shall be carried out as per good for construction (GFC) drawings, issued by Engineer-in-charge. The contractor shall study the GFC drawings and taking into account actual site conditions and selected material and requirements shall prepare shop drawings for the following works, as fully coordinated drawings, as given above.

- a. Aluminium work structural glazing and ACP.
- b. Expansion joint work
- c. Stone cladding work
- d. Suspended ceiling work, coordinated with all ceiling related services.
- e. Marble, granite, vitreous, ceramic, tile work
- f. All Electrical work
- g. All Sanitary work
- h. DG sets
- i. Boilers & Pumps

The shop drawings shall be prepared and submitted for approval to achieve the milestones provided.

- (iii) Within the time frame agreed with the Engineer-in-charge, the contractor shall prepare shop drawings using latest version of Auto CAD. Shop drawings shall show all layouts, details in plans & sections showing all connections, junctions, bends, supports, clearances. Fixing arrangements with dimensions, room, etc shall be prepared by the contractor on AutoCAD based on the architectural drawings and site measurements. All measurable items quantities shall be mentioned on each shop drawing being submitted for approval by the contractor. Three (3) sets of shop drawings (i/c digital soft copy (Autocad & pdf) shall be submitted for approval and Seven sets of final shop drawings after approval by Engineer-in-charge shall be submitted by the contractor along with the soft copy. The shop drawings shall be prepared as per schedule given in PERT Chart.

Technical submittals of manufacturer's catalogues and technical data shall be submitted for approval. The contractor shall designate an Engineer responsible for issue and preparation of shop drawings and control of GFC drawings.

1.6 TOOLS AND PLANTS

The bidder should have own constructions equipment required for the proper and timely execution of the work. Nothing extra shall be paid on this account.

No tools and plants including any special T&P etc. shall be supplied by the Institute 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.

1.7 SCAFFOLDING

1.7.1 Wherever required for the execution of work, all the scaffolding shall be provided and suitably fixed, by the Contractor. It shall be provided strictly with steel double scaffolding system, suitably braced for stability, with all the accessories, gangways, etc. with adjustable suitable working platforms to access the areas with ease for working and inspection. Single scaffolding system is strictly prohibited and shall invite action. It shall be designed to take all incidental loads. It should cater to the safety features for workmen. Nothing extra shall be payable on this account. It shall be ensured that no damage is caused to any structure due to the scaffolding.

1.7.2 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 should 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 by contractor 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 workshop 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.

Slab cycle requirements: The contractor shall plan and design concreting activities at various stages of work commensurate to the slab cycle requirement through submitted shuttering plan/design, which shall be the sole responsibility of the contractor and this shall not absolve him of his responsibility despite approvals accorded by Engineer-in-Charge. The quoted rate shall be deemed to include the cost of the above.

1.7.3 The Contractor shall maintain all the work in good condition till the completion of entire work. The Contractor shall be responsible for and shall make good, all damages and repairs, rendered necessary due to fire, rain, traffic, floods or any other causes. The Engineer-in-Charge shall not be responsible for any claims for injuries to person/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the Contractor or of any other of his representatives, in his employment during the execution of the work. The compensation, if any, shall be paid directly to the Department / authority / persons concerned, by the Contractor at his own cost.

1.7.4 The steel/marine ply centring and shuttering and other connected materials required for shuttering an area of 10,000 sqm +/-10% shall be made available within 60 days of the date of start of work, failing which recovery will be made at the rate of Rs.10,000/- per day till the materials are made available at site upto the satisfaction of the Engineer-in-charge. The bidder shall further mobilize construction equipment (other than centring and shuttering material) to site of work as per Table-2 within one month from the date start of work failing which a recovery will be made at Rs.25,000/- per day till those T&P are brought to site. The recovery will be effected in the next running account bill itself. The materials so brought shall not be removed from the site of work, unless all connected works are completed and approval of the Engineer-in-charge is obtained. The decision of the Engineer-in-charge shall be final and binding on the contractor.

1.7.5 The recoveries, if any, towards late procurement of centring and shuttering, T&P equipment, automatic batching plant, delay in submission of construction programmes, progress reports are refundable, if the targeted portions are completed within the stipulated period of completion of contracted work and extension of time is granted without levy of compensation. Else this is non-refundable and is over and above the compensation levied (if any) under Clause 2 of General Conditions of Contract.

1.8 ROYALTY

Royalty at the prevalent rates shall be paid by the Contractor or his material suppliers as per the terms of supply between them, on all materials such as boulders, metals, all sizes stone aggregates, brick aggregates, coarse and fine sand, moorum, river sand, gravels and bajri etc. collected by him for the execution of the work, directly to the revenue authority of the state government concerned. Further, contractor needs to submit proof of submission of full royalty to the state government or local authority. Nothing extra shall be payable on this account.

1.9 PRESERVATION AND CONSERVATION MEASURES

- (i) Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services, if any, encountered in the course of the execution of work shall be protected against the damage by the contractor at his own expense. In case the same are to be removed and diverted, expenditure incurred in doing so shall be payable to the contractor. The contractor shall work out the cost, get the same approved by Engineer-in-Charge before taking up actual execution. 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.
- (ii) All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on project location during excavation/construction shall be the property of the Institute, and shall be dealt with as per provisions of the relevant legislation. The contractor will take reasonable precaution to prevent his work men or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer-in-charge of such discovery and carry out the official instructions of Engineer-in- charge for

dealing with the same, till then all work shall be carried out in a way so as not to disturb/damage such article or thing.

1.10 RESPONSIBILITY

- (i) He shall protect and indemnify the Institute, Project Management Consultant (PMC) and Master Plan Designer (MPD) 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.
- (ii) The fee payable to statutory authorities for obtaining the various permanent service connections and Building Use Certificate for the building shall be borne by the Institute.
- (iii) The Contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the Institute, PMC and Master Plan Designer (MPD) from any and all damages and claims that may arise on any account. The Contractor shall indemnify the Institute, PMC and Master Plan Designer (MPD) 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 Institute, PMC and Master Plan Designer (MPD) in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.

1.11 CO-OPERATION WITH OTHER CONTRACTORS/SPECIALIZED AGENCIES/ SUBCONTRACTORS, PROJECT MANAGEMENT CONSULTANT AND MASTER PLAN DESIGNER (MPD)

- (i) The Contractor shall take all precautions to abide by the environmental related restrictions imposed by any statutory body having jurisdiction in on work site as well as prevent any pollution of streams, ravines, river bed and waterways. All waste or superfluous materials shall be transported by the Contractor, entirely to the satisfaction of the Engineer- in-Charge and disposed at designated places only. 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 claims what so ever on account of site constraints mentioned above or any other site constraints, lack of public transport, inadequate availability of skilled, semi-skilled or unskilled workers in the near vicinity, non-availability of construction machinery spare parts and any other constraints not specifically stated here, shall be entertained from the Contractor.

Therefore, the tenderers 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.

- (ii) The Contractor shall cooperate with and provide the facilities to the sub-Contractors and other agencies working at site for smooth execution of the work. The contractor shall indemnify the Institute, PMC and Master Plan Designer (MPD) against any claim(s) arising out of any disputes. The Contractor shall:
 - (i) Allow use of scaffolding, toilets, sheds etc.

- (ii) Properly co-ordinate their work with the work of other Contractors.
 - (iii) Provide control lines and benchmarks to his Sub-Contractors and the other Contractors.
 - (iv) Provide electricity and water at mutually agreed rates.
 - (v) Provide hoist and crane facilities for lifting material at mutually agreed rates.
 - (vi) Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.
 - (vii) Adjust work schedule and site activities in consultation with the Engineer-in-Charge and other Contractors to suit the overall scheduled completion.
 - (viii) Resolve the disputes with other Contractors/ sub-contractors amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator.
- (iii) The work should be planned in a systematic manner so as to ensure proper coordination of various disciplines viz. sanitary & water supply, drainage, rain water harvesting, electrical, fire fighting, information technology, communication & electronics and any other services.
- (iv) Other Associated agencies will also simultaneously execute and install the works of sub-station / generating sets, air-conditioning, lifts, etc. for the work if required 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. unless otherwise specifically mentioned) and the contractor shall fix the same at time of casting of concrete, stone work and brick work, if required.
- (v) 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 in a proper co-ordinated manner and shall perform it in proper sequence to the complete satisfaction of others.

1.12 SUPERVISION OF WORK

- 1.12.1 The Contractor shall depute Site Engineer & skilled workers as required for the work. He shall submit organization chart along with details of Engineers and supervisory staff. It shall be ensured that all decision making powers shall be available to the representatives of the Contractor at Project Site itself to avoid any likely delays on this account. The Contractor shall also furnish list of persons for specialized works to be executed for various items of work. The Contractor shall identify and deploy key persons having qualifications and experience in the similar and other major works, as per the field of their expertise. If during the course of execution of work, the Engineer-in-Charge is of the opinion that the deployed staff is not sufficient or not well experienced; the Contractor shall deploy more staff or better experienced staff at site to complete the work with quality and in stipulated time limit.

1.12.2 Principle Technical representative of the Contractor having minimum fifteen years of experience in similar nature of work as mentioned in the clause 36 of the General Conditions of the Contract, shall always be available at the site during the actual execution of the work. The recovery of Rs. 60,000/- (Rupees Sixty Thousand Only) per month shall be effected from the Contractor in the event of not fulfilling this provision.

1.12.3 Specialized Agencies

(i) The composite tender comprises of two main components: viz. civil work and E & M works. The list of specialized items for civil & E&M works which are to be got executed through specialized agencies are as below:

CIVIL WORKS:

- a. Anti-termite treatment.
- b. Water proofing works.
- c. Steel works.
- d. Aluminium doors, windows and aluminium partition.

ELECTRICAL WORKS:

- a. Fire fighting.
- b. Fire alarm system.

The main contractor shall submit the credential of specialized agency well in advance as per the direction of Engineer-in-charge. After verification of the same, written approval will be conveyed to main contractor in this regard. The quantum of credentials will be broadly in line with CPWD guidelines. The main contractor shall not change the specialized agency. However, if the change is warranted, he may do so, with permission of Institute. However before making any such change he has to enter into similar agreement as with previous agency & submit the same to Institute for approval. This shall however be without any change in the accepted rates of the contract agreement and without any cost implications to the Institute.

(ii) It shall be the responsibility of Contractor to sort out any dispute / litigation with the Specialized Agencies without any time & cost overrun to the Institute. The main contractor shall be solely responsible for settling any dispute / litigation arising out of his agreement with the Specialized Agencies. The contractor shall ensure that the work shall not suffer on account of litigation/ dispute between him and the specialized agencies / subcontractor(s). No claim of hindrance in the work shall be entertained from the Contractor on this account. No extension of time shall be granted and no claim what so ever, of any kind, shall be entertained from the Contractor on account of delay attributable to the selection/rejection of the Specialized Agencies or any dispute amongst them.

1.13 RATES

I. The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, setting lay out on ground, establishment of reference bench mark(s), installing various signage, taking spot levels, with total station, construction of all safety and protection devices, compulsory use of helmet and safety shoes, and other appropriate safety gadgets by workers, imparting

continuous training for all the workers, barriers, preparatory works, construction of clean, hygienic and well ventilated workers housings in sufficient numbers as per drawing supplied by Engineer in charge, working during monsoon or odd season, working beyond normal hours, working at all depths, height, lead, lift, levels and location, unless otherwise provided in the schedule of quantities, implementation of green building norms to achieve desired GRIHA (3/4 star) Rating etc. and any other unforeseen but essential incidental works required to complete this work. Nothing extra shall be payable on this account and no extension of time for completion of work shall be granted on these accounts.

- II. The rates quoted by the tenderer, shall be firm and inclusive of all taxes and levies **(including GST and construction labour welfare cess)**
- III. No foreign exchange shall be made available by the Institute 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.
- IV. 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, 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.
- V. 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, not with-standing 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.
- VI. 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.

1.14 SAFETY PRACTICES

- (i) 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.
- (ii) SIGN BOARDS: The Contractor shall provide and erect a display board of size and shape as required and paint over it, in a legible and workman like manner, the details about the salient features of the project, as required by the Engineer-in-Charge. The Contractor shall fabricate and put up a sign board in an approved location and to an approved design indicating name of the project, Client/Owner, Engineer-in-charges, Project Management Consultant, Master Plan Designer (MPD), Structural Consultants, etc. besides providing space for names of other Contractors, Sub-Contractors and specialized agencies within 30 days from issue of award letter. Nothing extra shall be payable on this account. **In case of non compliance/delay in compliance in this, a penalty @ Rs. 500/- per day will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.**
- (iii) Necessary protective and safety equipments such as helmet, safety shoes, gloves etc. shall be provided to the Site Engineer, Supervisory staff, labour and technical staff of the contractor by the Contractor at his own cost and to be used at site.
- (iv) 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.

1.15 QUALITY ASSURANCE

- (i) The proposed work is a prestigious campus development project and quality of work is of paramount importance. Contractor shall have to engage well-experienced skilled labour and deploy modern T&P and other equipment to execute the work. Many items like specialized flooring work, silicon sealant and backer rod fixing in expansion joints, factory made door- window shutters, proper slope maintaining in toilet units, sanitary- water supply installation, water proofing treatment, etc. will specially require engagement of skilled workers having experience particularly in execution of such items.
- (ii) The contractor shall ensure quality construction in a planned and time bound

manner. Any sub-standard material / work beyond set out tolerance limit shall be summarily rejected by the Engineer-in-charge & contractor shall be bound to replace / remove such sub-standard / defective work immediately. 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.

- (iii) In addition to the supervision of work by Project Management Consultant and Master Plan Designer (MPD), the Institute or any Consultants deployed by the Institute shall also be carrying out regular and periodic inspection of the ongoing activities in the work and deficiencies, shortcomings, inferior workmanship pointed out by them shall be communicated by Engineer-in-charge to the contractor. Upon receipt of instructions from Engineer in Charge these are also to be made good by necessary improvement, rectification, replacement upto his complete satisfaction. Special attention shall be paid towards line and level of internal and external plastering, exposed **smooth surface of RCC members by providing fresh shuttering plates, rubberized linings to all the shuttering joints**, accurate joinery work in wooden doors and windows, thinnest joints in stone/ tiling / cladding work, non-hollowness in floor and dado tiles work, protection of scratches over flooring by impounding layer of plaster of Paris, water tight pipe linings, absence of hollow vertical joints in brick masonry, proper compaction of filled up earth, etc. to achieve an Institution of International standards and up keeping of quality assurance shall be of paramount importance, as such.
- (iv) The Contractor shall submit, within 15 days after the date of award of work, a detailed and complete method statement for the execution, testing and Quality Assurance, of such items of works, as directed by the Engineer-in-Charge. All the materials to be used in the work, to make the finished work complete in all respects, shall comply with the requirements of the specifications and shall pass all the tests required as per specifications as applicable or such specifications / standards as directed by the Engineer-in-Charge. However, keeping the Quality Assurance in mind, the Contractor shall submit, on request from the Engineer-in-Charge, his own Quality Assurance procedures for basic materials and such items, to be followed during the execution of the work, for approval of the Engineer-in-Charge.
- (v) 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 suggested list of brand names given in the tender document / particular specifications for approval of Engineer-In-Charge. For all other items, materials and fittings of ISI Marked 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 and use the same only after getting the approval of Engineer-In-

Charge.

- (vi) The Contractor shall procure and provide all the materials from the manufacturers /suppliers as per the list attached with the tender documents, as per the item description and particular specifications for the work. The equivalent brand for any item shall be permitted to be used in the work, only when the specified make is not available. This is, however, subject to documentary evidence produced by the contractor for non-availability of the brand specified and also subject to independent verification by the Engineer-in-Charge. In exceptional cases, where such approval is required, the decision of Engineer-in-Charge as regards equivalent make of the material shall be final and binding on the Contractor. No claim, whatsoever, of any kind shall be entertained from the Contractor on this account. Nothing extra shall be payable on this account. Also, the material shall be procured only after written approval of the Engineer-in-Charge.
- (vii) All materials whether obtained from Govt. stores or otherwise shall be got checked by the Engineer-in-Charge or his authorized supervisory staff on receipt of the same at site before use.
- (viii) The contractor has to establish field laboratory at site including all necessary equipment for field tests as given in Schedule 'F'. All the relevant and applicable standards and specifications shall be made available by the contractor at his cost in the field laboratory. The contractor shall designate one of his technical representatives as Quality Assurance Engineer, who shall be responsible for carrying out all mandatory field/laboratory tests. The contractor shall also provide adequate supporting staff at his cost for carrying out field tests, packaging and forwarding of samples for outside laboratory tests and for maintaining test records.
- (ix) The tests, as necessary and where no field laboratory facilities are available, shall be conducted in the laboratory approved by the Institute. For materials for which field testing equipment is established at site, 90% of total tests shall be done at the laboratory established at site by contractor and remaining 10% in the reputed laboratories approved by Institute. The samples shall be taken for carrying out all or any of the tests stipulated in the particular specifications and as directed by the Institute or his authorized representative.
- (x) All the registers of tests carried out at Construction Site or in outside laboratories and all Material At Site (MAS) registers including cement register shall be maintained by the contractor which shall be issued to the contractor by Engineer-in-charge. All the entries in the registers will be made by the designated Engineering Staff of the contractor and same should be regularly reviewed by Project Management Consultant and Engineer-in-Charge. Contractor shall be responsible for safe custody of all the registers.
- (xi) The Contractor shall at his own risk and cost make all arrangements and shall provide all such facilities including material and labour, the Engineer-in-

Charge may require for collecting, preparing, forwarding the required number of samples for testing as per the frequency of test stipulated in the contract specifications or as considered necessary by the Engineer-in-Charge, at such time and to such places, as directed by the Engineer-in-Charge. Nothing extra shall be payable for the above.

- (xii) The Contractor or his authorized representative shall associate in collection, preparation, forwarding and testing of such samples. In case he or his authorized representative is not present or does not associate him, the result of such tests and consequences thereon shall be binding on the Contractor. The Contractor or his authorized representative shall remain in contact with the Engineer-in-Charge or his authorized representative associated for all such operations. No claim of payment or claim of any other kind, whatsoever, shall be entertained from the Contractor.
- (xiii) All the testing charges shall be borne by the contractor/ Institute in the manner indicated below:
 - (a) By the contractor, if the results show that the material does not confirm to relevant specifications and BIS codes or any other relevant code for which confirmatory test is carried out.
 - (b) By the Institute, if the results show that the material confirms to relevant specifications and BIS codes or any other relevant code for which confirmatory test is carried out.
- (xiv) All the hidden items such as water supply lines, drainage pipes, conduits, sewers etc. are to be properly tested as per the design conditions before covering and their measurements in computerized measurement book duly test checked shall be deposited with Engineer in-charge or his authorized representative, prior to hiding these items.
- (xv) Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should confirm to bylaws and municipal body / corporation where CPWD Specifications are not available. The contractor should engage licensed plumbers for the work and get the materials (fixtures/fittings) tested by the Municipal Body/Corporation authorities wherever required at his own cost.
- (xvi) The contractor shall give performance test of the entire installation(s) as per the standing specifications before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.
- (xvii) The contractor shall have to execute guarantee bonds in respect of water proofing works as per Performa enclosed.
- (xviii) The Contractor shall arrange electricity at his own cost for testing of the various electrical installations as directed by Engineer-in-Charge and for the consumption by the contractor for executing the work. Also all the water required for testing various electrical installations, fire pumps, wet riser / fire fighting equipments, fire sprinklers etc. and also testing water supply, sanitary and drainage lines, water proofing of underground sump, overhead

tanks, water proofing treatment etc. shall be arranged by the contractor at his own cost. Nothing extra shall be payable on this account.

1.16 SUBMISSION AND DOCUMENTATION

- (i) 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. He should also keep at site at least one set of BIS Codes and other relevant codes at site and produce the same if asked for by Engineer-In-Charge. In case of non compliance, these codes will be purchased from the Market and actual cost of purchase will be recovered from the next R/A Bill of the Contractor.
- (ii) The Contractor shall make available a digital copy (Autocad & pdf) and four (04) cloth mounted sets of completed Building Drawings, "As Built Drawings" along with literatures, manuals, warranty certificates etc. of various installed fittings, fixtures and equipment for the completed projects. This shall be the prerequisite for payment of final bill.
- (iii) The Contractor shall make available a digital copy (Autocad & pdf) and four (04) cloth mounted sets of all drawings of internal and external services i.e. Water Supply, Sanitary line and Drainage lines. This shall be the prerequisite for payment of final bill. These drawings shall have the following information:
 - (a) Run off for 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, up to outfall.
 - (c) Run off for all water supply lines with diameters location of control valves, access panels etc.
- (iv) The contractor shall make available a digital copy (Autocad & pdf) and four (04) sets of computerized Standard Measurement Books (SMBs) having measurement of all the permanent standing in a building.
- (v) The Performance Guarantee shall not be released to the contractor until the aforesaid drawings are submitted to the Engineer-in-Charge
- (vi) The contractor will submit computerized measurement sheet for the work carried out by him for making payment as per Clause – 6A of the General Conditions of Contract. For casting of RCC members and other hidden items the corrected and duly test checked measurement sheets of reinforcement or that of other hidden items shall be deposited with Engineer in charge or his authorized representative, before casting of RCC or other hidden items. The delay in submission of corrected and duly checked measurement sheet may, therefore, delay casting of RCC or execution of hidden item for which no hindrance shall be recorded.
- (vii) To avoid delay, contractor should submit all samples well in advance so as to

give timely orders for procurement.

1.17 PROJECT PROGRAM CHART:

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 and submit the same for approval of the Engineer-In-Charge within fifteen days of the award of the work. These shall be submitted by the contractor through electronic media besides forwarding hard copies of the same. The integrated program chart so submitted should not have any discrepancy with the physical milestones attached in the contract agreement. The program chart should include the following: -

- (a) Descriptive note explaining sequence of various activities.
 - (i) Construction Program prepared on PRIMAVERA, which will indicate resources in financial terms, manpower and specialized equipment for every important stage.
 - (ii) Program for procurement of materials by the contractor.
 - (iii) Program for arranging and deployment of manpower both skilled and unskilled so as to achieve targeted progress.
 - (iv) Program of procurement of machinery/equipment having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor.
 - (v) Program for achieving fortnightly micro milestones and periodic milestones.
 - (vi) In case of non compliance/delay in compliance in this, a penalty @ Rs. 5000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.
 - (vii) 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.
 - (viii) The submission for 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.

Submission of Progress Reports:

- (ix) Apart from the above integrated program chart, the contractor shall be required to submit fortnightly progress report of the work in a computerized form on 1st and 16th of every month. The progress report shall contain the following, apart from whatever else may be required as specified above:
 - (a) Construction schedule of the various components of the work through a bar chart for the next two fortnights (or as may be specified), showing the micro milestone/ milestones, targeted tasks (including material and labour requirement) and up-to-date progress. Atleast 10 digital photographs showing all the parts of construction site along with atleast 5 minutes video of executions of different items in soft

- copy has to be submitted in every fortnightly progress report.
- (b) Progress chart of the various components of the work that are planned and achieved, for the fortnight as well as cumulative up to the fortnight under reckoning, with reason for deviations, if any in a tabular format.
 - (c) Plant and machinery statement, indicating those deployed in the work.
 - (d) Man-power statement indicating:
 - Individually the names of all the staff deployed on the work, along with their designations.
 - No. of skilled workers (trade wise) and total no. of unskilled workers deployed on the work and their location of deployment i.e. blocks.
 - (e) 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 advance payment received, extra/substituted/deviation items if any, etc.
 - (f) In case of non compliance / delay in compliance in submission of fortnightly, a penalty @ Rs. 5000/- per fortnightly report will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.

1.18 PROJECT REVIEW MEETINGS:

The contractor, immediately on award of work shall submit details of his key personnel to be engaged for the work at site. In addition, he shall furnish the Engineer-in-charge detailed organogram involved with the work.

The contractor shall present the programme and status at various review meetings as required.

- i) Weekly Review Meetings: Shall be attended by Local Team headed by Project-in-charge

Agenda	<ul style="list-style-type: none"> (a) Weekly programme v/s actual achieved in the past week and programme for next week. (b) Remedial actions and hold up analysis. (c) Any decision on queries raised by contractor
--------	--

- ii) Monthly Review Meetings : Shall be attended by Project – in – charge and the Management Representative with authority to take independent decisions.

Agenda	<ul style="list-style-type: none"> (i) Progress Status/Statistics. (ii) Completion Outlook. (iii) Major hold ups/slippages. (iv) Assistance required. (v) Critical issues. (vi) Any decision on queries raised either by Contractor (vii) Anticipated cash flow requirement for next two
--------	---

1.19 TEMPORARY WATER/ ELECTRICITY/ TELEPHONE CONNECTION

- (i) Arrangement of temporary telephone connection, water and electricity required by Contractor, shall be made by him at his own cost and also necessary permissions shall be obtained by him directly from concerned authorities, under intimation to the Department. Also, all initial cost and running charges, and security deposit, if any, in this regard shall be borne by him. The Contractor shall abide by all the rules/ bye laws applicable in this regard and he shall be solely responsible for any penalty on account of violation of any of the rules/byelaws in this regard. Nothing extra shall be payable on this account.
- (ii) The Contractor shall be responsible for maintenance and watch and ward of the complete installation and water / electricity meter and shall also be responsible for any pilferage, theft, damage, penalty etc. in this regard. The Contractor shall indemnify the Institute and its representatives against any claim arising out of pilferage, theft, damage, penalty etc. whatsoever on this account. Nothing extra shall be payable on this account.
- (iii) The Institute shall in no way be responsible for either any delay in getting electric and/or water and/or telephone connections for carrying out the work or not getting connections at all. No claim of delay or any other kind, whatsoever, on this account shall be entertained from the Contractor. Also contingency arrangement of stand-by water & electric supply shall be made by the Contractor for

commencement and smooth progress of the work so that work does not suffer on account of power failure or disconnection or not getting connection at all. No claim of any kind whatsoever shall be entertained on this account from the Contractor. Nothing extra shall be payable on this account.

1.20 CLEANLINESS OF SITE

- (i) The Contractor shall not stack building material/malba/muck on the land or road of the local development authority or on the land owned by the others, as the case may be. The muck, malba, rubbish etc. shall be removed periodically as directed by the Engineer-in-Charge, from the site of work to the approved dumping grounds as per the local byelaws and regulations of the concerned authorities and all necessary permissions in this regard from the local bodies shall be obtained by the Contractor. Nothing extra shall be payable on this account. In the event the Contractor is found stacking the building material/malba as stated above, the Contractor shall be liable to pay the stacking charges/penalty as may be levied by the local body or any other authority and also to face penal action as per the rules, regulations and bye-laws of such body or authority. The Engineer –in-Charge shall be at liberty to recover such sums due but not paid to the concerned authorities on the above counts, from any sums due to the Contractor including amount of the Security Deposit and performance guarantee in respect of this contract agreement.
- (ii) 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, services and compound walls are to be constructed.
- (iii) The site of work shall be always kept clean due to constraints of space and to avoid any nuisance to the users of buildings in the adjacent plots. The Contractor shall take all care to prevent any water- logging at site. The waste water, slush etc. shall not be allowed to be collected at site. It may be directly pumped into the natural drainage channels with prior approval of the concerned authorities. For discharge into public drainage system, necessary permission shall be obtained from relevant authorities after paying the necessary charges, if any, directly to the authorities. The work shall be carried out in such a way that the area is kept clean and tidy. All the fees/charges in this regard shall be borne by the Contractor. Nothing extra shall be payable on this account.

1.21 INSPECTION OF WORK

- (i) In addition to the provisions of relevant clauses of the contract, the work shall also be open to inspection by officers of Institute, Project Management Consultant, Master Plan Designer (MPD), Chief Technical Examiner and any other consultants/advisors/committees appointed by the Institute. The contractor shall at times during the usual working hours and at all times at which reasonable notices of the intention of the Engineer-in-charge or other officers as stated above to visit the works shall have been given to the contractor, ensure the presence of Principal Technical Representative to be present to receive the orders and instructions.
- (ii) Inspection of the work by Institute.

- (a) The Engineer-in-charge or his representative shall be inspecting the works including workshops and fabrication factory to ensure that the works in general being executed according to the design, drawings and specifications laid down in the contract.
- (b) The Engineer-in-charge shall certify on completion of particular building that it has been constructed according to the approved drawings, designs and specifications.
- (iii) Officers of the Central Ministries, Departments, or Institute shall be inspecting the on-going work at site at any time with or without prior intimation. The contractor shall, therefore, keep updated the following requirements and detailing.
 - (i) Display Board showing detail of work, weekly progress achieved with respect to targets, reason of shortfall, status of manpower, wages being paid for different categories of workers.
 - (ii) Entrance and area surrounding to be kept cleaned.
 - (iii) Display layout plan key plan, Building drawings including plans, elevations and sections.
 - (iv) Upto date displays of Bar chart, CPM and PERT etc.
 - (v) Keep details of quantities executed, balance quantities, deviations, possible Extra item, substituted Item etc.
 - (vi) Keep plastic / cloth mounted, one sets of building drawings.
 - (vii) Set of Helmets and safety shoes for exclusive use for officers/dignitaries visiting at site.

1.22 FINAL TESTING OF THE INSTALLATION

The Contractor shall demonstrate trouble free functioning of all the Civil and E & M installations and services. The Engineer-in-Charge or his authorized representatives shall carry out final inspection of the various Civil and E & M services and installations. Any defect(s) noticed during demonstration shall be rectified by the Contractor at his own cost to the entire satisfaction of the Engineer-in-Charge. Nothing extra shall be payable on this account.

1.23 SUBMISSION OF AS BUILT DRAWINGS AND OBTAINING OCCUPATION CERTIFICATE

The contractor shall coordinate and facilitate Project Management Consultant and Master Plan Designer (MPD) for obtaining occupation certificate /completion certificate from local bodies including getting the required site visits conducted by such authorities with a view to obtain the same.

1.24 REFUND OF PERFORMANCE GUARANTEE

The performance guarantee for the work shall be refunded to the contractor soon after the completion of the entire construction works under this agreement and recording of the completion certificate for such agreement and submission of completion plans/As-built drawings.

1.25 DEFECT LIABILITY PERIOD (REFUND OF SECURITY DEPOSIT)

The defect liability / maintenance period shall be 12 months after the date of completion of work except in case of components of works for which a separate defect liability / maintenance period has been specified elsewhere in the tender document. The Security Deposit shall be released after the expiry of defect liability

period and for this the contractor shall have to produce a certificate from the Project Management Consultant and Engineer-in-Charge, but subject to other provisions specified elsewhere in the contract agreement.

1.26 GENERAL CLARIFICATIONS

- (i) Wherever any reference to any Indian Standards occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued thereto or revisions thereof, if any.
- (ii) Unless otherwise specified in the schedule of quantities, the rates for all items of work shall be considered, as inclusive of pumping out or bailing out water, if required throughout the construction period for which no extra payment shall be made. This shall also include water encountered from any source such as rains, floods, sub soil water table being high and/or due to any other cause whatsoever.
- (iii) All stone aggregate and stone ballast shall be of hard stone variety to be obtained from approved quarries.
- (iv) Coarse sand should be obtained from approved sources. The same shall be clean and sharp angular grit type. The coarse sand shall be screened before using, if required. If the sand brought to site is dirty, it must be washed in clean water to bring the sand to the required specifications. Nothing extra shall be payable on this account.
- (v) The rates for all items of work, shall unless clearly specified otherwise, include cost of all operations and all inputs of labour, material, T & P, scaffolding, wastages, watch and ward, other inputs, all incidental charges, all taxes, cess, VAT, duties, levies etc. required for execution of the work.

1.27 PRODUCT DELIVERY, STORAGE AND HANDLING OF CHEMICALS

- (i) The contractor shall construct storage space for Chemicals materials to ensure that the storage conditions are as recommended by the manufactures.
- (ii) All the materials shall be procured and delivered in sealed containers with labels legible and intact.
- (iii) All the chemicals {polymers, epoxy, water proofing compound, plasticizer, Polysulphide, SBR based elastomeric, APP (Atactic Polypropylene Polymer), all exterior and interior paints, polish etc.) shall be procured in convenient packs say 20 litres/Kgs.} capacity packing only or as approved by the Engineer-in-Charge, and not in bigger capacity containers, say 200 litre (Kgs.) drums unless otherwise specifically permitted by the Engineer-in-Charge. One sample from each lot of the chemical procured by the contractor shall be tested in a laboratory as approved by the Engineer-in-charge
- (iv) All material required for the execution of the work shall be got approved, procured and deposited with the Engineer-in-charge. The materials shall be kept in joint custody of the contractor and the Engineer-in-charge. The watch and ward of such material shall, however, remain the responsibility of the contractor and no claim, whatsoever, on this account shall be entertained. Different containers of each chemical shall be serially numbered on packing and also consumed in that order. Day-to-Day account of receipt, issue and balance shall be regulated by the Engineer-in-charge and proper account shall be maintained at site of work in the prescribed form as per the standard practice.

- (v) All the chemicals shall be procured by the contractor directly from the manufacturer. In exceptional circumstances, the contractor may be allowed to procure the materials from the authorized dealers of the manufacturers, if specifically permitted by the Engineer-in-Charge.
- (vi) The original copies of challan/cash memos towards the quantity of various chemicals procured shall be made available by the contractor at the request from the Engineer-in-Charge and a copy of the same shall be kept in record.
- (vii) The Name of manufacturers, manufacturer's product identification, manufacturer's mixing instructions, warning for handling and toxicity and date of manufacturing and shelf life shall be clearly and legibly mentioned on the labels of the each container.
- (viii) The contractor shall submit for the chemicals procured, manufacturer's and / or authorized dealer's certificate regarding supplying and verifying conformance to the material specifications, as specified.
- (ix) All filled containers shall be handled in safe manner and in a way to avoid breaking container seals.
- (x) Empty containers of the chemicals should not be removed from site till the completion of work and shall be removed only with the written approval of the Engineer-in-Charge.
- (xi) All arrangements for measuring, dosing and mixing of material / chemicals at site have to be made by the contractor.
- (xii) Contractor shall suitably advise his site supervisory staff and all the workers as regards safe handling of chemicals. Necessary protective and safety equipments in form of hand gloves, goggles etc. shall be provided by the contractor and be also used at site.
- (xiii) All incidental charges of any kind including cartage, storage and wastage and safe custody of material etc. shall be borne by the contractor and no claim, whatsoever, shall be entertained on this account.
- (xiv) The chemicals shall be tested in an independent laboratory as approved by the Engineer-in-charge at the frequency as specified. If required, more samples may have to be tested as per the directions of the Engineer-in-Charge. Nothing extra shall be payable on this account. However testing charges shall be borne by the Institute for the samples satisfying the requirements specified in the tender.

1.28 DE-WATERING

- (i) De-watering required, if any, shall be done conforming to BIS Code IS: 9759 (guide lines for de-watering during construction) and / or as per the specifications approved by the Engineer-in-Charge. Design of an appropriate and suitable dewatering system shall be the Contractor's responsibility. Such scheme shall be modified / augmented as the work proceeds based on fresh information discovered during the progress of work, at no extra cost. At all times during the construction work, efficient drainage of the site shall be carried out by the Contractor and especially during the laying of plain cement concrete, taking levels etc. The Contractor shall also ensure that there is no danger to the nearby properties and installations on account of such lowering of water table. If needed, suitable precautionary measures shall be taken by the Contractor. Also the scheme of dewatering adopted shall have adequate built in arrangement to serve as stand-bye to attend to repair of pumps etc. and disruption of power / fuel supply. Nothing extra shall be payable on this account.

- (ii) In trenches where surface water is likely to percolate during monsoons, a ring bund of puddle clay or by any other means shall be formed outside, to the required height, and maintained by the Contractor. Also, suitable steps shall be taken by the Contractor to prevent back flow of pumped water into the trench. Nothing extra shall be payable on this account.

1.29 INSURANCE POLICIES

Before commencing the execution of work, the Contractor shall, without in any way limiting his obligations and liabilities, insure at his own cost and expense against any damage or loss or injury, which may be caused to any person or property, at site of work. The Contractor shall obtain and submit to the Engineer-in-Charge proper Contractor All Risk Insurance Policy for an amount equivalent to contract value for this work, with Engineer-in-Charge as the first beneficiary. The insurance shall be obtained in joint names of Engineer-in-Charge and the Contractor (who shall be second beneficiary). Also, he shall indemnify the Institute or its representatives from any liability during the execution of the work. Further, he shall obtain and submit to the Engineer-in-Charge, a third party insurance policy for maximum Rs. 20 lakhs (Rupees Twenty Lakhs only) for each accident, with the Engineer-in-Charge as the first beneficiary. The insurance shall be obtained in joint names of Engineer-in-Charge and the Contractor (who shall be second beneficiary). The Contractor shall, from time to time, provide documentary evidence as regards payment of premium for all the Insurance Policies for keeping them valid till the completion of the work. The Contractor shall ensure that Insurance Policies are also taken for the workers of his Sub-Contractors /specialized agencies also. Without prejudice to any of its obligations and responsibilities specified above, the Contractor shall within 10 days from the date of letter of acceptance of the tender and thereafter at the end of each quarter submit a report to the Institute giving details of the Insurance Policies along with Certificate of these insurance policies being valid, along with documentary evidences as required by the Engineer-in-Charge. **No work shall be commenced by the Contractor unless he obtains the Insurance Policies as mentioned above.** Also, no payment shall be made to the Contractor on expiry of insurance policies unless renewed by the Contractor. Nothing extra shall be payable on this account. No claim of hindrance (or any other claim) shall be entertained from the contractor on these accounts.

1.30 TRAINING OF THE PERSONNEL

- 1.30.1 The contractor shall arrange at no extra cost to the Department to train two persons from the Institute and two person from the Project Management Consultant, one each for civil and electrical works, on how to operate and carryout preventive maintenance of the systems (both civil and electrical) . The contractor shall arrange this training from well qualified and experience personnel for at least seven days.
- 1.30.2 The Architectural drawings given in the tender other than those indicated in nomenclature of items are only indicative of the nature of the work and materials/fixings involved unless and otherwise specifically mentioned. However, the work shall be executed in accordance with the drawings duly approved by the Engineer-in-Charge.

1.31 APPLICABLE PERMITS

1.31.1 The contractor(s) shall give to the municipal corporation, police and other authorities, all necessary notices etc. that may be required by law and obtain all requisite licenses for temporary obstructions, enclosures etc. and pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night.

1.31.2 The contractor shall ensure that applicable permits mandated by the local bodies and in case warranted for this work are obtained as required under the Applicable Laws. An indicative but not exhaustive list of some of the applicable permits are mentioned below for the guidance of the Contractor.

1.31.3 Consequences on account of failure to obtain the mandatory permits shall be the sole responsibility of the contractor and no claim what so ever shall be entertained by the Institute. Any liability incurred by Institute on account of such failure shall be recovered from the amounts/payments due to the contractor.

- Permission of the State Government for extraction of boulders from quarry;
- Permission of Pollution Control Board for installation of crushers;
- Licence for use of explosives;
- Permission of the State Government for drawing water from river/reservoir;
- Licence from Inspector of factories or other competent authority for setting of Batching Plant;
- Clearance of Pollution Control Board for setting up Batching Plant;
- Clearance of Pollution Control Board for Asphalt Plant;
- Clearance of Pollution Control Board for installation of diesel generator sets;
- Fire safety clearance from fire authorities;
- Permission of State Government for cutting of trees; if any.
- Permit for employing unskilled/semi skilled labour during day/night.
- Permit for disposal of solid waste/excess material or soil,
- Permissions from the public utilities for diversion of utilities including reinstatement/reconstruction to original specifications;
- Approvals for electric supply/distributions;
- Any other permits or clearance required under the Applicable laws.

1.32 RECORDING OF HINDRANCE & MAINTENANCE OF HINDRANCE REGISTER

- (i) Whenever any hindrance whether on part of Institute or on part of contractor, comes to the notice of the Project Management Consultant, he shall at once make a note of such hindrance in the register kept at site, and immediately make a report to the Engineer-in-charge within a week.
- (ii) The following points shall be kept in mind while entering the hindrances in the Hindrance Register:
 - a) The entry of date of start of hindrance and date of removal of hindrance shall be made on the same day as the hindrance takes place or the cause of the hindrance is removed, respectively.

- b) The Engineer-in-charge shall work out the over lapping period, net if hindrance and of each hindrance within 15 days of removal of the cause of hindrance.
- c) The items of work affected due to any hindrance shall be clearly mentioned in the Hindrance Register by the Project Management Consultant, and the weightage shall be allowed on this basis.
- d) Each hindrance shall be entered in the hindrance Register, which shall be authenticated by the Engineer-in-charge, PMC and Contractor.
- e) The hindrance on part of contractor shall also to be entered in the Hindrance Register.
- f) The hindrance shall be recorded carefully in the Hindrance Register after considering its effect on completion of work.
- g) Review of hindrance register shall be compulsory at the time of payment of each Running Account Bill and final bill and certificate shall be recorded that all up to date hindrances on part of Institute and contractor have been recorded in the hindrance register.
- h) The net delay on part of Institute or contractor shall be worked out after considering all the hindrances recorded in the hindrance register.

1.33 SAFETY, HEALTH AND ENVIRONMENT

Over and above the provisions made in Safety Code (part of General Conditions of Contract) the following will also be applicable:

In respect of all workmen directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractor shall at his expense arrange for the safety provisions as per Indian Standard Safety codes shown below and shall at his own expense provide for all facilities in connection there with. In case the contractor fails to make arrangement and provide necessary facilities, he shall be liable to pay compensations prescribed under Workmen's Compensation Act 1923 as amended from time to time for each default and in addition the Engineer-in-charge shall be at liberty to make arrangement and provide facilities as aforesaid and recover the cost incurred on that behalf from the contractor, and no claims what so ever shall be entertained.

Details regarding some special provisions to be followed by contractor are as follows:

- a) Usage of quality Personal Protection Equipments (PPEs) through approved vendors. PPEs would include amongst others the following items:
 - Safety Helmets.
 - Hearing Protection.
 - Respiratory Protection.
 - Eye Protection.
 - Protective Gloves.
 - Safety Footwear.
 - High Visibility Clothing (Jacket)

All the items should be got approved before issued to the use in the work.

The contractor shall provide all the PPE (Personnel Protective Equipment) and safety appliances required to carry out the job to all the workmen deployed by the contractor and also ensure that his workmen use those PPE and safety appliances while on the job. The contractor shall not pay any cash amount in lieu of PPE to the workers/sub-contractors and expect them to buy and use during work. If the contractor fails to ensure provision of safety appliances and its workmen do not use the PPE and safety appliances as needed for safe working, the Engineer-in-charge may ask the contractor to stop the work and comply with safety requirements first. The contractor shall at all time maintain a minimum of 10% spare PPEs and safety appliances and properly record and show to the Engineer-in-charge during the inspections. Failing to do so shall invite appropriate compensations as per the provisions of under Workmen's Compensation Act 1923 as amended from time to time.

It is always the duty of the contractor to provide required PPEs for all visitors. Towards this required quantity of PPEs shall be kept always at the security post.

Colour coding for helmets

Safety Helmet Color Code	Person to use
White	Staff of IIM, Project Management Consultant and Master Plan Designer (MPD) and their Consultants
Violet	Main Contractors (Engineers / Supervisors)
Blue	All Sub-contractors (Engineers / Supervisors)
Red	Electricians (Both Contractor and Sub-contractor)
Green	Safety Professionals (Both Contractor and Sub-contractor)
Orange	Security Guards / Traffic marshals
Yellow	All workmen
White (with "VISITOR" sticker)	Visitors

b) Working at Heights

Contractor shall ensure that work at height is properly planned for any emergencies and rescue appropriately supervised, and carried out in a manner, which is reasonably practicable safe. Contractor shall ensure that work at height is carried out only when the weather conditions do not jeopardize the health or safety of persons involved in the work. Guardrail, Toe-board, Barrier or similar collective means of protection shall be of sufficient dimensions, of sufficient strength and rigidity for the purposes for which they are being used, and otherwise suitable.

Working Platform shall be of sufficient dimensions to permit the safe passage of persons and the safe use of any plant or materials required to be used and to provide a safe working area-having regard to the work being carried out there. It shall be so constructed that the surface of the working platform has no gap through which a person, material or object could fall and injure a person. A working platform and any supporting structure shall not be loaded so as to give rise to a risk of collapse or to any deformation, which could affect its safe use. Strength and stability calculations for scaffolding shall be carried out by the contractor. The dimensions, form and layout of scaffolding decks shall be appropriate to the nature of the work to be performed and suitable for the loads to be carried and permit work and passage in safety.

A personal fall protection system designed for use with an anchor shall be securely attached to at least one anchor, and each anchor and the means of attachment thereto shall be suitable and of sufficient strength and stability for the purpose of supporting any foreseeable loading. Suitable and sufficient steps shall be taken to prevent any person falling or slipping from a personal fall protection system. Any other steps in the opinion of engineer-in-charge suggested will also be taken in Protection system

Only metal ladders shall be allowed. Any surface upon which a ladder rests shall be stable, firm, of sufficient strength and of suitable composition safely to support the ladder so that its rungs or steps remain horizontal, and any loading intended to be placed on it. A ladder shall be so positioned as to ensure its stability during use. A suspended ladder shall be attached in a secure manner and so that, with the exception of a flexible ladder, it cannot be displaced and swinging is prevented. No interlocking or extension ladder shall be used unless its sections are prevented from moving relative to each other while in use.

c) Lifting appliances and gears.

The contractor shall maintain a register for record of examinations and test details of all lifting appliances. This register should also contain a system of identification of all tools and tackles, its date of purchase, safe working load etc. Contractors can utilize the services of any competent person as defined in Factories Act, 1948 and approved by Chief Inspector of Factories with the permission of the Employer.

d) Automatic safe load indicators

Every lifting appliances and gears like cranes, hydras etc, if so constructed that the safe working load may be varied by raising or lowering of the jib or otherwise shall be attached with an automatic indicator of safe working loads approved by Bureau of Indian standards/ International certifying bodies which gives a warning to the operator and arrests further movements of the lifting parts.

e) **Qualification of operator of lifting appliances and of signaller etc.**

The contractor shall not employ any person to drive or operate a lifting machine like crane, hydra etc whether driven by mechanical power or otherwise or to give signals to work as a operator of a rigger or derricks unless he is above twenty-one years of age and possesses a valid heavy transport vehicle driving license as per Motor Vehicle Act and Rules, is absolutely competent and reliable, possesses the knowledge of the inherent risks involved in the operation of lifting appliances by undergoing a formal training at any institution of importance and is medically examined periodically.

1.34 EXISTING SERVICES

- 1.34.1 Existing drains, pipes, electricity cables, overhead wires and telephone cables, sewer lines, water lines and similar services encountered in the course of the execution of the work shall be protected/ maintained against the damage by the contractor. 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 shifting/supporting of such services is required to facilitate the work, the contractor at no extra cost shall do the same. The decision of the Engineer-in-Charge in this regard shall be final and binding.
- 1.34.2 All works pertaining to services including rerouting/diversion of services, routine testing, installation etc., completed in one or more than one process shall be subject to examination and approval at each stage thereof by the Engineer-in-charge or concerned department as would be notified by the Engineer-in-charge or his authorized representative when such stage is ready. In default of such notice the Engineer-in-Charge shall be entitled to appraise the quantity and extent thereof and the decision of Engineer-in-Charge or his authorized representative in this regard shall be final and binding.
- 1.34.3 For utilities which are required to be removed or **permanently shifted** to new position in the opinion of the Engineer-in-charge, shall be removed / shifted by the contractor in consultation with the service provider agency. Payment for this shall be made as per terms and conditions of the contract. No claim for delay or otherwise due to above reasons shall be entertained on this account.
- 1.34.4 The contractor shall make his own arrangement for the disposal of the spoils, waste of bentonite, all dismantled material, slush and foul materials, surplus earth to such place where the same shall not cause nuisance or any environmental problems anywhere and should be acceptable to the authorities concerned. No extra claim whatsoever shall be entertained due to above. The road connected to site should be kept free of nuisance or environmental problems.
- 1.34.5 The contractor shall make his own arrangement at his own cost for the provision of telephone facilities at the site of works or at any other place.
- 1.34.6 The contractor shall make his own arrangements for obtaining electric & water connection(s) if required and make necessary payment directly to department

concerned. The Institute will however make all reasonable recommendations to the authority concerned in this regard.

- 1.34.7 The Contractor shall construct and provide, at location to be approved by Engineer-in-charge, the following infrastructure for the exclusive use of the staff/representatives of the Institute, engaged for supervision of Project.
- (a) Office space with a minimum carpet area of 600 sqft and office furniture for 8-10 persons
 - (b) One Conference room with a minimum carpet area of 500 sqft, with conference table and seating for 20-25 persons, white board and projection equipments
 - (c) Toilet facility with two European WCs and two urinals
 - (d) The above facilities should have lighting and ventilation facilities including air-conditioning.
 - (e) The contractor shall maintain the infrastructure and bear all expenses on account of housekeeping, maintenance, water and electricity.

Nothing extra shall be payable to the contractor for constructing, providing and maintaining the above support infrastructure, which shall not be removed after completion of the project.

- 1.34.8 The contractor shall bear all incidental charges for cartage, storage and safe custody of materials brought to site.
- 1.34.9 The work shall be carried out in accordance with the Architectural drawings, structural and services 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, structural drawing and services 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 supercede 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.
- 1.34.10 Construction Worker's Welfare Cess as applicable shall be deducted from payments made to the contractor.
- 1.34.11 The contractor shall have registration with EPFO and ESIC. The ESI and EPF contributions on the part of employer in respect of this contract shall be paid by the contractor. These contributions on the part of the employer paid by the contractor shall be reimbursed by the Engineer-in-charge to the contractor on actual basis.

2.0.1 Procurement of Construction Materials

- (i) All vehicles delivering construction materials to the site shall be covered to avoid spillage of materials and maintain cleanliness of the roads.
- (ii) Wheel Tyres of all vehicles used by of the contractor, or any of his sub contractor or materials suppliers shall be cleaned and washed clear of all dust/mud before leaving the project premises. This shall be done by routing the vehicles through tyre washing tracks.
- (iii) Contractor shall arrange for regular water sprinkling at least twice a day (i.e. morning and evening) for dust suppression of the construction sites and unpaved roads used by his construction vehicles.

2.0.2 Water Pollution

- (i) The Contractor shall take all precautionary measures to prevent the wastewater during construction to accumulate anywhere.
- (ii) The wastewater arising from the project is to be disposed off in the manner that is acceptable to the respective Pollution Control Board.

2.0.3 Air and Noise Pollution

Contractor shall use dust screens and sprinkle water around the construction site to arrest spreading of dust in the air and surrounding areas.

- (i) Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that emission levels comply with environmental emission standards/norms.
- (ii) For controlling the noise from Vehicles, Plants and Equipments, the Contractor shall confirm the following:
- (iii) All vehicles and equipment used in construction will be fitted with exhaust silencers.
- (iv) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.
- (v) Noise emission from compactors (rollers), front loaders, concrete mixers, cranes (movable), vibrators and saws should be less than 75 dB(A).
- (vi) As per the standards/guidelines for control of Noise Pollution from Stationary Diesel Generator (DG) sets, noise emission in dB(A) from DG Sets (2-1010 KVA) should be less than $94+10 \log_{10} (KVA)$. The standards also suggest construction of acoustic enclosure around the DG Set and provision of proper exhaust muffler with insertion loss of minimum 25 dB(A) each as mandatory.

2.0.4 Personal Safety Measures for Labour

Contractor shall provide the following items for safety of workers employed by contractor and associate agencies:

- (i) Protective footwear / helmet and gloves to all workers employed for the work on mixing cement, lime mortars, concrete etc. and openings in water pipeline/sewer line.

- (ii) Welder's protective eye-shields to workers who are engaged in welding works.
- (iii) Safety helmet and Safety harness/ belt.
- (iv) Adequate sanitation/safety facilities for construction workers to ensure the health and safety of the workers during construction, with effective provisions for the basic facilities such as sanitation, drinking water and safety equipments or machinery.
- (v) All the workers should be wearing helmet and shoes all the time on site.
- (vi) Masks and gloves should be worn whenever and wherever required.
- (vii) Full time workers (if any with the approval of Engineer-in-Charge) residing on site should be provided with clean and adequate temporary hutment.
- (viii) First aid facility should also be provided.
- (ix) Overhead lifting of heavy materials should be avoided. Barrow wheel and hand-lift boxes should be used to transport materials onsite.
- (x) Tobacco and cigarette smoking should be prohibited onsite.
- (xi) All dangerous parts of machinery are well guarded and all precautions for working on machinery are taken.
- (xii) Maintain hoists and lifts, lifting machines, chains, ropes and other lifting tackles in good condition. Provide safety net of adequate strength to arrest falling material down below.
- (xiii) Use of durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- (xiv) Ensure that walking surfaces or boards at height are of sound construction and are provided with safety rails and belts. Provide protective equipments such as helmets.
- (xv) Provide measure to prevent fire. Fire extinguisher and buckets of sand to be provided in fire-prone area and elsewhere.
- (xvi) Provide sufficient and suitable light for working during night.
- (xvii) Ensure that measures to protect workers from materials of construction, transportation, storage and other dangers and health hazards are taken
- (xviii) Ensure that the construction firm/division/company have sound safety policies.
- (xix) Comply with the safety procedure, norms and guidelines (as applicable) as outlined in NBC 2005 (BIS 2005c).
- (xx) Adopt additional best practices and prescribed norms as in NBC 2005 (BIS2005).

2.0.5 Identify roads on-site that would be used for vehicular traffic. Update vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral type that make up the surface base. Add surface gravel to reduce source of dust emission. Limit amount of fine particles (smaller than 0.075mm) to 10 -20%. Limit vehicular speed on site 10km/h. Nothing extra will be payable for this.

2.0.6 All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust/particulate emissions.

2.0.7 Spills of dirt or dusty materials shall 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. When cleaning up the spill, ensure that the clean – up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained/cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearby areas.

- 2.0.8 Ensure that water spraying is carried out by wetting the surface by spraying water on:
- (i) Any dusty material.
 - (ii) Areas where demolition work is carried out.
 - (iii) Any unpaved main-haul road and.
 - (iv) Areas where excavation or earth moving activities are to be carried out.
- 2.0.9 The contractor shall ensure the following:
- (i) Cover and enclose the site by providing dust screen, sheeting or netting to scaffold along the perimeter of a building.
 - (ii) Covering stockpiles of dusty material with impervious sheeting.
 - (iii) Covering dusty load on vehicles by impervious sheeting before they leave the site.
 - (iv) Transferring, handling/storing dry loose materials like bulk cement and dry pulverized fly ash inside a totally enclosed system.
 - (v) Spills of dirt or dusty materials shall be cleaned up promptly so that the spilled material does not become a source of fugitive dust and also to prevent seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained / cleaned up immediately before they can infiltrate into the soil/ground or runoff in nearby areas.
 - (vi) Clear vegetation only from areas where work will start right away.
 - (vii) Vegetate / mulch areas where vehicles do not ply.
 - (viii) Apply gravel/landscaping rock to the areas where mulching/paving is impractical.
- 2.0.10 Adopt measures to prevent air pollution in the vicinity of the site due to construction activities. There is no standard reference for this. The best practices should be followed (as adopted from international best practice documents and codes).
- 2.0.11 Provide safety barricading of site by drawing ribbon band along the site boundary, next to a road or other public area.
- 2.0.12 The contractor shall provide experienced personnel with suitable training to ensure that these methods are implemented. Prior to the commencement of any work, the method of working, plant equipment and air pollution control system to be used on – site should be made available for the inspection and approval of the Engineer –in-Charge to ensure that these are suitable for the project.
- 2.0.13 Employ measures to segregate the waste on-site into inert, chemical or hazardous wastes. Recycle the unused chemical/hazardous wastes such as oil, paint, batteries and asbestos. Inert and Hazardous waste must be collected and stored separately from site. Proper training must be given to all construction workers in order to train

them to be able to handle different kind of waste on site. In addition to segregating the inert and hazardous waste, it is also important to either reuse the construction waste on site or safely dispose it off to designated agencies for recycling.

- 2.0.14 The contractor should preserve the existing landscape and protect it from degradation during the process of construction. Select proper timing for construction activity to minimize the disturbance such as soil pollution due to spilling of the construction material and its mixing with rainwater. The construction management plan including soil erosion control management plan shall be prepared accordingly for each month. The application of erosion control measures includes construction of gravel pits and tyre washing bays of approved size and specification for all vehicular site entry/exits, protection of slopes greater than 10%. Sedimentation Collection System and run-off diversion systems shall be in place before the commencement of construction activity. Preserve and protect the existing vegetation by not-disturbing or damaging to specified site areas during construction.
- 2.0.15 The Contractor should follow the construction plan as proposed by the Engineer-in-charge /landscape consultant to minimize the site disturbance such as soil pollution due to spilling. Use staging and spill prevention and control plan to restrict the spilling of the contaminating material on site.
- 2.0.16 Spill prevention and control plans should clearly state measures to stop the source of the spill. Measures to contain the spill and measures to dispose the contaminated material and hazardous wastes. It should also state the designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners and petroleum products.
- 2.0.17 A soil Erosion and Sedimentation Control Plan (ESCP) should be prepared prior to construction and should be applied effectively.
- 2.0.18 The contractor shall prepare and submit 'Spill prevention and control plans' before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.
- 2.0.19 The contractor shall ensure that no construction leaches (Ex: cement slurry) is allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant -laden water directly to the treatment device or facility (municipal sewer line).
- 2.0.20 All lighting installed by the contractor around the site and at the labour quarters during construction shall be energy efficient fixtures of the appropriate illumination levels. This condition is a must, unless specifically prescribed otherwise.

2.0.21 All paints, adhesives and sealants should comply with the VOC limits prescribed as a Green initiatives as follows:

Table 1- VOC limits for paints, adhesives and sealants

Paints	VOC Limit (g/l)	Adhesives	VOC Limit (g/l)
Non-flat paints	150	Wood flooring Adhesive	100
Flat (Mat) paints	50	Tile Adhesive	65
Anti-corrosive/ antirust paints	250	Indoor Carpet Adhesive	50
Varnish	350	Wood	30
Lacquer	550	Stains water proofing sealer	250

2.0.22 All the building materials and systems used on site must be as per the specifications and approved makes by the Engineer-In-Charge.

2.0.23 All required certificates explaining the properties of the building material/system needs to be obtained from the manufacturer/vendor as required by the green building rating authority. The purchase orders of all the materials made with the manufacturers / authorized vendors should be maintained and shall be provided for the process with due diligence upon request.

2.0.24 Water saving measures as suggested by the Institute need to be followed on site.

2.0.25 The contractor / subcontractor shall prepare and submit a Site Management Plan (SMP) within 20 days of start, for approval by the Engineer –in-charge. This SMP shall indicate the locations of godown, stockpiles, barricading, waste storage, offices, vehicular movement routes etc. In short this SMP would comprehensively represent how the site activities shall be managed conforming to GRIHA guidelines. Contractor will be penalized @ Rs. 2000/- per day of delay on non-submission of SMP beyond due date to be recovered from next RA bill.

2.0.26 Any other site management measures suggested by the Engineer-in-charge / Master Plan Designer (MPD) shall be followed on site.

2.0.27 The contractor shall submit to the Engineer –in-Charge after construction of the buildings, a detailed as built quantification of the following within 10 days of recording of completion. Contractor will be penalized @ Rs. 500 per day of delay in submission of “detailed as built quantification”.

(i) Total materials used

- (ii) Total waste generated,
- (iii) Total waste reused,
- (iv) Total water used,
- (v) Total electricity consumed, and
- (vi) Total diesel consumed.

2.0.28 Evidence for the implementation of the all the above required measures shall be provided to the Engineer-in-Charge in the form of photographs and templates as required which is required for the submission to the green building rating authority .

2.0.29 Nothing extra shall be payable for above provisions unless otherwise specified in Schedule of Quantity.

2.0.30 The recoveries to be made towards non fulfillment of conditions of submission of 'SMP' ,technical staff, field laboratory and safety measures in non-refundable and shall be over and above the compensation levied (if any) under Clause 2 of General Conditions of Contract.

3.0 SPECIAL CONDITIONS FOR ENVIRONMENT MANAGEMET PLAN

- a. The contractor shall obtain approval for laying electrical lines from the electricity distribution utility and comply with the provisions as per Terms and Conditions for Supply of Electricity, for construction purpose as well as for final connection.
- b. The contractor shall ensure taking necessary steps on urgent basis to improve the living conditions of the labour at site and provide necessary facility to the labour.
- c. Contractor has to construct housing colony for labour within the site with all necessary infrastructure and facilities such as health facility, sanitation facility, and fuel for cooking, along with safe drinking water, medical camps, and toilets for women, crèche for infants. The housing may be in the form of temporary structures to be removed after the completion of the project. Details of provisions should be submitted to Engineer In charge for approval.
- d. During construction period, mobile STP of required capacity shall be provided by the contractor for the labour colony. The drains should be of adequate capacity and be lined till the final disposal points. Provision for disinfection of wastewater after treatment and before reuse to be ensured by the contractor.
- e. All required sanitary and hygienic measures shall be in place before starting construction activities. The safe disposal of wastewater and solid waste generated during the Construction phase shall be ensured.
- f. All the Labourers engaged for construction shall be screened for health and adequately treated before engaging them to work at the site.
- g. All the topsoil excavated during the construction shall be stored for use in horticulture/landscape development within the project site.
- h. Disposal of muck during construction phase shall not create any adverse effect on the neighboring communities and be disposed taking the necessary precautions for general safety and health aspects of people only in approved sites with approve competent authority.
- i. The contractor shall ascertain that there is no threat to the ground water quality by leaching of heavy metals and other toxic contaminants during construction will test soil and ground water samples.
- j. Construction spoils, including bituminous material and other hazardous materials must not be allowed to contaminate water courses and the dump sites for such material must be secured so that they do not leach into the ground water.
- k. The diesel generator sets to be used during construction phase shall be of low-sulphur- diesel type and shall conform to Environment (Protection) Rules for

air and noise emission standards.

- l. Vehicles hired for bringing construction material and Labourers to the site shall be in good conditions and shall conform to applicable air and noise emission standards and shall be operated during non-peak/approved hours.
- m. Ambient noise levels shall conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality shall be closely monitored during construction phase.
- n. Water demand during construction shall be reduced by the use of pre-mixed concrete, curing agents and other best practices.
- o. Adequate measures shall be taken to reduce air and noise pollution during construction as per CPCB norms.
- p. A First Aid Room should be provided at the project site during construction phase of the project.
- q. Any hazardous waste generated during construction phase shall be disposed of as per applicable rules and norms with necessary authorization of the Haryana State Pollution Control Board.
- r. Regular supervision of the above and other measures for monitoring shall be done by Engineer In charge throughout the construction phase, so as to avoid nuisance to the surroundings.

PART-C
CIVIL WORKS-

PARTICULAR SPECIFICATIONS (CIVIL)

1. CEMENT

- 1.1 The contractor shall procure 43 grade (conforming to IS:5112) Ordinary Portland Cement / Portland Pozzolona Cement (PPC) [conforming to IS:1489(Part I)], with a flyash content of 28% or more as required in the the work, from reputed manufacturers of cement having a production capacity of one million tonnes per annum or more such as **ACC, Ultratech, Jaypee. Vikram, Shree Cement, Ambuja, Century Cement and J. K. Cement, Chettinad, Coramandal, Ramco or from any other reputed cement manufacturer having a production capacity not less than one million tones per annum and as approved by Engineer-in-charge.** Supply of cement shall be taken in 50kg bags bearing manufacturer's name and ISI marking. 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. 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. Every fresh cement batch should be brought to site atleast 30 days before they are to be used / consumed in the work.
- 1.2 Every delivery of cement shall be accompanied by producer's certificate confirming that the supplied cement conforms to relevant specifications. These certificates should be endorsed to Engineer-in-charge for his record.
- 1.3 For each grade, cement bags shall be stored in two separate godowns, one for tested cement and the other for fresh cement (under testing) constructed by the contractor at his own cost as per sketch given in General Conditions of Contract with weather proof roofs and walls. The actual size of godown shall be as per site requirements and as per the direction of the Engineer in charge and nothing extra shall be paid for the same. The decision of the Engineer-in-charge regarding the capacity required/needed will be final. However, the capacity of each godown shall not be less than 250 tonnes or as decided by Engineer-In-Charge.
- 1.4 Each godown shall be provided with a single door with two locks. The keys of one lock shall remain with CPWD Engineer-in-charge or his authorized person 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 the parties. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed Performa and signed daily by the contractor or his authorized agent in token of its correctness. The contractor shall be responsible for the watch & ward and the safety of the cement godown. The contractor shall facilitate the inspection of the cement godown by the Engineer-in-charge any time.
- 1.5 The cement shall be got tested by the Engineer-in-Charge and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost

to testing laboratories. The frequency and details of the tests shall be decided by the Engineer-in-Charge depending on the quantum of supply in each batch.

- 1.6 The cost of tests shall be borne by the contractor / Institute in the manner indicated below:
- (a) By the contractor, if the results show that the cement does not conform to the relevant BIS codes.
 - (b) By the Institute, if the results show that the cement conforms to relevant BIS codes.
- 1.7 PPC (Portland Pozzolana Cement) shall be used in RCC structures in accordance with the circular issued by the Directorate General of Works vide No.CDO/SE(RR)/Fly Ash (Main)/102 dt.09.04.2009. The use of PPC shall be regulated as per the following conditions stipulated in the circular dt.09.04.2009:-
- a) IS:456-2000 Code of Practice for Plain and Reinforced Concrete (as amended upto date) shall be followed in regard to Concrete Mix Proportion and its production as under:
 - (i) The concrete mix design shall be done as "Design Mix Concrete" as prescribed in clause-9 of IS 456 mentioned above.
 - (ii) Concrete shall be manufactured in accordance with clause 10 of above mentioned IS:456 covering quality assurance measures both technical and organizational, which shall also necessarily require a qualified Concrete Technologist to be available during manufacture of concrete for certification of quality of concrete.
 - b) Minimum M25 grade or as specified of concrete shall be used in all structural elements of RCC, both in load bearing and framed structure.
 - c) The mechanical properties such as modulus of elasticity, tensile strength, creep and shrinkage of concrete using fly ash blended cements (PPCs) are not likely to be significantly different and their values are to be taken same as those used for concrete made with OPC.
 - d) To control higher rate of carbonation in early ages of concrete in PPC based concrete, water/binder ratio shall be kept as low as possible, which shall be closely monitored during concrete manufacture. If necessitated due to low water/binder ratio, required workability shall be achieved by use of chloride free chemical admixtures conforming to IS: 9103. The compatibility of chemical admixtures and super plasticizers with each set PPC received from different sources shall be ensured by trials.
 - e) In environment subjected to aggressive chloride or sulphate attack in particular, PPC based concrete is recommended. In case, where structural concrete is exposed to excessive magnesium sulphate, fly ash content shall be limited to 18% by weight. Special type of cement with low C3A content may also be alternatively used. Durability criteria like minimum binder content and maximum water/binder ratio also need to be given due consideration in such environment.

- f) Wet curing period shall be enhanced to a minimum of 10 days or its equivalent. In hot & arid regions, the minimum curing period shall be 14 days or its equivalent.
 - g) Subject to General Guidelines detailed out as above, PPC manufactured conforming to IS:1489 (Part-I) shall be treated at par with OPC for manufacture of Design Mix Concrete for structural use in RCC.
 - h) Till the time, BIS makes it mandatory to print the %age of fly ash on each bag of cement, the certificate from the PPC manufacturer indicating the same shall supplied by the contractor.
 - i) While using PPC for structural concrete work, no further admixing of fly ash shall be permitted.
- 1.8 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of 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. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at rate so prescribed shall be made. In case of excess consumption no adjustment shall be made.
- 1.9 For non-schedule items, the decision of the Engineer-in-charge or successor thereof regarding theoretical quantity of cement which should have been actually used shall be final and binding on the contractor.
- 1.10 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.
- 1.11 Damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-in-charge. If he does not do so within 3 days of receipt of such notice, the Engineer-in-charge shall get it removed at the cost of the contractor.
- 1.12 Cement register for the cement shall be maintained at site. The account of daily receipts and issues of cement shall be maintained in the register in the proforma prescribed and signed daily by contractor or his authorized agent.

2. STEEL

- 2.1 The contractor shall procure TMT bars of Fe500 grade from primary steel producers such as SAIL, Tata Steel Ltd., RINL, Jindal steel & Power Ltd., and JSW Steel Ltd, or any other producer as approved by Institute who are using iron ore as the basic raw material / input and having crude steel capacity of 2.0 Million tones per annum and above. The TMT bars procured from primary producers shall conform to manufacturer's specifications. The specifications of TMT bars procured from primary producers, shall meet the provisions of IS 1786: 2008 pertaining to Fe500 D grade of steel.
- 2.2 The contractor shall have to obtain and furnish test certificates to the Engineer-in-charge in respect of all supplies of steel brought by him to the site of work.
- 2.3 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 2.1 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's time of written orders from the Engineer-in-charge to do so.
- 2.4 The steel reinforcement bars shall be brought to the site in bulk supply of 5 tonnes or more or as decided by the Engineer-in-Charge.
- 2.5 The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
- 2.6 For checking nominal mass, tensile strength, bend test, re-bend test, etc., specimen of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified below:-

Size of bar	For consignment below 100 tonnes	For consignment over 100 Tonnes
Under 10mm dia	One sample for each 25 tonnes or part thereof	One sample for each 40 tonnes or part thereof
10 mm to 16mm 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

- 2.7 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 / Institute in the manner indicated below:
- By the contractor, if the results show that the steel does not conform to relevant BIS codes.
 - By the Institute, if the results show that the steel conforms to relevant BIS codes.

- 2.8 The actual issue and consumption of steel on work shall be regulated and proper accounts shall be maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in as per Theoretical Consumption of the contract and shall be governed by conditions laid therein. In case the consumption is less than theoretical consumption including permissible variations, recovery at the rate so prescribed shall be made. In case of excess consumption, no adjustment needs to be made.
- 2.9 The steel brought to site and steel remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge.
- 2.10 For the purpose of payment, the actual weight of reinforcement steel shall be worked out as below:

To arrive at unit weight for the purpose of payment, three random samples each of 1 meter length shall be collected for each diameter of re-bar from every consignment received at site. Actual weight of three specimens for each diameter shall be taken and average weight calculated and recorded. The average weight so arrived at shall be compared with theoretical weight of that particular diameter of rebar. Actual or theoretical weight whichever is less shall be considered for making payment for that consignment. However final payment shall be made on the basis of weighted average of all the consignment. The decision of the Engineer-in-charge as regards the random samples and average weight shall be final and binding on the contractor and no claim of any kind shall be entertained in this regard.

3 STRUCTURAL STEEL

3.1 This specification covers the fabrication and transportation to site and erection on prepared foundations and structural steel work consisting of beams, columns, purlins, vertical trusses, bracings, shear connections etc.

3.2 Fabrication, erection and approval of steel structures shall be in compliance with: General Specifications mentioned in CPWD specifications and IS: 800 – 1984. For the guidance on general fabrication and erection of structural steel work, Chapter 11 of IS: 800 (1984) must be followed. As far as safety is concerned guidance could be obtained from Indian safety code for structural steelwork *IS: 7205(1974)*. Before the commencement of the erection, all the erection equipment tools, shackles, ropes etc. should be tested for their load carrying capacity. Such tests if needed may be repeated at intermediate stages also.

Drawings and supplementary drawings shall be supplied to the contractors during execution of the work.

3.3 Providing shop primer coat for steel structures. Grouting of holding-down bolt pockets and below base plates where required.

3.4 In case of conflict between the Clauses mentioned here and the Indian Standards, those expressed in this specification shall govern.

3.5 Scope

The fabrication and erection of the steel work consists of accomplishing of all jobs here-in enumerated including providing all labour, tools and plant all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning etc. of approved quality as per relevant IS. The work shall be executed according to the drawings, specifications, relevant codes etc. in an expeditious and workman like manner, as detailed in the specifications and the relevant Indian Standard Codes and Standard Practice and to the complete satisfaction of the Engineer-in-charge .

3.6 Fabrication Drawings

a. The contractor shall prepare all fabrication and erection drawings on the basis of design drawings supplied to him and submit the same in triplicate to the Engineer-in-charge for review, Engineer-in-charge shall review and comment, if any, on the same. Such review, if any, by the Engineer-in-charge, does not relieve the contractor of any of his required guarantees and responsibilities. The contractor shall however be responsible to fabricate the structural strictly conforming to specifications and reviewed drawings.

b. Fabrication drawings shall include but not limited to the following:

- Member sizes and details
- Types and dimensions of welds and bolts
- Shapes and sizes of edge preparation for welding
- Details of shop and field joints included in assemblies.

c. Bill of material

- Quality of structural steels, welding electrodes, bolts, nuts and washers etc. to be used.
 - Erection assemblies, identifying all transportable parts and sub-assemblies, associated with special erection instructions, if required.
 - Calculations where asked for approval.
- d. Connections, splices etc. other details not specifically detailed in design drawings shall be suitably given on fabrication drawings considering normal detailing practices and developing full member strengths. Where asked for calculations for the merit shall also be submitted for approval.
- e. Any alternate design or change in section is allowed when approved in writing by the Engineer-in-charge.
- f. However, if any variation in the scheme is found necessary later, the contractor will be supplied with revised drawings. The contractor shall incorporate these changes in his drawings at no extra cost and resubmit for review.
- g. Engineer-in-charge review shall not absolve the contractor of his responsibility for the correctness of dimensions, adequacy of details and connections. One copy will be returned reviewed with or without comments to the contractor for necessary action. In the former case further three copies of amended drawings shall be submitted by the contractor for final review.
- h. The contractor shall supply three prints each of the final reviewed drawings to the Engineer-in-charge within a week since final review, at no extra cost for reference and records.
- i. The Engineer-in-charge will verify the correct interpretation of their requirements.
- j. If any modification is made in the design drawing during the course of execution of the job, revised design drawings will be issued to the contractor. Further changes arising out of these shall be incorporated by the contractor in the fabrication drawings already prepared at no extra cost and the revised fabrication drawings shall be duly got reviewed as per the above Clauses.

3.7 Materials

(i) Rolled Sections

The following grades of steel shall be used for steel structures:

Structural steel will generally be of standard quality conforming to IS: 226/IS: 2062. Whenever welded construction is specified plates of more than 20 mm thickness will generally conform to IS: 2062.

(ii) Welding Materials

Welding electrodes shall conform to IS: 814.

Approval of welding procedures shall be as per IS: 823.

(iii) Bolts, Nuts & Washers

Bolts and nuts shall be as per IS: 1367 and tested as per IS: 1608. It shall have a minimum tensile strength of 44 Kg/mm² and minimum elongation of 23% on a gauge length of 5.65 (A- Original cross sectional area of the gauge length). Washers shall be as per IS: 2016.

(iv) All materials shall conform to their respective specifications. The use of equivalent or higher grade or alternate materials will be considered only in very special cases subject to the approval of the Engineer-in-charge in writing.

(v) Receipt & Storing of Materials

Steel materials supplied by the contractor must be marked for identification and each lot should be accompanied by manufacturer's quality certificate, conforming chemical analysis and mechanical characteristics. All steel parts furnished by supplier shall be checked, sorted out, straightened, and arranged by grades and qualities in stores.

Structurals with surface defects such as pitting, cracks, laminations etc. shall be rejected if the defects exceed the allowable tolerances specified in relevant standards or as directed by the chief Engineer-in-charge.

Welding wire and electrodes shall be stored separately by qualities and lots inside a dry and enclosed room, in compliance with IS: 816 - 1969 and as per instructions given by the Engineer-in-charge. Electrodes shall be perfectly dry and drawn from an electrode even, if required.

(vi) Checking of quality bolts of any kind as well as storage of same shall be made conforming to relevant standards.

Each lot of electrodes, bolts, nuts, etc. shall be accompanied by manufacturer's test certificate.

The contractor may use alternative materials as compared to design specification only with the written approval of the chief Engineer-in-charge.

(vii) Material Tests

The contractor shall be required to produce manufacturer's quality certificates for the materials supplied by the contractor. Notwithstanding the manufacturer's certificates, the Engineer-in-charge may ask for testing of materials in approved test houses. The test results shall satisfy the requirements of the relevant Indian Standards.

Whenever quality certificates are missing or incomplete or when material quality differs from standard specifications the contractor shall conduct all appropriate tests as directed by the Engineer-in-charge at no extra cost.

Materials for which test certificates are not available or for which test results do not tally with relevant standard specifications, shall not be used.

3.8 Fabrication

Fabrication shall be in accordance with IS: 800 Section V in addition to the following:

Fabrication shall be done as per approved fabrication drawings adhering strictly to work points and work lines on the same. The connections shall be welded or bolted as per design drawings. Work shall also include fabricating built up sections.

Any defective material used shall be replaced by the contractor at his own expense, care being taken to prevent any damage to the structure during removal.

All the fabricated and delivered items shall be suitably packed to be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at his own cost.

Any faulty fabrication pointed out at any stage of work shall be made good by the contractor at his own cost.

a. Preparation of Materials

Prior to release for fabrication, all rolled sections warped beyond allowable limit shall be pressed or rolled straight and freed from twists, taking care that a uniform pressure is applied.

Minor warping, corrugations etc. in rolled sections shall be rectified by cold working. The sections shall be straightened by hot working where the Engineer-in-charge so direct and shall be cooled slowly after straightening.

Warped members like plates and flats may be used as such only if wave like deformation does not exceed $L/1000$ but limited to 10 mm (L-Length).

Surface of members that are to be jointed by lap or fillet welding or bolting shall be even so that there is no gap between overlapping surfaces.

b. Marking

Marking of members shall be made on horizontal pads, of an appropriate racks or supports in order to ensure horizontal and straight placement of such members. Marking accuracy shall be at least + 1 mm.

c. Cutting

Members shall be cut mechanically (by saw or shear or by oxyacetylene flame). All sharp, rough, or broken edges, and all edges of joints which are subjected to tensile or oscillating stresses, shall be ground. No electric metal arc cutting shall be allowed.

All edges cut by oxyacetylene process shall be cleaned of impurities prior to assembly.

Cutting tolerances shall be as follows:

- a. For members connected at both ends + 1 mm.
- b. Elsewhere + 3 mm.

The edge preparation for welding of members more than 12 mm thick shall be done by flame cutting and grinding. Cut faces shall not have cracks or be rough. Edge preparation shall be as per IS : 823 - 1964.

d. Drilling

Bolts holes shall be drilled.

Drilling shall be made to the diameter specified in drawings.

No enlarging of holes filling, by mandrolling or oxyacetylene flame shall be allowed.

Allowed variations for holes (out-of-roundness, eccentricity, plumb-line deviation) shall be as per IS:800.

- Maximum deviation for spacing of two holes on the same axis shall be + 1 mm.
- Two perpendicular diameters of any oval hole shall not differ by more than 1 mm.

- e. Drilling faults in holes may be rectified by reaming the holes to the next upper diameter, provided that spacing of new hole centres and distance of hole centres to the edges of members are not less than allowed and that the increase of hole diameter does not impair the structural strength. Hole reaming shall be allowed if the number of faulty holes does not exceed 15% of the total number of holes for one joint.

WELDING:

Preparation of Members for Welding

- a. All welding in mild steel work shall be done with electrodes and / or by methods recommended by the suppliers of the metals being welded in accordance with corresponding Indian Standards. Type, size and spacing of welds, shall be as specified. All welding consumables shall be in accordance with the I.S. standards.
- b. Welds behind finished mild steel surfaces shall be so done as to eliminate distortion and / or discoloration on the finished side.
- c. Weld spatter and welding oxides on finished surfaces shall be removed by descaling and / or grinding. Plug, puddle or spot welding shall not be permitted. If weld beads are visible on exposed finished surfaces, the surfaces shall be ground and polished to match and blend with finish on adjacent parent metal.
- d. Structural welds shall be made by certified welders and shall conform to I.S. code. The welds shall be tested by the Contractor to ensure quality and integrity of the structural welds. However, welding tests shall be carried out as below: and the contractor shall maintain records for Visual testing – 100 % of the welds for size and quality. Fillet weld testing- 30 % of the welds for MPI or Dye penetration test
- e. Dirt grease, lubricant, or other organic material shall be removed by vapor degreasing or suitable solvent.
- f. Joints rejected because of welding defects may be repaired only by re welding. Defective welds shall be removed by chipping or machining. Flame cutting shall not be allowed.

Assembly of structural members shall be made with proper jigs and fixtures to ensure correct positioning of members (angles, axes nodes etc.)

Sharp edges, rust of cut edges, notches, irregularities and fissures due to faulty cutting shall be chipped or ground or filled over the length of the affected area, deep enough to remove faults completely.

Edge preparation for welding shall be carefully and accurately made so as to facilitate a good joint. Generally no special edge preparation shall be required for members under 8 mm thick.

Edge preparation (beveling) denotes cutting of the same so as to result in V, X K or U seam shapes as per IS: 823.

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy, rust or dirt covered parts be assembled. Joints shall be kept free from any foreign matter likely to get in to the gaps between members to be welded.

Before assembly the edges to be welded as well as adjacent areas extending for at least 20 mm shall be cleaned (until metallic polish is achieved).

When assembling members, proper care shall be taken of welding shrinkage and distortions, as the drawing dimensions cover finished dimensions of the structure.

The elements shall be got checked and approved by the Engineer-in-charge or their authorised representative before assembly.

The permissible tolerances for assembly of members preparatory to welding shall be as per IS: 823-1964.

After the assembly has been checked, temporary tack welding in position shall be done by electric welding, keeping in view finished dimensions of the structure.

f. Welding procedures

Welding shall be carried out only by fully trained and experienced welders as tested and approved by the Engineer-in-charge. Any test carried out either by the Engineer-in-charge or their representative or the inspectors shall constitute a right by them for such tests and the cost involved thereon shall be borne by the contractor himself.

Qualification tests for welders as well as tests for approval of electrodes will be carried out as per IS: 823. The nature of test for performance qualification of welders shall be commensurate with the quality of welding required on this job as judged by the Engineer-in-charge.

The steel structures shall be automatically, semi-automatically or manually welded as per direction of Engineer-in-charge. Welding shall begin only after the checks mentioned in Clause herein have been carried out.

The welder shall mark with his identification mark on each element welded by him.

When welding is carried out in open air, steps shall be taken to protect the face of welding against wind or rain. The electrodes, wire and parts being welded shall be dry.

Before beginning the welding operation, each joint shall be checked to ensure that the parts to be welded are clean and root gaps provided as per IS: 823.

For continuing the welding of seems discontinued due to some reason, the end of the discontinued seem shall be melted in order to obtain a good continuity. Before resuming the welding operation, the groove as well as the adjacent parts shall be well cleaned for a length of approx. 50 mm.

For single butt welds (in V, 1/2 V or U) and double butt welds (in K, double U etc.) the rewelding of the root is mandatory but only the metal deposit on the root has been cleaned by back gouging or chipping.

The welding seams shall be left to cool slowly. The contractor shall not be allowed to cool the welds quickly by any other method.

For multi-layer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping and wire brushing. Backing strips shall not be allowed.

The order and method of welding shall be so that -

- No unacceptable deformation appears in the welded parts.
- Due margin is provided to compensate for contraction due to welding in order to avoid any high permanent stresses.

The defects in welds must be rectified according to IS: 823 and as per instruction of Engineer-in-charge.

g. Weld Inspection

The weld seams shall satisfy the following:

- shall correspond to design shapes and dimensions.
- shall not have any defects such as cracks, incomplete penetration and fusion, under-cuts, rough surfaces, burns, blow holes and porosity etc. beyond permissible limits.

During the welding operation and approval of finished elements, inspections and tests shall be made as shown in annexure-B. The mechanical characteristics of the welded joints shall be as in IS: 823.

h. Preparation of Members for Bolting

The members shall be assembled for bolting with proper jigs and fixtures to sustain the assemblies without deformation and bending. Before assembly, all sharp edges, shavings, rust dirt, etc. shall be removed. Before assembly, the contacting surfaces of the members shall be cleaned and given a coat of primer as per IS: 2074. The members which are bolt assembled shall be set according to drawings and temporarily fastened with erection bolts (minimum 4 pieces) to

check the coaxiality of the holes. The members shall be finally bolted after the deviations have been corrected, after which there shall not be gaps. Before assembly, the members shall be checked and got approved by the Engineer-in-charge. The difference in thickness of the sections that are butt assembled shall not be more than 3% or maximum 0.8 mm whichever is less. If the difference is larger, it shall be corrected by grinding or filling. Reaming of holes to final diameter or cleaning of these shall be done only after the parts have been check assembled. As each hole is finished to final dimensions (reamed if necessary) it shall be set and bolted up. Erection bolts shall not be removed before other bolts are set.

- i. Bolting up
Final bolting of the members shall be done after the defects have been rectified and approval of joints obtained. The bolts shall be tightened starting from the centre of joint towards the edge.
- j. Planning of Ends
Planning of ends of members like column ends shall be done by grinding when so specified in the design. Planning of butt welded members shall be done after these have been assembled, the spare edges shall be removed with grinding machines or files. The following tolerances shall be permitted on member that has been planed.
 - On the length of the member having both ends planed, maximum + 2 mm with respect to design.
 - Level differences of planed surfaces, maximum 0.3 mm.
 - Deviation between planed surface and member's axis maximum 1/1500.
- k. Holes for Field Joints
Holes for field joints shall be drilled in the shop to final diameters and tested in the shop, with trial assemblies. When three-dimensional assembly is not possible in the shop, the holes for field joints may be drilled in shop and reamed on site after erection, on approval by the Engineer-in-charge. For bolted steel structures, trial assembly in shop is mandatory. The tolerance for spacing of holes shall be + 1 mm.
- l. Tolerances
All tolerances regarding dimensions, geometrical shapes and sections of steel structures, shall be as per Annexure B, if not specified in the drawing.
- m. Marking for Identification
All elements and members prior to despatch for erection shall be shop marked. The members shall be visibly marked with a weather proof light coloured paint. The size and thickness of the numbers shall be chosen as to facilitate the identification of members. For the small members that are delivered in bundles or crates, the required marking shall be done on small metal tags securely tied to the bundle, while the crates shall be marked directly. Each bundle or crate shall be packed with members for one and the same assembly; in the same bundle or crate, general utility members such as bolts, quests etc. may be packed. All bill of

materials showing weight, quality and dimension of contents shall be placed in the crates.

The members shall be marked with a durable paint, in a visible location, preferably at one end of the member so that these may be easily checked during storage and erection. All members shall be marked in the shop before inspection and acceptance. When the member is being painted, the marking area shall not be painted but bordered with white paint. The marking and job symbol shall be registered in all shop delivery documents (transportation, for erection etc.)

n. Shop Test Pre-assembly

For steel structures that have the same type of welding the shop test pre-assembly shall be performed on one out of every 10 members minimum. For bolted steel structures, shop test pre-assembly is mandatory for all elements as well as for the entire structure in conformity with previous Clause.

3.9 Shop Inspection and Approval

a. General

The Engineer-in-charge or their representative shall have free access at all responsible times to the contractors fabrication shop and shall be afforded all reasonable facilities for satisfying himself that the fabrication is being undertaken in accordance with drawings and specifications. Technical approval of the steel structure in the shop by the Engineer-in-charge is mandatory. The contractor shall not limit the number and kinds of tests, final as well as intermediate once, or extra tests required by the Engineer-in-charge. The contractor shall furnish necessary tools, gauges, instruments etc. and technical non-technical personnel for shop tests by the Engineer-in-charge, free of cost.

b. Shop Acceptance

The Engineer-in-charge shall inspect and approve at the following stages:
The following approvals may given in shop:

- Intermediate approvals of work that cannot be inspected later.
- Partial approvals
- Final approvals

Intermediate approval of work shall be given when a part of the work is preformed later:

- Cannot be inspected later
- Inspection would be difficult to perform and results would not be satisfactory.

Partial approval in the shop is given on members and assemblies of steel structures before the primer coat is applied and includes:

- Approval of materials
- Approval of field joints
- Approval of parts with planed surfaces
- Test erection
- Approval of members
- Approval of markings

- Inspections and approvals of special features, like Rollers, loading platform mechanism etc.

During the partial approval, intermediate approvals as well as all former approvals, shall be taken in to consideration.

c. Final approval in the Shop

The final approval refers to all elements and assemblies of the steel structures, with shop primer coat, ready for delivery from shop to be loaded for transportation, or stored.

The final approval comprises of:

- Partial approvals
- Approval of shop primer coat
- Approval of mode of loading and transport
- Approval of storage (for materials stored)

3.10 Painting and Delivery

(i) Preparation of parts for shop painting: Painting shall consist of providing at least one coat of red oxide zinc chromate primer to steel members before despatch from shop. Primer coat shall not be applied unless:

- Surface have been wire brushed, cleaned of dust, oil, rust or sand blasted as per the requirement and direction of Engineer-in-charge etc.
- Erection gaps between members, spots that cannot be painted or where moisture or other aggressive agents may penetrate, have been filled with an approved type of oil and putty.
- The surface to be painted is completely dry.
- The parts where water of aggressive agents may collect (during transportation, storage, erection and operation) are filled with putty and provided with holes for drainage of water.
- Members and parts have been inspected and accepted
- Welds have been accepted.

The following are not to be painted or protected by any other product:

- Surface which are in the vicinity of joints to be welded at site.
- Surfaces bearing markings
- Other surfaces indicated in the design.

The following shall be given a coat of hot oil or any approved resistant lubricant only.

- Planed surfaces
- Holes for links

The surfaces that are to be embedded or in contact with the concrete shall be given a coat of cement wash. The surfaces which are in contact with the ground, gravel or brick work and subject to moisture shall be given bituminous coat. The other surfaces shall be given a primer coating.

Special attention shall be given to locations not easily accessible, where water can collect and which after assembly and erection cannot be inspected, painted and maintained. Holes shall be provided for water drainage and in accessible box type sections shall be hermetically sealed by welds.

If specified elsewhere, in the schedule of quantities, the contractor shall paint further coats of red-oxide after erection and placing in position of the steel structures.

(ii) Packing, transportation, delivery

After final shop acceptance and marking, the item shall be packed and loaded for transportation. Packing must be adequate to protect item against warping during loading and unloading. Proper lifting devices shall be used for loading, in order to protect items against warping. Slender projecting parts shall be braced with additional steel bars, before loading, for protection against warping during transportation. Loading and transportation shall be done in compliance with transportation rules. If certain parts cannot be transported in the lengths stipulated in the design, the position and type of additional splice joints shall be approved by the Engineer-in-charge. Items must be carefully loaded on platforms of transportation means to prevent warping, bending or falling during transportation. The small parts such as fish-plates, quests etc. shall be securely tied with wire to their respective parts. Bolts, nuts and washers shall be packed and transported in crates. The parts shall be delivered in the order stipulated by the Engineer-in-charge and shall be accompanied by document showing:

- Quality and quantity of structure or members
- Position of member in the structure
- Particulars of structure
- Identification number job symbol.

3.11 Field Erection

- a. The erection work shall be permitted only after the foundation or other structure over which the steel work will be erected is approved and is ready for erection.
- b. The contractor shall satisfy himself about the levels, alignment etc. for the foundations well in advance, before starting the erection. Minor chipping etc. shall be carried out by the contractor on his expense.
- c. Any faulty erection done by the contractor shall be made good at his own cost.
- d. Approval by the Engineer-in-charge or their representatives at any stage of work does not relieve the contractor of any of his required guarantees of the contract.
- e. Storage and preparation of parts prior to erection

The storage place for steel parts shall be prepared in advance and got approved by the Engineer-in-charge before the steel structures start arriving from the hop. A platform shall be provided by the Contractor near the erection site for preliminary erection work. The contractor shall make the following verifications upon receipt of material at site.

- For quality certificates regarding materials and workmanship according to these general specifications and drawings.
- Whether parts received are complete without defects due to transportation, loading and unloading and defects, if any, are well within the admissible limit.

For the above work sufficient space must be allotted in the storage area which will be arranged by the contractor without any extra cost to the Institute. Steps shall be taken to prevent warping of items during unloading. The parts shall be unloaded, stored and stored so as to be easily identified. The parts shall be stored according to construction symbol and markings so that these may be taken out in order or erection. The parts shall be at least 150 mm clear from ground on wooden or steel blocks for protection against direct contact with ground and to permit drainage of water. If rectification of members like straightening etc. are required, these shall be done in a special place allotted which shall be adequately equipped. The parts shall be clean when delivered for erection.

f. Erection & Tolerances

Erection in general shall be carried out as required and approved by the Engineer-in-charge. Positioning and levelling of the structure, alignment and plumbing of the stanchion and fixing every member of the structure shall be in accordance with the relevant drawings and to the complete satisfaction of the Engineer-in-charge.

The following checks and inspection shall be carried out before during and after erection.

- damage during transportation
- accuracy of alignment of structures
- erection according to drawings and specifications
- progress and workmanship.

In case there be any deviations regarding positions of foundations or anchor bolts, which would lead to erection deviations, the Engineer-in-charge shall be informed immediately. Minor rectifications in foundations, orientation of bolts holes etc. shall be carried out as part of the work, at no extra cost. The various parts of the steel structure shall be so erected so to ensure stability against inherent weight, wind and erection stresses. The structure shall be anchored and final erection joints completed after plan and elevation positions of the structural members have been verified with corresponding drawings and approved by the Engineer-in-charge. The bolted joints shall be tightened so that the entire surface of the bolt heads and nuts shall rest on the member. For parts with sloping surfaces tapered washers shall be used.

3.12 Final acceptance and handing over the structure

- (i) At acceptance, the contractor shall submit the following documents:
 - Shop and erection drawings – four sets soft copy and hard copies
 - copies of each of the following:
 - Shop acceptance documents quality certificate for structurals, plates, etc. (electrodes, welding wire, bolts, nuts, washers etc.)
 - List of certified welders who worked on erection of structures.

- Acceptance and intermediate control procedure of erection operations.
- (ii) Approval by the Engineer-in-charge at any stage of work does not relieve the contractor of any of his required guarantees of the contract.

3.13 Method of Payments

Payment for steel work shall be made on basis of admissible weight of the structure accepted, the weight being determined as described below:

- a. The rate for supply, fabrication and erection, shall include cost of all handling and transportation to Owner's store/site of work where supply and fabrication only are involved, trimming, straightening, edge preparation, preparation and getting reviewed of fabrication drawings, and providing one or more coat of Red-oxide zinc chromate primer as specified in the schedule of quantity.
- b. In the case, Owner supplies materials the rate shall include cost of steel materials taking delivery of the materials, from owner's store all handling and rehandling, loading and unloading, transport to site or work, returning of surplus materials to owner's stores etc. complete as well as the cost of all handling and transport, scaffolding, temporary supports, tools and tackles, touching up primer coat, grouting etc.
- c. The actual lengths installed shall be measured and the weight of structural material/plate shall be calculated wherever necessary on the basis of IS handbook. If sections are different from IS section, then manufacturers handbook shall be adopted. No allowance in weights shall be made for rolling tolerance.
- d. Sections built out of plates, structural shall be paid on the actual weight incorporated except for gussets which will be paid on the weight of the smallest rectangle enclosing the shape. No deductions shall be made for skew cuts in rolled steel sections.
- e. Welds, bolts, nuts, washers, etc. shall not be measured. Rate for structural steel work shall be deemed to include the same.
- f. No other payment either for temporary works connected with this contract or for any other item such as welds, shims, pacing plates etc. shall be made. Such item shall be deemed to have been allowed for in the rate quoted for steel work.

3.14 Grouting of Pockets

- (i) Grouting of pockets and under base plates will be done only after the steel work has been levelled and plumbed and the bases of stanchions are supported by steel shims. The space below the base plate and pockets shall be thoroughly cleaned.
- (ii) The mortar used for grouting shall not be leaner than 1:2 (1 cement: 2 sand) (grade 300 in case of concrete) or as is specified and shall be mixed to the minimum consistency required. It shall be poured under suitable head and tamped until the space has been completely filled.

3.15 Tolerances allowed in the erection of building without cranes

The maximum tolerances for line and level of the steel work shall be + 3.00 mm on any part of the structure. The structure shall not be out of plumb more than 3.5 mm on each 10 M. section of height and not more than 7.0 mm per 30 M. section. These tolerances shall apply to all parts of the structure unless the drawings issued for erection purposes state otherwise.

- 3.16 Contractor to submit shop drawing for all structural steel work for approval. The work at site should commence only after getting the shop approved.
- 3.17 Contractor to get erection scheme approved before commencement of erection of trusses.

4 R.C.C. WORK (DESIGN MIX CONCRETE)

4.1 The RCC work shall be done with RMC of Design Mix Concrete, unless otherwise specified in the nomenclature of items, wherever letter 'M' has been indicated , the same shall imply for the Design Mix Concrete. The Ready Mix Concrete shall be as per IS : 4926 and as per CPWD Specification and guide lines. For the nominal mix in RCC, CPWD specification shall be followed. The Design Mix Concrete will be designed based on the principles given in IS : 456, 10262 and SP 23. The contractor shall carry out design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. The cement shall be actually weighed, as presumption of each bag having 50 kg shall not be allowed. In case of use of admixture, the mix shall be designed with these ingredients as well. The specification mentioned herein below shall be followed for Design Mix Concrete.

INGREDIENTS

- a. Coarse Aggregate :- As per CPWD Specifications
 - b. Fine Aggregate :- As per CPWD Specifications.
 - c. Water :- As per requirements laid down in IS 456-2000 and CPWD specifications.
 - d. Cement: Cement arranged by the contractor will be OPC (in bags) conforming to IS: 8112.
- 4.2 Admixture:- Type of Admixture shall be got approved from Engineer-in-Charge. Admixtures of approved quality shall be mixed with concrete to achieve the desired workability within specified water cement ratio. The admixture shall conform to IS : 9103. The chloride content in the admixture shall satisfy the requirement of BS : 5075. The total amount of chlorides in the admixture mixed concrete shall also satisfy the requirements of IS : 456-2000
- 4.3 The contractor shall not be paid anything extra for admixture required for achieving desired workability without any change in specified water cement ratio for RCC / CC work.
- 4.4 Grade of concrete:- The characteristic compressive strength of various grades of concrete shall be given as below :-

Sl. No.	Grade / Designation	Compressive Strength on 15 cm cubes min 7 days (N/mm ²)	Specified characteristic compressive strength at 28 days (N/mm ²)	Minimum cement content * (Kg per cum)	Maximum water cement ratio
(i)	M-30	As per design	30	340	0.45
(ii)	M-40	As per design	40	360	0.45

4.5 The Concrete mix will be designed for minimum workability as specified in para 7 of IS-456-2000

4.6 WORKABILITY OF CONCRETE (UNLESS OTHERWISE SPECIFIED ELSEWHERE OR AS DECIDED BY ENGINEER IN CHARGE.

Placing Conditions	Degree of Workability	Slump (mm)
(1)	(2)	(3)
Lightly reinforced sections in slabs, beams walls, columns	Low	25-75
Heavily reinforced section in slabs, beams, walls, columns	Medium	50-100
Pumped concrete	Medium	75-100

4.7 The recommended values of slump for various members shall conform to IS 456

4.8 In the designation of concrete mix letter M refers to the mix and the number to the specified characteristic compressive strength of 15 cm – Cube at 28 days expressed in N/mm². It is specifically highlighted that in addition to above requirement the maximum cement content of OPC for any grade shall not exceed 430 kg/cum.

4.9 The concrete design mix with or without admixture will be carried out by the contractor and got approved by IIT Delhi or NCBM Ballabgarh as per direction of Engineer-In-Charge, within 30 days from the date of issue of letter of acceptance. No concreting shall ne done until the mix design is approved.

4.10 For such approval various ingredients for mix design as submitted by contractor shall be sent to the lab / test houses through the Engineer-In-Charge of the project and got it tested in approved laboratories as may be decided by the Engineer-in-charge. Sample of aggregate sent shall be preserved at site by the Institute. For each different set of Coarse aggregates & Fine aggregates , fresh design shall be done and got approved by the Institute. The admixture if used by contractor shall be at his own cost without any extra payment.

4.11 The Cement content means PP Cement including fly ash added during the production of PPC at the cement plant/factory.

4.12 In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted in approved Lab. By Engineer-In-Charge shall be submitted by the contractor as per the direction of the Engineer in charge. In case of failure of batching plant and site conditions warrants for smooth progress of work, RMC of suitable design mix may be allowed with the written permission of Engineer-in-charge, and with no claim of extra cost from the contractor.

4.13 Approval of Design Mix

- a. The mix design for a specified grade of concrete shall be done for a target mean compressive strength $T_{ck} = F_{ck} + 1.65s$

Where F_{ck} = Characteristic Compressive Strength at 28 days

s = Standard deviation which depends on degree of quality control.

- b. The degree of quality control for this work is “good” for which the standard deviation(s) obtained for different grades of concrete shall be as per IS relevant IS Standards/Codes.
- c. Out of the six specimen of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days.

4.14 Charges for Design Mix

All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the contractor.

4.15 Design Mix Concrete from Fully Automatic Computerized Concrete Batching and Mixing Plant

a. Proportioning Concrete

In proportioning cement concrete, the quantity of both cement and aggregates shall be determined by weight. The cement shall be weighed separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean and serviceable condition. The amount of mixing water shall be adjusted to compensate for moisture content in both coarse and fine aggregates. The moisture content of aggregates shall be determined in accordance with IS : 2386 (Part III). Suitable adjustments shall also be made in the weights of aggregates to allow for the variation in weight of aggregates due to variation in moisture content.

b. Production of Concrete

The concrete shall be RMC .produced in a central batching and mixing plant with, computerized printing for contents and admixture dosage. The batching plant shall be fully automatic. Automatic batcher shall be charged by devices which, when actuated by a Single starter switch will automatically start the weighing operation of each material and stop automatically, when the designated weight of each material has been reached. The batching plant shall have automatic arrangement for dispensing the admixture and shall also be capable of discharging water in more than one stage. A print out from the batching plant for every lot shall be submitted. A batching plant essentially shall consist of the following components : Separate storage bins for different sizes of aggregates, silo for cement; and water storage tank.

- (i) Batching equipment
- (ii) Mixers
- (iii) Control panels
- (iv) Mechanical material feeding and elevating arrangements
- (v) The Contractor shall arrange for inspection of automatic batching plant within seven days of issue of letter of award to facilitate inspection and approval of same by Engineer-In-Charge. Nothing extra will be paid for this.

- c. The compartments of storage bins for aggregates shall be approximately of equal size. The cement compartment shall be centrally located in the batching

plant. It shall be watertight and provided with necessary air vent, aeration fittings for proper flow of cement & emergency cement cut off gate. The aggregate and sand shall be charged by power operated centrally revolving chute. The entire plant from mixer floor upward shall be enclosed and insulated. The batch bins shall be constructed so as to pass by self-cleansing during drawdown. The batch bins shall in general conform to the requirements of IS :4925.

- d. The batching equipment shall be capable of determining and controlling the prescribed amounts of various constituent materials for concrete accurately i.e. water, cement, sand, individual size of coarse aggregates etc. The accuracy of the measuring devices shall fall within the following limits.

Measurement of Cement	±2% of the quantity of cement in each batch
Measurement of Water	±3% of the quantity of water in each batch
Measurement of Aggregate	±3% of the quantity of aggregate in each batch
Measurement of Admixture	±3% of the quantity of admixture in each batch

4.16 Mixing Concrete

The mixer in the batching plant shall be so arranged that mixing action in the mixers can be observed from the operator's station. The mixer shall be equipped with a mechanically or electrically operated timing, signaling and metering device which will indicate and assure completion of the required mixing period. The mixer shall have all other components as specified in IS:4925.

4.17 Transportation, Placing and Compaction of Concrete

- (i) Mixed concrete from the batching plant shall be transported to the point of placement by transit mixers or through concrete pumps or steel closed bottom buckets capable of carrying 6 cum concrete. In case the concrete is proposed to be transported by transit mixer, the mixer speed shall not be less than 4 rev/ min. of the drum nor greater than a speed resulting in a peripheral velocity of the drum as 70 m / minute at its largest diameter. The agitating speed of the agitator shall be not less than 2 rev / min. nor more than 6 rev / min. of the drum. The number of revolutions of the mixing drum or blades at mixing speed shall be between 70 to 100 revolutions for a uniform mix, after all ingredients, have been charged into the drum. Unless tempering water is added, all rotation after 100 revolutions shall be at agitating speed of 2 to 6 rev / min. and the number of such rotations shall not exceed 250. The general construction of transit mixer and other requirements shall conform to IS : 5892.
- (ii) In case concrete is to be transported by pumping, the conduit shall be primed by pumping a batch of mortar / thick cement slurry through the line to lubricate it. Once the pumping is started, it shall not be interrupted (if at all possible) as concrete standing idle in the line is liable to cause a

plug. The operator shall ensure that some concrete is always there in the pump-receiving hopper during operation. The lines shall always be maintained clean and shall be free of dents.

- (iii) Materials for pumped concrete shall be batched consistently and uniformly. Maximum size of aggregate shall not exceed one-third of the internal diameter of the pipe. Grading of aggregate shall be continuous and shall have sufficient ultra fine materials (materials finer than 0.25mm). Proportion of fine aggregates passing through 0.25mm shall be between 15 & 30% and that passing through 0.125 mm sieve shall not be less than 5% of the total volume of aggregate. When pumping long distances and through hot weather, setretarding admixtures may be used. Admixtures to improve workability can be added. Suitability of concrete shall be through pumping shall be verified by trial mixes and by performing pumping tests.

4.18 Preparation of Mixes as per approved Design Mix and Conducting Confirmatory Test at Field Lab

- a. The contractor shall make the cubes of trial mixes as per approved Mix design at site laboratory for all grades, in presence of Engineer in charge using sample of approved materials proposed to be used in the work prior to commencement of concreting and get them tested in his presence to his entire satisfaction for 7 days and 28 days. Test cubes shall be taken from trial mixes as follows.

For each mix, a set of six cubes shall be made from each of the three consecutive batches. Three cubes from each set of six shall be tested at age of 7 days and remaining three cubes at age of 28 days. The cubes shall be made, cured, transported and tested strictly in accordance with specifications. The average strength of nine cubes at age of 28 days shall exceed the specified target mean strength for which design mix has been approved , the evaluation of test results will be done as per IS : 456-2000.

4.19 Work Strength Test TEST SPECIMEN

Work strength test shall be conducted in accordance with IS: 516 on random sampling. Each test shall be conducted on six specimen, three of which shall be tested at 7 days and remaining three at 28 days. Additional samples shall be prepared, if required, as per direction of Engineer in charge for testing samples cured by accelerated method as described in IS : 9103.

TEST RESULTS OF SAMPLE

The test results of the sample shall be the average of the strength of three specimen. The individual variation shall not be more than + - 15 percent of the average. If more, the test results of the sample are invalid. 90% of the total tests shall be done at the laboratory established at site by the contractor and remaining 10% in the laboratory of Government Engineering colleges, or in any other approved laboratory as directed by the Engineer-in-charge.

4.20 Standard for Acceptance

- a. Standard of acceptance shall be same as specified in clause 16 of IS 456-2000.
- b. In order to keep the floor finish as per direction of Engineer-in-charge and as per Architectural drawings and to provide required thickness of the flooring as per specification, the level of top surface of RCC shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the contractor.

4.21 Ultrasonic Pulse Velocity Method of Test for RCC

- a. The underlying principle of assessing the quality of concrete is that comparatively higher velocities are obtained when the quality of concrete in terms of density, homogeneity and uniformity is good. The consistency of the concrete as regards its general quality gets established. In case of poorer quality lower velocities are obtained. If there are cracks, voids or flaws inside the concrete which come in the way of transmission of pulse, lower velocities are obtained.
- b. The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation etc. indicative of the level of workmanship employed, can thus be assessed using the guidance given in table below, which have been evolved for characterizing the quality concrete in structure in term of the ultrasonic pulse velocity.

Velocity criterion for Concrete Quality Grading

S. No.	Pulse velocity by Cross Probing (km/sec)	Concrete Quality Grading
1.	Above 4.5	Excellent
2.	4.5 to 3.5	Good
3.	3.5 to 3.0	Medium
4.	Below 3.0	Doubtful

Note : In Case of “doubtful” quality it may be necessary to carry further tests.

- c. Pulse velocity method of test of concrete is to be conducted for CPWD works as a routine test. The acceptance criteria as per the above table will be applicable which is as per IS 13311 (part-1): 1992. From the above “Good” and “Excellent” grading are acceptable and below these grading the concrete will not be acceptable.
- d. 5% of the total number of RCC members in each category i.e. beam, column, slab and footing may be tested by UPV test method for establishing quality of concrete. It is suggested that test be conducted on RCC beam near joint with column, on RCC column near joint with beam, on RCC footings and rafts. On RCC rafts a suitable grid can be worked out for determining number of tests. In addition doubtful areas such as honeycombed locations, locations, where continuous seepage is observed, construction joints and visible loose pockets will also be tested.

- e. The test results are to be examined in view of the above acceptance criteria "Good" and "Excellent" and wherever concrete is found with less than required quality as per acceptance criteria, repairs to concrete will be made. Honeycombed areas and loose pockets will be repaired by grouting using Portland Cement Mortar/Polymer Modified Cement Mortar /Epoxy Mortar, etc. after chipping loose concrete in appropriate manner. In areas where concrete is found below acceptance criteria and defects are not apparently visible on surface ,injecting approved grout in appropriate proportion using epoxy grout /acrylic Polymer modified cements slurry made with shrinkage compensating cement / plain cement slurry etc will be resorted to for repairs.(refer relevant chapters from CPWD Hand Book on Repairs and Rehabilitation of RCC Buildings).Repair to concrete will be done till satisfactory results are obtained as per the acceptance criteria by retesting of the repaired area. If satisfactory results are not obtained dismantling and relaying of concrete will be done.

4.22 Measurement

As per CPWD specifications.

4.23 Tolerances

As per CPWD specifications

4.24 Rate

- a. The rate includes the cost of materials and labour involved in all the operations described above except for the cost of centering, shuttering and reinforcement, which will be paid separately.
- b. In case of actual average compressive , strength being less than specified strength which shall be governed by para ' Standard of Acceptance'' as above the rate payable shall be worked out accordingly on the basis of analysis.
- c. 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 contractors. 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 para 5.4.13 of Revised CPWD specification 2009, Vol.-I.
- d. 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. The landing level of mumti / Staircase cabin shall be Kept one riser level higher than adjoining slab level so as to accommodate water proofing treatment over terrace slab. In case of kitchen slab the portion of floor trap below kitchen platform be kept at lower level as per drawings. Nothing extra is payable on this account.

- e. For the execution of centering and shuttering, the contractor shall use propriety "Reebole" chemical mould release agent of FOSROC or equivalent as shuttering oil as approved by Engineer-in-charge and nothing extra shall be paid on this account.

4.25 Cover / Spacer Block

The contractor shall provide approved type of support for maintaining the bars in position and ensuring required spacing and correct cover of concrete to reinforcement as called for in the drawings, spacer blocks of required shape and size. Chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. Spacer blocks shall be cast well in advance with approved proprietary pre-packed free flowing mortars (Conbextra as manufactured by M/S Fosroc Chemicals India Ltd. Or equivalent as approved by the Engineer-in-charge at his discretion) of high early strength and same colour as surrounding concrete, Pre-cast cement mortar/concrete blocks/blocks of polymer shall not be used as spacer blocks unless specially approved by the Engineer-in-charge, rate of RCC items is inclusive of cost of such cover blocks.

4.26 Construction Joints

Construction joints in PCC, RCC and Light Weight Concrete works etc., shall be provided only at places as per approved structural drawings. It shall not in any manner structurally or functionally affect the structure. If, any additional construction joint is required to be provided, it shall be done with approval of the Engineer-in-Charge. The centring, shuttering, strutting etc., required for the construction joint in PCC, RCC and Light Weight Concrete works shall be provided as per the CPWD Specifications. Nothing extra shall be payable on this account.

4.27 Treatment to the Construction Joints and Rectification of Defects

All care shall be taken to minimize the number of construction joints in the basement raft and walls as well as in the leveling course of PCC at base. Still, wherever the construction joints are provided, these shall be slightly opened up and then suitably filled with cement mortar 1:3 (1 cement: 3 fine sand) after applying a bond coat of cement slurry. The aluminium nipples shall be fixed in the cavity and crevices, if required. Then cement slurry of w/c ratio 0.5 shall be pressure grouted through these nipples as required, which shall then be suitably cut. Nothing extra shall be payable on this account.

All care shall be taken to avoid any honey combed concrete or any cavity. Still, if any honey combed concrete or cavity in RCC wall is encountered the same shall be rectified by removing all loose concrete by chiseling. The chipped concrete surface shall be cleaned and made dust free by blowing compressed air and then washed clean with water (but without excess water). Then a bond coat of polymer modified cement slurry @ 2.2 kg of cement per sq. m. of concrete surface, in two coats, shall be

applied as specified. The second coat shall be applied immediately within 15-20 minutes of application of the first coat. A coat of polymer modified cement plaster of mix 1:3 (1 cement: 3 fine sand) of the required thickness shall be applied as specified to fill the cavity if the required thickness is less than 20 mm. If the required thickness is more than 20 mm. the cavity shall be filled by concrete of relevant grade after providing the required centering and shuttering. The surface shall then be moist cured for minimum 7 days. Nothing extra shall be payable on this account.

4.28 MISCELANEOUS

Mixer having arrangement of weighing water for controlling W.C. ratio should only be used in all PCC and RCC works where there is no provision for Ready Mix Concrete.

Only factory made round type concrete cover blocks of same mix shall be used. No other type of cover blocks shall be permitted.

Any cement slurry if added over base surface (or for continuation of concreting) for bond, its cost shall be deemed to have been included in the respective items, unless otherwise, explicitly stated and nothing extra shall be payable nor extra cement considered in the cement consumption on this account.

Centering and shuttering for all concrete and reinforced concrete wherever required shall be in steel and / or plywood to produce a smooth and uniform finish on all exposed surfaces. However, all props, bracings, scaffolding etc., shall be in steel. The entire responsibility of planning, design, erection and safety of formwork shall lie with the Contractor.

Extra for shuttering in curved profile

It is clarified that only the portion of shuttering in elevation and not segmental exceeding 6m radius in plan shall be measured for payment under this item. The shuttering curved in plan shall not be measured separately for payment and its rate is deemed to be included in the cost of respective item for payment and mode of measurement shall be as per the CPWD specifications. For shuttering curved in elevation the steel / ply shuttering shall be fabricated to achieve the curved profile as per the architectural drawings.

The contractor shall arrange and provide at the site of work all the equipments for field testing as required like balances, sieves, slump cone , dial gauges, compression testing machines(still the samples shall be tested in an independent laboratory as approved by the Engineer-in- Charge), graduated measuring cylinders, steel tapes, vernier calipers, micrometer screw gauges, plumb bobs, spirit levels , Schmidt rebound hammer, total station survey equipment, magnifying glass, screw drivers, plastic bags for samples, etc. Allowing establishing the site laboratory by the contractor shall not absolve the contractor from fulfilling the criteria of getting the tests done in an independent laboratory. The decision of the Engineer-in-Charge of allowing any test in the site laboratory or any other laboratory shall be final and binding on the contractor and no claim of any kind whatsoever shall be entertained from the contractor on this account.

Even if the certain items of work are carried out by the specialized contractors, the responsibility for the work shall however rest with the contractor only. Unless otherwise specified for the item, the maximum water cement ratio for any grade of concrete shall not be more than 0.5. The contractor shall within 15 days of issue of letter for commencement of the work, submit the mix design for various grades of concrete along with 7 days crushing strength reports and within 40 days submit 28 days crushing strength reports, for the samples for the mix. Nothing extra shall be payable on account of admixing any chemical admixture for achieving any characteristic for the concrete. Concreting shall be commenced only after the approval of the mix design by the Engineer-in-Charge.

Wherever required the M.S. inserts shall be provided during the casting of RCC / PCC. The payment of providing and fixing inserts shall be made separately. However contractor shall have to bear all the incidental costs and expenses on this account.

As far as possible the contractor shall plan that the concreting is carried out during day shift.

4.29 Expansion joint:

General

Seismic/separation joints shall be provided where shown on the drawings. They shall be constructed with in gap between the adjoining parts of the works of the width specified in the drawings.

The contractor shall ensure that no debris is allowed to enter and be lodged in seismic and separation joints.

Seismic or separation joints shall be provided with approved 50mm thickness of compressible filler board, backer rod and polysulphide sealant compound etc., Boards to be used in expansion joint shall be best approved quality and shall be got approved before use. It shall have minimum density of 95 kg/cum, Non staining with less than 1% water absorption and compression recovery of 93% minimum as per the specifications.

4.30 Method of Application

50mm thick expansion board having sufficient width directed by Engineer-in-charge shall be provided in expansion joint before filling and finishing the expansion joint with sealant. The expansion joint shall be cleaned and made dry completely. All loose materials shall also be removed. The joints gap shall be made uniform in width and depth after cleaning the joints. The backup materials of best quality shall be provided in position in order to produce thoroughly together in required proportion as prescribed by manufacture specification, so that a uniform mixture obtained. The mixed solution shall be applied to two sides of the joint that it covers the sides complete.

Disturbed edges of RCC members near expansion joints shall be finished with rich mortar without any extra work includes providing required width of expansion board in the joints and measurement of expansion board only shall be taken.

The rate shall be for a unit of one square meter of the joint finished with board.

4.31 Sampling Criteria

Following test carried out at every 100 sqmt.

- (i) Density.
- (ii) Water absorption.
- (iii) Compression recovery.

4.32 Mode of measurement:

The rate shall be for a unit of one square meter

The area where overlap is supposed to be required will not be paid for separately.

4.33 Rate

The rate shall be include the cost of all the materials and labour involved in all the operations described above expect otherwise stated.

5 BRICKWORK / AAC BLOCKWORK, FLOORING & WALL LINING / VENEER WORKS

5.1.1 BRICK WORK:-

The classification of bricks brought by the contractor shall strictly confirm with CPWD Specifications – 2009 Vol-1 & II with upto date correction slips or as specified. The rate shall also include for leaving chases / notches for dowels / cramps for all kinds of cladding to come over brick work.

The walls shall be made with brick masonry

5.1.2 WORKING CHARACTERISTICS:

- Masonry structures can be designed conforming to BIS: 1905.

STRENGTH & STABILITY:

Unless otherwise specified the design and construction of cellular concrete masonry walls shall conform generally to the requirements of BIS: 1905-1980.

5.1.3 MANUFACTURERS

Acceptable Manufacturer: As per approved list of makes.

1. Requests for substitutions will be considered only in case of non availability of material.

5.1.4 The Flooring work, wall lining work and stone cladding work in general including testing etc. shall be carried out as per CPWD specifications.

6.0 WOOD WORK

General

- 6.1 The wood work in general shall be carried out as per CPWD Specifications 2009
- 6.2 The wood selected shall be best quality second class Teak wood or as specified.
- 6.3 Specified timber shall be of good quality and well-seasoned. It shall have uniform colour, reasonably straight grains and shall be free from knots, cracks, shakes and sapwood. It shall be close grained.
- 6.4 Wood work shall not be painted, oiled or otherwise treated before it has been approved by the Engineer-in-Charge.
- 6.5 All portion of timber including architrave abutting against masonry, concrete, stone or embedded in ground shall be painted with approved wood preservative or with boiling coal tar.
- 6.6 Anti-termite Treatment and fire retardant paint to be provided of approved brand and manufacturers as directed.
- 6.7 All fittings and fixtures shall be got approved from the Engineer-in-Charge before procurement well in advance and the approved samples shall be kept at site till completion of the work.
- 6.8 The timber to be procured for the work shall match the samples shown to the Tenderers before submission of the tenders. Before starting the work, the Contractor shall procure and submit the samples of timber (matching to the samples shown to the Tenderers before submission of the tenders) for the approval of the Engineer-in-Charge.
- 6.9 The samples of species of timber to be used shall be deposited by the contractor with the Executive Engineer before commencement of the work. The contractor shall produce cash vouchers and certificates from standard kiln seasoning plant operator about the timber section to be used on the work having been kiln seasoned by them, failing which it would not be so accepted as kiln seasoned.
- 6.10 Factory made shutters, as specified shall be obtained from factories to be approved by the Engineer-in-Charge and shall conform to IS: 2202 (Part-I) 1991. The contractor shall inform well in advance to the Engineer-in-Charge the names and address of the factory where from the contractor intends to get the shutters manufactured. The contractor will place order for manufacture of shutters only after written approval of the Engineer-in-Charge in this regard is given.
- 6.11 The contractor is bound to abide by the decision of the Engineer in Charge and recommend a name of another factory from the approved list in case the factory already proposed by the contractor is not found competent to manufacture quality shutters. Shutters will however, be accepted only if this meet the specified

tests. The contractor will also arrange stage wise inspection of the shutters at factory by the Engineer in Charge or his authorized representative. The contractor will have no claim if the shutters brought at site are rejected by the Engineer in Charge in part or in full lot due to bad workmanship/quality. Such shutters will not be measured and paid. The contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by the Engineer in Charge.

6.12 Testing

- i. The shutters shall be tested for species, seasoning & treatment, defects in the timber, panel material, construction & workmanship in the approved Laboratory at the frequency mentioned in CPWD specification
- ii. If shutters are found defective in any one of the criterion double the shutter shall be tested & if found permissible can be accepted. If shutter is found defective in more than one criterion, the whole lot shall be rejected.
- iii. Finish
 - a) All components of door shutter shall have smooth finish.
 - b) Panels of the door shutters shall be flat and well sanded to a smooth and level Surface.
 - c) All the surfaces of door shutters which are required to be painted or polished or varnished shall be got approved from the Engineer In Charge before applying protective coat of primer, polish or varnish.
- iv. Transparent sheet glass conforming to IS: 2835 shall be used.
- v. **Silicone Sealant** -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 **silicone sealant** of approved colour and make to ensure complete water tightness. The **silicone sealant** 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.
- vi. While procurement of wooden members care shall be taken to arrange thicker sections than those proposed in Engineer-in-charge architectural drawings as there is reduction of thickness in sawing process and kiln seasoning. The Engineer-in-charge architectural drawings show net thickness and no plea towards less size beyond tolerance shall be entertained during measuring the shutters. The contractor is, therefore, advised to procure approximately 45 mm and 40 mm thick wooden members to achieve net thicknesses of 35 mm and 30 mm respectively for shutter thickness and similar care in selection of width of styles, rails, sash bars to avoid any complications for acceptance of shutters.

6.13 Hardware

(i) Hardware

All hardware for doors and windows shall be of stainless steel or as specified. All hardware shall be installed using routers and counter sunk screws. Panic

hardware will be provided in all staircase and escape doors. Drawer slides with steel roller ball-bearings and drawer locking system with master keying option is to be provided for all built in cabinetry work and drawer units.

- (ii) The contractor shall procure all the hardware as specified in the schedule. The rate shall include for making mechanical chases to receive the hardware, and also the cost of approved screws, nails, clamps etc. The fixing shall be done in the best workmanship like manner and in accordance with that employed for fixing hardware. Any damage to the joinery or the hardware shall be made good at no extra cost to the Institute.

7.0 FALSE CEILING

General

Work shall in general be carried out as per the CPWD specification. Modular and acoustical false ceiling shall be provided and installed in all areas. All ceilings in the office areas, pantry and all service areas shall be openable, where provided in drawing and nothing extra shall be payable for provision for access panels.

The false ceiling material shall be of Gypsum board, metal, acoustic modular tiles or calcium *silicate* mineral fibre ceiling tiles as specified. The technical assistance and guidance is to be taken from the respective approved manufacturers and work shall be done strictly according to the manufacturers specifications and manuals. Material from original source shall only be used.

No sagging, unlevelled stretch of work or chipped tiles shall be accepted. Contractor shall take full responsibility for its firmness with the structure.

The false ceiling is to be in different shapes, such as Vaults, Coffers, cove's and Plain in unison with Acoustical Ceiling Tiles and Metallic Tiles Ceiling. The technical assistance and guidance is to be taken from manufacturers and work has to be done according to the manufacturer's specifications and manuals. A sample of each finish shall be got approved before proceeding for bulk production. GI framing shall be erected as per recommendation of the manufacturer specification and approval of the Engineer-in-charge. The main contractor shall engage specialized agency and submit its credentials to Engineer-in-charge for approval. The criteria for setting the terms and conditions shall be broadly in line with CPWD criteria for similar works.

False ceiling work shall be carried out in accordance with the actual site conditions at different /split-levels. Any sagging, unlevelled stretch of work shall be redone /replaced and made good, at no extra charge, to the satisfaction of Engineer-in-charge. No compensation shall be paid on account of provision /coverage of openings for lighting fixtures, air-conditioning ducts and the likes as detailed in drawings and /or directed.

8.0 FIRE CHECK DOORS

8.1 General

The door frames and shutters shall be fabricated from approved manufacturers with materials and specifications identical to those for the prototype test report in accordance with IS:3614 (Part-2) 1992 for prescribed fire rating either by CBRI Roorkee shall be submitted to the Engineer-in-charge, and execution of the work shall commence only after obtaining his approval in writing. The test report shall include the information prescribed in clause 10 of IS:3614(Part2) 1992.

Testing: The Engineer-in-charge may select, out of the fire door and shutter, assemblies brought at site , random samples for testing either at CBRI Roorkee or at the Quality Marking Centre for Engineering Goods, Department of Industries, Bahadurgarh Harayana. The contractor shall make all arrangement for testing of the sample as per IS: 3614(Part2) 1992 and submit the test result to Engineer-in-charge. In case the test result is satisfactory testing charges (which includes the cost of sample and transportation) shall be paid by Engineer-in-charge. If the test result indicates that the fire door assembly does not conform to the requirement of IS:3614 (Part2) 1992for FD/60/120/180, the entire lot of the material shall be rejected. In later case, no testing charges shall be paid.

The Contractor shall furnish all materials, labour, operations, equipment, tools & plant, scaffolding and incidentals necessary and required for the completion of all metal work in connection with steel doors, as called for in the drawings, specifications and bill of quantities which cover the major requirements only. Anything called for in the tender documents shall be considered as applicable to the items of work concerned. The supply and installation of additional fastenings, accessory features and other items not specifically mentioned, but which are necessary to make a complete functioning installation shall form a part of this contract.

All metal work shall be free from defects, impairing strength, durability and appearance and shall be of the best quality for purposes specified made with structural proprieties to withstand safety strains, stresses to which they shall normally be subjected to.

All fittings shall be of high quality and as specified and as per approval.

The Contractor shall strictly follow, at all stages of work, the stipulations contained in the Indian Standard Safety Code or its Equivalent British Standard and the provisions of the safety code and the provision of the safety rules as specified in the General Conditions of the Contract for ensuring safety of men and materials.

Any approval, instructions, permission, checking, review, etc., whatsoever by the Engineer-in-charge shall not relieve the Contractor of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship, etc.

The fire check doors shall satisfy:

- (i) **Stability:** The fire check door should not collapse during the rated period of fire under the specified fire conditions. The fire check doors provide safe access to the escape route in the building namely protected corridors and staircase.
- (ii) **Integrity:** The fire check door should not allow the passage of hot gases or the flames through the rebate or the gap between the door frame and shutters for the duration of its fire rating.
- (iii) **Insulation:** The mean temperature of the fire door on the unexposed side should not exceed 140 degrees C above ambient temperature for the duration of its fire rating. The fire/smoke check door assembly being offered shall be as prototype tested by CBRI, Roorkee or any other approved laboratory for the prescribed fire rating as per BS:476 part20/22, IS:3614 part-II. A test report from CBRI Roorkee shall be submitted for approval before executing the work. The fire/smoke check doors should also have Tariff Advisory Committee approval as admissible. The tenderer shall employ specialized agency or manufacturer of the fire check door assembly having their own manufacturing facility and such agency shall be got approved by the Engineer-in-charge. Door frame and shutter shall in general be fabricated as per the nomenclature of the item of the work and recommendations of the specialized agencies as approved by the Engineer-in-charge.
- (iv) Fire check doors shall be 2 hour or as specified fire rated and shall satisfy the three performance criteria of stability, integrity and insulation as per BS:476 part20/22, IS:3614 part-II.
- (v) One door assembly shall be got tested from CBRI Roorkee or any other test laboratory approved by Engineer-in-charge as per the nomenclature of the item for the same.
- (vi) The tenderer shall be responsible for obtaining 'No Objection Clearance' from local fire authority for the executed work.
- (vii) **Guarantee Bond:** The work shall be guaranteed for a period of five years from the expiry of defect liability period specified in the contract. The security deposit against this item of work shall be in addition to the security deposit mentioned in schedule-F. The contractor shall execute the necessary guarantee bond against any structural defect, faulty materials, workmanship and defective finish. In addition 5% (five percent) of the cost of this item of work shall be retained as security deposit and the amount so withheld would be released after five years from the expiry of defect liability period under the agreement, if performance of the work is found satisfactory. If any defect is noticed during the guarantee period, it shall be rectified by the contractor along with any incidental repairs to the structure, flooring, finishing, fixtures and any other related damaged work within fifteen days of receipt of intimation of such defects in the work. If the defects pointed out are not attended to within the specified period, the same shall be got done from another agency at the risk and cost of the contractor and the cost of the attending such repairs shall be deducted from any dues payable to the contractor. However, the security deposit deducted may be released in full against bank guarantee of equivalent amount in favour of Engineer-in-charge in the prescribed proforma.

8.2 Codes & Specifications

The complete assembly of the doors i.e. frame, shutter, vision glass and hardware shall have fire rating as required and shall confirm to:

1. BS:476,Part-4 Non combustibility test for materials.
2. BS:476,Part-7 Surface spread of flame test for materials.
3. BS:476,Part-20 Method for determination of the fire resistance of elements of construction (general principles).
4. BS:476,Part-22 Method for determination of the fire resistance of non load bearing elements of construction.
5. BS:6206:1981 Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings.
6. EN:410 Determination of luminous and solar characteristics of glazing.
7. EN:12600 Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings.
8. EN:1634 Part-1-1999 Fire resistance tests for doors, shutters and open able windows
9. EN:1364 Part-1-1999 Fire resistance tests for non-load bearing elements.

8.3 Fire Check Glazed Doors & Windows

Composition of the Doors & Windows

All materials, items, hardware etc. shall be subjected to approval by Engineer-In-Charge. Necessary documentation/ test certificates shall be furnished by the Contractor for such approval. FCD & FCW shall be fabricated only after approval of materials etc, by Engineer-In-Charge.

Each FCD & FCW shall be provided with a small metal identification plate in suitable location indicating Fire rating, name of the Manufacturer, date of installation and approval of approved test house.

Each vision panel shall carry a stamp of the manufacturer.

Unless otherwise mentioned elsewhere, all FCD & FCW shall be of two hours (120 Mins.) and all door assemblies (except fully glazed fire door) shall satisfy three criteria of fire resistance (stability, fire smoke check integrity and thermal insulation).For glazed fire rated door it should exhibit integrity, stability and radiation control for 120 mins and insulation for the first 30 mins. The glazed fire doors shall be manufactured as per the nomenclature of the item an as per the manufacturers specification as per the best engineering practice and as per the drawing and direction of Engineer-in-charge.

The glass panels shall be double glazed with thickness as specified clear, interlayered, 120 min. rated, non wired toughened glass of approved make complies to BS476 Part22 or (EN-1634-1:1999). The glass shall be complied to Class 1B1 Category of Impact Resistance to EN:12600 safety Glazing Material. The system should be tested as per EN:1364 Part-1-1999 or equivalent standard.

8.4 Fire Check Glazed Partition

Fire Check Glazed Partition with galvanized steel frame 120 minute fire rated – fully glazed non load bearing fixed partition shall be of proprietary design of the manufacturers as per the valid fire test certificate from /EN/BS from National or international test lab. Frames and glass panels shall be as per the nomenclature of the item.

8.5 Installation

Shop drawings of the doors, windows and partitions in accordance to the prototype profiles used to obtain fire test certificate by approved national or international test house shall be prepared and submitted for approval by the Engineer-In-Charge. The shop drawings shall include all details of construction, anchoring, connections, fastenings etc. Any suitable modification in fittings, fixtures as required for project specific installations shall have to be incorporated in door profile and approval obtained prior to the installation of the door.

8.6 Deliverables by the Contractor

Following documentation/ drawings shall be furnished along with the Doors

1. Prototype Test Certificate by approved test house
2. Shop drawings
3. Specification / Manufacturer's literature, Test certificates and other documentation for materials and items intended to be used.
4. Certificate indicating that design and installation of Doors and hardware conforms to norm laid down by approved international test house.
5. Test report attested by Fire rated glass manufacturer.
6. The Fire rated glass applicator has to be approved by Fire rated Glass Manufacturer and Submit the approved applicator certificate.

9.0 GLASS AND GLAZING WORK

9.1 General

The contractor shall furnish all labour, material and equipment required completing the installation of all glass and related items. A glass shall be of the type, quality, and substance specified in the schedule of quantities. The contractor shall cut glass sizes by field measurements or dimensions of the approved shop drawings. The responsibility for correct glass sizes shall rest with the contractor. No cracked, chipped or disfigured glass shall be accepted, and the contractor shall replace all breakages or faulty installation without extra cost.

The glass shall be set in wood or metal glazing straps and metal sash with elastic glazing and compound. The glass shall be beaded first and so installed as to achieve a completely watertight result. The opaque glass, where called for, shall be set with the smooth surface outside. At the completion of the work all glass shall be thoroughly cleaned off paint and other marks removed. No cracked, chipped or disfigured glass shall be accepted, and the contractor shall replace all breakage or faulty installation without extra cost to the owner before acceptance of fit-out.

All vision glasses shall be float glass of specified thickness. The edges shall be beveled as indicated in drawings and shall be done at approved source.

The Etching wherever specified in drawings, shall be done at approved sources as per full-scale drawing approved by Engineer-in-charge. The etched panel shall be chemically washed /treated as per specialist specifications to have a permanent dust free surface.

The Contractor shall be responsible for protecting all mirrors and glasses fixed by him and shall replace at his own expense any broken or damaged mirror / glass caused through lack of adequate protection or care in installation or handling.

9.2 Tempered / Toughened Glass:

Tempered /Toughened glass shall be examined by the glass manufacturer to detect and discard any glass which exceeds the following tolerance: 1.5mm bow in 600mm; 3mm bow in 1500mm; 6mm bow in 3000mm; 9 mm bow in 4500mm. Where the strengthening process results in essentially parallel ripples or waves, the deviation from flatness at any peak shall not exceed 0.13 mm and the difference between adjacent peaks shall not exceed 0.13mm. Where bow tolerance and wave tolerance differ, the stricter requirements shall govern. Direction of ripples shall be consistent and in conformance with architectural design.

Following test shall be also carried out by the contractor at his own cost as per following provisions.

Thickness	Impact Strength	Fragmentation	Surface Compression	Bending Strength
IS-2835-1987	IS-2553-PART-I	IS-2553-PART-I	ASTM C-1048-90	DIN 1249-PART - 12

9.3 Float Glass

Glass that gives distorted reflections will not be accepted. Reflections due to pressure, poor manufacturing process, uneven thickness or poor storage are some of the reasons for distortion. All clear float glass quality should conform to BS – 952 and ASTM C 1036 – 90.

9.4 Mirrors

Mirrors shall be fabricated from best clear plate or float glass of approved quality in imported variety and shall match the International Standards. All fixed panel mirrors shall be +/- 0.30mm tolerance. The edges of mirrors shall be polished and beveled and mitered as per I.S. specifications wherever, it's indicated in the drawing.

**Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak**

10 FINISHING

10.1 General

- (a) The work shall be done in accordance with CPWD Specifications -2009 Vol. I to Vol. II with upto date correction slips and the manufacturer's specifications where CPWD specifications are not available.
- (b) The quantity of paint required as per the theoretical consumption including wastages, if any, shall be procured from the approved manufacturer or his authorized dealers and deposited with the representative of the Engineer-in-Charge at site.
- (c) The Primer, Synthetic Enamel paint, distemper etc., of makes as approved by the Engineer in charge and of low VOC, shall only be used and brought to the site of work in the original sealed containers. The material brought to the site of work shall be sufficient for at least 60 days of work. The material shall be kept under the joint custody of contractor and representative of the Engineer-in-Charge. The empty containers shall not be removed from the site till the completion of the work without permission of the Engineer-in-Charge.
- (d) The paint shall be obtained in smaller packing (around 20 litre).
- (e) The paint shall be kept in the joint custody of the Institute and the Contractor and day- to-day account of receipt and issue shall be maintained. However, the safe custody and watch and ward shall remain to be the responsibility of the Contractor. Nothing extra shall be payable on this account.
- (f) The name of the manufacturer, manufacturer's product identification, manufacturer's mixing instructions, warnings and instructions for handling and application, toxicity and date of manufacturing and shelf life shall be clearly and legibly mentioned on the labels of each container. These details shall be kept in record. The material shall be consumed in the order of material brought to site, first come first consume basis. The Contractor shall obtain and submit to the Institute the manufacturer's certificate for compliance of the various characteristics of the materials as per the manufacturer's specifications and also copy of the manufacturer's test report for the record.
- (g) Empty containers of the paints shall not be removed from site till the completion of the work unless otherwise permitted and shall be removed only with the permission of the Engineer-in-Charge or his authorized representative at site of work.
- (h) All arrangements for measuring, dosing etc. at site shall be made by the Contractor. Nothing extra shall be payable on this account.
- (i) The Contractor shall apply samples of each kind of paint for the approval of shade and colour as per the directions of the Engineer-in-Charge before procuring the paint in mass.
- (j) All incidental charges of cartage, storage, wastage, safe custody, scaffolding,

cost of samples and mock ups etc. shall be borne by the Contractor and no claim, whatsoever, shall be entertained on this account.

- (k) For the item of Epoxy paint, it is clarified that the surface for painting shall be prepared by shot blasting. The metal surface shall be cleaned off any rust using sand/ emery paper and also by mechanical brush / power tool cleaning using grinder as required as per the manufacturer's specifications etc. The sand blasting as such is not required to be carried out on the surface. However the epoxy primer shall be applied immediately after the surface preparation.
- (l) For the item of melamine polish, the item includes all the sand papering required to be carried out and wiped properly for cleaning all the loose dust particles. Necessary masking tapes are to be provided where different finishing work is to be carried out, so that the melamine polish does not spread to the other surfaces. Care should be taken while removing the masking tape, so that the surface is not damaged. Cost of melamine polish includes the cost of providing and removing the masking tapes wherever required. The surface shall be sand papered using emery paper no. 180, 320 and 400 as required. Any staining required shall be carried out by applying Apcolite Wood Stain or equivalent, to achieve the required colour and shade as directed by the Engineer-in-Charge. The item of melamine polish is deemed to include cost of such staining. Where French spirit polish is to be carried out the rate is inclusive of cost of staining and wood filler (Apcolite wood filler of Asian Paints or Asian NC Clear Wood filler or equivalent of other brands ICI and Pidilite Industries) if required. Nothing extra shall be payable on this account.

10.2 Quality Assurance

For Quality Assurance the Contractor shall ensure that color and texture of finish coats, shall match the approved sample. Also,

- i) Color of priming coat shall be lighter than body coat.
- ii) Color of body coat shall be lighter than finish coat.
- iii) Color prime and body coats as required so as not to show through the finish coat and to mask surface imperfections.

Before starting application of each type of paint, the Contractor shall apply the paint to a specimen area, not to exceed 10 square meter and get finish and texture approved and shall use it as a sample for the remainder of the work.

11 STAINLESS STEEL / M.S HAND RAIL

- (i) Providing, fabricating and fixing in position welded built –up section using stainless steel/ M.S. section/pipes and connecting plates, and of required diameter & thickness as per the Drawings and details, at the junctions of doors, on walls, other locations as directed etc. including cutting, welding, grinding, bending to required profile and shape, finish, hoisting, buffing and polishing, cutting chase
/ embedding in RCC / Masonry, fixing using stainless steel screws, nuts, bolts and washers or stainless steel fasteners as required to make it rigidly fixed & stable and making good the plaster/ flooring etc. all complete, at all floors and all levels as directed by the Engineer-in – Charge. Prototype samples to be approved by Engineer-in-charge before mass fabrication.

- (ii) Rate includes cost of all inputs of materials, labour, T&P, etc. involved in the work and all incidental charges to execute this item. However, for the purpose of payment only the actual weight of the pipes and plates provided and fixed shall be measured in kg.

Chief Engineer

Kailash Pati Mishra

Indian Institute Of Management Rohtak

12 WATER PROOFING TREATMENT

12.1 General

12.1.1 The work shall be got executed as per CPWD Specifications and as per the manufacturer's specification through specialized agency as approved by the Engineer-in-Charge.

12.1.2 The contractor shall furnish the following particulars immediately after the issue of letter of acceptance by the Institute.

- a) The name of the special firm
- b) The trade names of the product, which would be used.
- c) List of works where the treatment has been used.
- d) Quantity of chlorides and sulphides used in the product.

12.1.3 The rate shall include the cost of all labour and materials involved in all the operations described above and as per the item description.

12.2 Guarantee for Water Proofing Treatment

12.2.1 The contractor shall be fully responsible for and shall guarantee proper performance of the entire waterproofing system for a period of 10 (Ten) years from the expiry of defect liability period. In addition, specific 10 years written guarantee (to be furnished in a non-judicial stamp paper of value not less than Rs.100/-) in approved proforma shall be submitted for the performance of the system, before final payment and shall not in any way limit any other rights the Employer may have under the contract. Guarantee for water proofing shall comprises of all the items described above in particular specification.

12.2.2 All water-proofing work shall be carried out through approved specialist agency as per method of working approved by the Engineer-in-charge. However the Contractors shall be solely responsible for waterproofing treatment until the expiry of the above guarantee period.

12.2.3 Ten years guarantee in prescribed proforma attached shall be given by the contractor for the water proofing treatment. **Towards that 10% (ten percent) of the cost of these items of water proofing under this sub head shall be retained as guarantee to watch the performance of the work executed. However, half of this amount (withheld) would be released after five years from the date of completion of the work, if the performance of the waterproofing works is satisfactory. The remaining withheld amount shall be released after completion of ten years from the date of completion of work, if the performance of the waterproofing work is satisfactory.** If any defect is noticed during the guarantee period, it should be rectified by the contractor within seven days of issuing of notice by the Engineer-in-Charge and, if not attended to, the same shall be got done through other agency at the risk and cost of the contractor and recovery shall be effected from the amount retained towards guarantee. In any case, the contractor and the specialist agency, during the guarantee period, shall inspect and examine the treatment once in every year and make good any defect observed and confirm the same in writing.

The security deposits recovered towards guarantee for removal of defects for specified duration of particular items mentioned in this agreement can be released in full, if bank guarantee of equivalent amount, valid for the duration of guarantee period, is produced and deposited with the Institute.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

13 LIGHT WEIGHT PLAIN CEMENT CONCRETE

- 13.1 The lightweight cement concrete shall be as per the specification for the cement concrete works given in CPWD Specifications except for the material used as coarse aggregate. The coarse aggregate used for the lightweight cement concrete works shall be lightweight aggregates like 'Siporex', or Ultratech or Aerocon or equivalent as approved by the Engineer-in-charge. The grading of the lightweight coarse aggregate shall be the same as that of the specified size of the coarse aggregate. In case of non-availability of the specific or required sizes of the lightweight aggregates, it shall be broken into required sizes by using mechanical crushers or any other method approved by the Engineer-in-charge. The oven dry density of the lightweight aggregate shall not be more than 650kg/cum.
- 13.2 When the lightweight cement concrete is laid in roofing, it shall be laid to required slopes. Laying of concrete shall be done in layers not exceeding 150mm thick and top layer finished rough or smooth with broom finish to receive the proposed water proofing or weather treatment etc. Any construction joints required while laying shall be treated with cement slurry or polymer modified cement mortar 1:3(1 cement : 3 coarse sand) for which, nothing extra would be paid.
- 13.3 Necessary approved water proofing compound may be mixed with the lightweight cement concrete in the places directed by the Engineer-in-charge for which, separate payment for supplying and stacking of water proofing material will be paid. However, mixing charges will be inclusive of the lightweight cement concrete. Mixing of the waterproofing compound shall be made as per the manufacturer's specifications.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

15 ALUMINIUM WORK

15.1 General

- 15.1.1 The material for the work shall be procured from the approved manufacturer as per the list attached with the tender documents. The Contractor shall procure and submit samples of various materials to be used in the work for the approval of Engineer-in-Charge and no work shall commence before such samples are approved. Samples of un-anodized as well as polyester powder coated aluminium sections, microwave cured EPDM gaskets, glass, stainless steel screws, anchor fasteners, hardware and any other material or components requiring approval of samples, in opinion of Engineer-in-Charge, shall be submitted for the approval as mentioned above. The above samples shall be retained as standards of materials and workmanship.
- 15.1.2 The Contractor shall prepare the shop drawings for the aluminium windows giving details of the various aluminium sections, microwave cured EPDM gaskets, cleats, anchor fasteners, hardware, sealants, glass etc. and submit the same for the approval of Engineer-in-Charge.
- 15.1.3 Only after the approval of the samples and the shop drawings by the Engineer-in-Charge, the Contractor shall procure the material for the work. All materials brought to the site by the Contractor, for use in the work, as well as fabricated components shall be subject to inspection and approval by Engineer-in-Charge. The Contractor shall produce manufacturer's test certificates for any material or particular batch of materials supplied by him.
- 15.1.4 The Contractor shall prepare a finished sample of the aluminium window along with glazing panel and fittings etc. for approval of workmanship and material. Nothing extra shall be payable on this account.
- 15.1.5 Aluminium sections to be used for various works shall be appropriate to meet technical, structural, functional and aesthetic considerations. The polyester powder coating shall be carried out in an approved factory / workshop as specified in the tender documents.

15.2 Fabrication

- 15.2.1 All joints shall be accurately fabricated and be hairline in appearance. The finished surface shall be free from visible defects. All the aluminium windows/ventilators/doors shall be factory made and shall be brought to site for assembly and fixing.
- 15.2.2 All hardware used shall conform to the relevant specifications and as per samples approved by the Engineer-in-Charge. Design, quality, type, number and fixing of hardware shall be generally in accordance with architectural drawings and as approved by the Engineer-in-Charge before use.
- 15.2.3 All doors, windows, ventilators and glazing etc. shall be made water tight with microwave cured EPDM gaskets and weather silicone sealants to the satisfaction of the Engineer-in-Charge, for which nothing extra shall be payable.

15.2.4 The frames shall be strictly as per Architectural drawings, the corners of the frame being fabricated to the true right angles. Both the fixed frames and openable shutter frames shall be fabricated out of sections cut to required length, mitered and mechanically jointed for satisfactory performance. All members shall be accurately machine milled and fitted to form hairline joints. The jointing accessories such as aluminium cleats, stainless steel screws etc. shall not to cause any bi-metallic reaction by providing separators, wherever required.

15.2.5 Vertical members of the aluminium frame work shall be embedded in the floors, wherever required, by cutting and making good of the floor.

15.3 Fixing of Aluminium Frame Work

15.3.1 The screws used for fixing fixed aluminium frames of the aluminium windows to masonry walls / RCC members and aluminium members to other aluminium members shall be of stainless steel of approved make and quality and of stainless steel grade 304. Threads of machine screws used shall conform to requirement of I.S. 4218.

15.3.2 For the aluminium windows, the gap between the aluminium frames and the R.C.C /Masonry and also any gaps in the various sections shall be filled with weather silicone sealant DC 795 of Dow Corning or equivalent in the required bite size, to ensure water tightness including providing and fixing backer rod , wherever required. The weather silicone sealant shall be of such approved colour and composition that it would not stain or streak the masonry / R.C.C. work. It should not sag or flow and shall not set hard or dry out under any conditions of weather and shall be tooled properly. The weather silicone sealant shall be used as per the manufacturer's specifications and shall be of approved colour and shade. Any excess sealant shall be removed / cleared. Nothing extra shall be payable for the above.

15.3.3 Fixing of glass panes shall be designed in such a way that replacing damaged / broken glass panes is easily possible without having to remove or damage any members or interior finishing materials.

15.4 Polyester Power Coating

Aluminium section shall be polyester powder coated by electrostatic powder spray method and as per IS 13871 of 1993 and shall not be less than 50micron thick. The contractor should submit detailed specification for application of polyester powder coating from manufactures of polyester powder for approval of Engineer-in-charge. Performance of finishing and measurement as per CPWD specification.

15.5 Glazing

15.5.1 All glass panes shall be retained within aluminium framing by use of exterior grade microwave cured EPDM gaskets. Use of glazing or caulking compounds around the perimeter of glass will not be permitted. There shall be no whistling or rattling. Before installation of glass, Contractor shall ensure the following:

15.5.2 All glazing rebates shall be square, to plumb, true to plane, dry and free from dust.

- 15.5.3 Glass edge shall be clean and cut to exact size and grounded
- 15.5.4 Low 'E' Heat strengthened glass of specified thickness in doors, windows, ventilators and fixed glazing etc. shall be of approved make and standard quality conforming to C.P.W.D. Specifications.
- 15.5.5 4 mm thick glass panes shall be provided for openings not exceeding 0.5 sqm. For openings exceeding 0.5 sqm in area, 5.0 mm thick glass panes shall be provided unless specified otherwise.
- 15.5.6 The weight calculated on the basis of average weight of 5 samples. Weight of composition section in KG corrected to the second place of decimal shall be taken for payment. Weight shall be taken after powder coating.

15.6 Measurement and Rates

- 15.6.1 Aluminium frame work shall be measured as per CPWD specifications.
- 15.6.2 For glazing, the actual area of the glass panels excluding the portion in the beading shall be measured in sqm upto two decimal places, for payment.
- 15.6.3 Stainless steel adjustable heavy duty friction hinges and the aluminium handles for the openable side hung windows shall be of "Earl Bihari" Ebco, make or equivalent as approved by the Engineer-in-Charge. 2 nos. friction hinges shall be provided per shutter.
- 15.6.4 The cost of designing and preparation of shop drawings, all the samples, mock up of window etc. is deemed to be included in the cost of the relevant items. Nothing extra shall be payable on this account.
- 15.6.5 The item for aluminium for fixed portions for aluminium windows and frame work for partitions shall include cost of all inputs of labour, polyester powder coated (anodized aluminium sections, including cleats, other fixtures, weather silicone sealants, stainless steel screws, nuts, bolts, rawl plugs, backer rods, polyethylene tapes etc. which shall be required for fabrication and erection of aluminium work) T & P, all incidental charges, wastages etc. involved in the work. However, for the purpose of payment, the weight of aluminium sections for the fixed window frame and frame work for partitions, shall be measured in Kg. The aluminium cleats shall be measured. The stainless steel screws, nuts, bolts, separators etc. shall not be measured separately for payment and their cost is deemed to be included in the cost of this item. The item for aluminium for frame work for fixed partitions shall also include cost of providing and fixing stainless steel anchor fasteners as required.
- 15.6.6 The item of aluminium for the openable aluminium shutters for windows and doors etc., shall include cost of all inputs of labour, material (polyester powder coated aluminium sections, including such as cleats / angles, other fixtures, stainless steel screws nuts, bolts, weather silicone sealant etc. which shall be required for fabrication of aluminium work) T & P, all incidental charges, wastages etc. involved in the work. However, for the purpose of payment, the weight of aluminium sections

for the window shutter (sash frame) shall be measured in Kg. The aluminium cleats, screws, nuts, bolts, separators, etc. shall not be measured separately for payment and their cost is deemed to be included in the cost of this item. The anodized aluminium snap beading for fixing glass panels in the openable shutters of the windows shall be measured separately (on weight basis) and paid under this item of aluminium frame work for window shutters. Cost of heavy duty stainless steel hinges and stainless steel anchor fasteners used for fixing aluminium window frames will be paid separately.

- 15.6.7 The glass shall be paid for separately under relevant item. The cost providing and fixing Microwave cured EPDM gasket, felt etc. is included in the cost of this item and shall not be measured separately for payment.
- 15.6.8 The item for the aluminium frame work includes cost of making provision for fixing fittings, wherever required, as per the item description (The cost for providing fitting (handle, lock and buffer) shall be paid for separately).

15.7 Guarantee for Aluminium Work

- 15.7.1 The contractor shall be fully responsible for and shall guarantee proper design and performance of his installed system for a period of 10 years from the expiry of defect liability period specified in the contract.
- 15.7.2 The design and installation shall be to the best international standards and shall specially take account of wind and seismic loads, storms, thermal stresses, building movements and the like
- 15.7.3 In addition 10 years guarantee (to be furnished in non-judicial stamp paper of value Rs.100/-) in prescribed Performa shall be given which shall be submitted before final payment and shall not in any way limit any other rights to correct which the Employer may have under the Contract.
- 15.7.4 In addition **2%(two percent)** of the cost of all the items forming part of **ALUMINIUM WORK**, as mentioned in schedule of quantities, shall be withheld from the bills towards guarantee as specified above. This amount to be withheld towards guarantee shall be in addition to the other amounts to be withheld as mentioned elsewhere in the contract agreement. However, half of this amount(withheld) would be released after five years from the expiry of defect liability period date of completion of the work, if the performance, as required, is satisfactory. The remaining withheld amount shall be released after 10 years from the expiry of defect liability period date of completion of work, if the performance, as required, is satisfactory. If any defects is noticed during the guarantee period, it shall be rectified by the contractor within seven days of issue of notice to the contractor, temporarily, to the satisfaction of the IIM or any other authorized representative of Institute and within a period of one month the permanent rectification of the defects/replacement of defective materials should be carried out by the contractor. If not attended to, the same shall be got done through other agency at the risk and cost of the contractor and the cost, which shall be final and binding on the contractor, shall be recovered from the amount withheld towards the guarantee as mentioned

above or any other amount due to the contractor.

- 15.7.5 However, the amount withheld as guarantee can be released in full against irrevocable bank guarantee, from a Schedule/Nationalized Banks, of the same amount, for the guarantee period is submitted by the contractor in favour of Institute. The defects, if any, shall be rectified in a workmanlike manner, retaining the same aesthetics and other functional parameters of the original work.

Chief Engineer
Kailash Pati Mishra
Indian Institute Of Management Rohtak

16 PRE-CONSTRUCTION ANTI TERMITE TREATMENT

16.1 General

17.1.1 Anti termite treatment shall be executed through one of the approved agencies.

17.1.2 The contractor shall furnish the following particulars immediately after the issue of letter of acceptance by the Institute.

- a) The name of the special firm
- b) The trade names of the product, which would be used.
- c) List of works where the treatment has been used.

16.2 Treatment for Masonry Foundations and Basements

The bottom surface and the sides (upto a height of about 300 mm) of the excavation made from masonry foundations and basements shall be treated with the chemical at the rate of 5 l/Sqm surface area. After the masonry foundations and the retaining wall of the basements come up, the backfill in immediate contact with the foundation structure shall be treated at the rate of 7.5 l/Sqm of the vertical surface of the sub-structure for each side. If water is used for ramming the earth fill, the chemical treatment shall be carried out after the ramming operation is done by rodding the earth at 150 mm centres close to parallel to the wall surface and spraying the chemical emulsion at the above dosage. After the treatment, the soil should be tamped in place. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the masonry surfaces so that the earth in contact with these surfaces is well treated with the chemical.

16.3 Treatment for RCC Foundations and Basement

The treatment shall start at a depth of 500 mm below the ground level except when such ground level is raised or lowered by filling or cutting after the foundations have been cast. In such cases, the depth of 500 mm shall be determined from the new soil level resulting from the filling or cutting mentioned above, and soil in immediate contact with the vertical surfaces of RCC foundations shall be treated at the rate of 7.5 l/Sqm.

16.4 Treatment of Top Surface of Plinth Filling

The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 l/Sqm of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm deep at 150 mm centres both ways maybe made with 12 mm diameter mild steel rod on the surface to facilitate saturation of the soil with the chemical emulsion.

16.5 Treatment at Junction of the Wall and the Floor

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surface from ground level (where it had stopped with the treatment up to the level of the filled earth surface. To achieve this, a small channel 30 mm x30 mm shall be made at all the junctions of wall and columns with the floor (before laying the sub-grade) the rod holes made in the channel up to the ground level 150 mm apart and the iron rod moved backward and forward to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/Sqm of vertical wall or column

surface so as to soak the soil right to the bottom. The soil should be tamped back into place after the operation.

16.6 Treatment of Soil Along External Perimeter of Building

After the building is complete, the earth along the external perimeter of the building should be rodded at intervals of 150 mm and to a depth of 300 mm. The rods should be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/Sqm of vertical surfaces. After the treatment, the earth should be tamped back into place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading. In the event of filling being more than 300 mm, the external perimeter treatment shall extend to the full depth of filling upto the ground level so as to ensure continuity of the chemical barrier.

16.7 Treatment of Soil Under Apron Along External Perimeter of Building

Top surface of the consolidated earth over which the apron is to be laid shall be treated with chemical emulsion at the rate of 5 l/Sqm of the surface before the apron is laid. If consolidated earth does not allow emulsion to seep through, holes up to 50 to 75 mm deep at 150 mm centres both ways may be made with 12 mm diameter mild steel rod on the surface to facilitate saturation of the soil with the chemical emulsion

16.8 Treatment of Walls Retaining Soil Above Floor Level

Retaining walls like the basement walls or outer walls above the floor level retaining soil need to be protected by providing chemical barrier by treatment of retained soil in the immediate vicinity of the wall, so as to prevent entry of termites through the voids in masonry, cracks and crevices, etc above the floor level. The soil retained by the walls shall be treated at the rate of 7.5 l/Sqm of the vertical surface so as to effect a continuous outer chemical barrier.

16.9 Treatment of Soil Surrounding Pipes, Wastes and Conduits

When pipes, wastes and conduits enter the soil inside the area of the foundations, soil surrounding the point of entry shall be loosened around each such pipe, waste or conduit for a distance of 150 mm and to a depth of 75 mm before treatment is commenced. When they enter the soil external to the foundations, they shall be similarly treated at a distance of over 300 mm unless they stand clear of the walls of the building by about 75 mm.

16.10 MEASUREMETS: The Complete work of anti-termite treatment shall be measured for plinth area treated. This includes treatment, to foundations, walls, trenches, basements, plinth, burried pipes, conduits etc. The extended portions of foundation and like beyond plinth limit shall be the part of complete work and no extra payment shall be made.

16.11 RATES: The rate shall include the cost of all labour and materials involved in all the operations described above and as per the item description.

16.12 GUARANTEE FOR ANTI TERMITE TREATMENT

Ten years guarantee in prescribed proforma attached shall be given by the contractor for the Anti-termite treatment. In addition 10% (ten percent) of the cost of these items

of Anti termite under this sub head shall be retained as guarantee to watch the performance of the work executed. However, half of this amount (withheld) would be released after five years from the expiry of defect liability period, if the performance of the anti termite works is satisfactory. The remaining withheld amount shall be released after 10 years from the expiry of defect liability period date of completion of work, if the performance, as required, is satisfactory. If any defect is issuing of notice by the Engineer-in-Charge and, if not attended to, the same shall be got done amount retained towards guarantee. In any case, the contractor and the specialist agency, during the guarantee period, shall inspect and examine the treatment once in every year and make good any defect observed and on firm the same in writing. The security deposit can be released in full, if bank guarantee of equivalent amount, valid for the duration of guarantee period, is produced and deposited with the Institute.

18 INTEGRAL CEMENT BASED WATER PROOFING TREATMENT

18.1 Treatment for roof surface:

- 18.1.1 The brick bats shall be from well-burnt bricks. The proprietary waterproofing compound shall be I.S.I. mark and shall conform to I.S. 2645. Before executing of work, waterproofing compound shall be procured and brought to site from which random sample would be got tested for its conformance to I.S. code in an approved laboratory. The proprietary waterproofing compound shall be added at the rate recommended by the specialist firms.
- 18.1.2 The finished surface after water proofing treatment shall have minimum slope of in 80. At no point, the thickness of water proofing treatment shall be less than 65 mm.
- 18.1.3 While treatment of roof surface is done, it shall be ensured that the outlet drainpipes have been fixed and mouths at the entrance have been eased and rounded off properly for easy flow of water.
- 18.1.4 The surface where the waterproofing is to be done shall be prepared by thoroughly cleaning with wire brushes. All loose scales, laitance shall be removed and dusted off and washed clean with water. The surface shall then be treated with neat cement slurry @ 2.75 Kg per Sqm, admixed with proprietary waterproofing compound, in proportion as recommended by the manufacturer, to penetrate into crevices and fill up all the pores in the surface. This cement slurry shall be applied at the junction of parapet and terrace slab including the vertical face of the parapet up to 300 mm.
- 18.1.5 After the slurry coat is applied, a 20 mm thick layer of cement mortar not learner than 1:5 (1 cement :5 coarse sand) admixed with proprietary water proofing compound confirming to IS: 2645 shall be laid . Then a layer of well burnt brick bats shall be laid in cement mortar of mix as specified by the specialist firm but not learner than 1:5 (1 cement:5 coarse sand) admixed with proprietary water proofing compound. This layer shall be laid to required gradient and joints filled to half the depth. The brickbat layer shall be rounded at the junction with the parapet and tapered towards top for a height of 300 mm. Curing of the layer shall be done for 2 days.
- 18.1.6 After curing, the surface shall be applied with a coat of cement slurry admixed with proprietary water proofing compound.
- 18.1.7 Joints of brickbat layer shall then be filled fully with cement mortar of mix as specified by the specialist firm but not learner than 1:4 (1 Cement: 4 coarse sand) admixed with proprietary water proofing compound and finally top finished with average 20 mm thick layer of joint less cement mortar of same mix and finished smooth with cement slurry admixed with proprietary water proofing compound. The finished surface shall have marking of 300 x 300 mm false squares to give the appearance of tiles. Where the water proofing treatment is to be finished with china mosaic tile flooring, the top surface of the water proofing treatment shall be finished rough and false squares shall not be made.

- 18.1.8 Curing and final test of water proofing treatment shall be done for a minimum period of two weeks by ponding water, The water for this purpose shall be arranged by the Contractor at his own cost. Nothing extra shall be payable on this account.
- 18.2 **Measurements:** The measurements shall be taken along the finished surface of treatment including the rounded and treated portion at junction of parapet wall. Length and breadth shall be measured correct to one centimetre and area shall be worked out to nearest 0.01 sqm. No deduction in measurements shall be made for either opening or recesses for chimneys, stacks, roof lights and the like for areas up to 0.40 sqm. Nor anything extra shall be payable for forming such openings. For similar areas exceeding 0.40 sqm. Deductions shall be made in measurements for full openings and nothing extra shall be paid for making such openings.
- 18.3 **Rates:** The rate shall include the cost of all labour and materials involved in all the operations described above and as per the item description.
- 18.4 GUARANTEE FOR WATER PROOFING TREATMENT**
- 18.4.1 The contractor shall be fully responsible for and shall guarantee proper performance of the entire waterproofing system for a period of 10 (Ten) years from the expiry of defect liability period specified in the contract. In addition, specific 10 years written guarantee (to be furnished in a non-judicial stamp paper of value not less than Rs.100/-) in approved proforma shall be submitted for the performance of the system, before final payment and shall not in any way limit any other rights the Employer may have under the contract. Guarantee for water proofing shall comprises of all the items described above in particular specification.
- 18.4.2 All water-proofing work shall be carried out through approved specialist agency as per method of working approved by the Engineer-in-charge. However the Contractors shall be solely responsible for waterproofing treatment until the expiry of the above guarantee period.
- 18.4.3 Ten years guarantee in prescribed proforma attached shall be given by the contractor for the water proofing treatment. **Towards that 10% (ten percent) of the cost of these items of water proofing under this sub head shall be retained as guarantee to watch the performance of the work executed. However, half of this amount (withheld) would be released after five years from the expiry of defect liability period, if the performance of the waterproofing works is satisfactory. The remaining withheld amount shall be released after completion of ten years from the expiry of defect liability period,** if the performance of the waterproofing work is satisfactory. If any defect is noticed during the guarantee period, it should be rectified by the contractor within seven days of issuing of notice by the Engineer-in-Charge and, if not attended to, the same shall be got done through other agency at the risk and cost of the contractor and recovery shall be effected from the amount retained towards guarantee. In any case, the contractor and the specialist agency, during the guarantee period, shall inspect and examine the treatment once in every year and make good any defect observed and confirm the same in writing.

The security deposits recovered towards guarantee for removal of defects for specified duration of particular items mentioned in this agreement can be released

in full, if bank guarantee of equivalent amount, valid for the duration of guarantee period, is produced and deposited with the Institute.

19 WATER SUPPLY ,SANITARY INSTALLATIONS AND DRAINAGE

- 19.1 The contractor shall furnish all labour, materials and equipment, transportation and incidental necessary for supply, installation, testing and commissioning of the complete Plumbing / Sanitary system as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. The Plumbing / Sanitary System shall comprise of following:
- a. Sanitary Fixtures and Fittings.
 - b. Internal and External Water Supply.
 - c. Internal and External Drainage
 - d. Approval from Local Authorities
 - e. Balancing, testing & commissioning.
 - f. Completion drawings
- 19.2 The contractor shall procure and install all pipes, Sockets/Nipples including shut-off valve etc for mounting sensors/transmitters for the interface to Building Automation System.
- 19.3 The contractor shall ensure that senior and experienced plumbers are assigned exclusively for this work. Such plumber(s) should have valid license from the local authorities. The project management shall be done through modern technique. For quality control & monitoring of workmanship, contractor shall assign at least one engineer who would be exclusively responsible for ensuring strict quality control, adherence to specifications and ensuring top class workmanship for the installation.
- 19.4 The work shall be in conformity with the Bye-laws, Regulations and Standards of the local authorities concerned. But if these Specifications and Drawings call for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then these Specifications and Drawings shall take precedence over the said regulations and standards. However, if the Drawings and specifications require something which violates the Bye-laws and Regulations, then the Bye-laws and Regulations shall govern the requirement of this installation.
- 19.5 The contractor shall obtain all permits/ licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation. However, all receipted amount shall be reimbursed on production of proof of payment.
- 19.6 The Plumbing / Sanitary Drawings given by the Engineer In-Charge or issued with tenders are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The contractor shall follow these drawings in preparation of his shop drawings, and for subsequent installation work.

- 19.7 The contractor shall examine all architectural, structural, plumbing, electrical and other services drawings and check the as-built works before starting the work, report to the Engineer In-Charge any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer In-Charge without additional cost to the Institute.
- 19.8 All the shop drawings shall be prepared on computer through Autocad System based on Architectural Drawings and site measurements. Within two months of the award of the contract, contractor shall furnish, for the approval of Engineer In-Charge, the two sets of detailed shop drawings of complete work and materials including layouts for Plant room, Pump room, Typical toilets drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; external insulation details for pipe insulation etc.
- 19.9 These shop drawings shall contain all information required to complete the work. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in quantity statement at the completion of all shop drawings. Minimum 4 sets of drawings shall be submitted after final approval along with CD. When he makes any amendments in the above drawings, the contractor shall supply two fresh sets of drawings with the amendments duly incorporated along with check prints, for approval. The contractor shall submit further four sets of shop drawings to the Engineer In-Charge for the exclusive use by the Engineer In-Charge and all other agencies. No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment / installation.
- 19.10 Shop drawings shall be submitted for approval four weeks in advance of planned delivery and installation of any material to allow the Engineer In-Charge ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.
- 19.11 Samples of all materials like valves, pipes and fittings etc. shall be submitted to the Engineer In-Charge prior to procurement for approval and retention by Engineer In-Charge and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation without any extra cost.
- 19.12 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way

relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

- 19.13 All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be in conformity with list of approved manufacturers.
- 19.14 Balancing of all water systems and all tests as called for the CPWD Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and ASPE / ASHRAE Guide lines and Standards. The installation shall be tested and shall be commissioned only after approval by the Engineer In-Charge. All tests shall be carried out in the presence of the representatives of the Engineer In-Charge and nothing extra shall be payable on this account.
- 19.15 The contractor shall submit completion plans for water supply, internal sanitary installations and building drainage work and other services done under E&M works within 15 days of the date of completion. These drawings shall be submitted in the form of two sets of CD's and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate complete plant room layouts, piping layouts and sequencing of automatic controls, location of all concealed piping, valves, controls and other services. In case the contractor fails to submit the completion plans as aforesaid, security deposit shall not be released and these shall be got prepared at his risk and cost
- 19.16 The CCI/CI/PVC pipe and GI pipe etc. wherever necessary shall be fixed to RCC columns, beams etc. with rawl plugs and nothing extra shall be paid for this.
- 19.17 The variation in consumption of material shall be governed as per CPWD specification and clauses of the contract to the extent applicable.

ROAD WORKS

21.0 General Specifications and Conditions

1. The work in general shall be executed as per the description of the item, attached specifications, CPWD Specifications 2009 Vol.-I & II with upto- date correction slips.
2. In case of any variation between between the Schedule of Quantities, the specifications and/or the drawings; the following order of precedence be followed:
 - (i) Nomenclature of item in Schedule of quantities
 - (ii) Particular specification attached with the tender documents.
 - (iii) General specification attached with the tender documents.
 - (iv) Drawings
 - (v) CPWD specifications 2009 Vol.-I & II with upto- date correction slips.
 - (vi) MORTH specifications for Road & Bridge work (Fourth revision) with correction slips issued upto the last date of issue of tender.
 - (vii) IRC specifications/ Codes
 - (viii) Relevant specification of BIS
 - (ix) Standard acceptable practice as approved by Engineer-in-charge.
3. The contractor shall be required to produce samples of all materials sufficiently in advance to obtain approval of the Engineer-in-Charge. Subsequently the materials to be used in the actual execution of the work shall strictly conform to the approved samples and shall be preserved till the completion of the work. In case of variation, such materials shall be liable to rejection.
4. All materials shall be got checked from the Engineer-in-charge of work, on receipt of the same at site and before use at site.
5. The contractor shall be required to provide testing lab at site with necessary appliances. The Engineer-in-charge reserves right to conduct field tests to ensure that the quality is consistent with the prescribed specifications. If the material of end product is found defective or sub standard it will have to be replaced / rectified at the risk and cost of contractor.
6. The contractor shall at his own cost, make all arrangements and shall provide such facilities as the Engineer-in-charge may require for collecting, preparing and forwarding the required number of samples for tests and for analysis at such time and to such places as directed by the Engineer-in-charge. Nothing extra shall be paid for the above including the cost of material to be tested.
7. The Contractor or his authorized representative shall associate in collection, preparation, forwarding, and testing of such samples. In case he or his authorized representative is not present or does not associates himself, the result of such tests and consequences thereon shall be binding on the contractor.
8. Wherever any reference to any Indian Standard specifications / IRC codes/ MORTH specifications occur in the documents relating to this contract, same shall be inclusive of all amendments issued thereto or revision thereof if any, till the date of the tender

notice. The contractor shall keep at his own cost all such publications of relevant Indian Standards applicable to the work at site.

9. The contractor must take adequate precaution to ensure that no spillage of construction material takes place on the site and on the carriageway leading to the site. Whenever it is found that the carriage way has been blocked, due to contractor's fault the Engineer-in-charge would get it cleared at the risk and cost of contractor, without giving any notice, for smooth running of traffic. The decision of Engineer-in-charge in this regard shall be final and binding on the contractor.
10. The necessary tests shall be conducted in the laboratory of M.D. University, Rohtak, IIT Delhi, NIT Kurukshtra, CRRI Delhi, Shri Ram Test House Delhi or any other laboratory approved by the Engineer-in-charge.
11. The contractor shall get the water tested with regard to its suitability for use on the work and get approval from the Engineer-in-charge before proceeding with the use of same for execution of works.
12. The contractor shall have to make his own, arrangement for housing for staff and labour at/away from construction site The decision about how many huts can be allowed for labour/construction workers at project site shall rest with the Engineer-in-charge and shall be binding on the contractor.

21.1 Special Conditions

1. All setting out activities concerning establishment of bench marks, theodolite stations, centre line pillars, etc. including all materials, tools, plants, equipments, theodolite and all other instruments, labour etc. required for performing all the functions necessary and ancillary thereto at the commencement of the work, during the progress of the work and till the completion of the work shall be carried out by the contractor.
2. The contractor shall carry out true and proper setting out of the work under the supervision of the Engineer-in-Charge or his authorized representatives and shall be responsible for the correctness of the positions, levels, dimensions and alignments of all parts of the Road. If at any time, during the progress of the work, any error appears or arises in the position, level, dimensions or alignment of any part of the work, the contractor on being asked to do so by the Engineer-in-charge, shall rectify such error to the entire satisfaction of the Engineer-in-Charge. The supervision and/or checking by the Engineer-in-charge or his authorized representatives shall not relieve the contractor of his responsibility for the correctness of any setting out of any line or level. The contractor shall carefully protect and preserve all bench marks, pegs and pillars provided for the setting out of works.
3. Some restrictions may be imposed by the concerned authorities on quarrying of sand, stone etc. from certain areas. For timely completion of work, the contractor shall have to bring such material from other quarries located elsewhere, and nothing extra shall be payable on this account.
4. Unless otherwise specified in the Schedule of Quantities, the rates of all items of work shall be considered as inclusive of working in or under water and/or liquid mud and/or foul conditions including pumping or bailing out liquid mud or water accumulated in excavations during the progress of the work from springs, tidal or river seepage, rain, broken water mains or drains and seepage from subsoil aquifer.
5. Stacking of materials and excavated earth including its disposal shall be done as per the directions of the Engineer-in-Charge. Multiple handling of materials or excavated earth, if required, shall have to be done by the contractor at his own cost.
6. Contractor shall supply, free of charge, all the materials required for testing. The testing charges shall be borne by the contractor / Institute in the manner described below:
 - (i) By the contractor, if the test results show that the material does not conform to the relevant codes / specifications mentioned elsewhere in the tender document.
 - (ii) By the Institute, if the test results show that the material conforms to the relevant / codes/ specifications mentioned elsewhere in the tender document.

The contractor or his authorized representative shall associate in collection,

preparation, forwarding and testing of such samples. In case he or his authorized

- representative is not present or does not associate himself, the Engineer-in-Charge shall do the needful or getting the samples collected and tested; the result of such tests and consequences thereof shall be binding on the contractor.
7. Other agencies working at site may also simultaneously execute the works entrusted to them and to facilitate their working, the contractor shall make necessary provisions e.g. holes, openings, etc. for laying / burying pipes, cables, conduits, clamps, hooks etc. as may be required from time to time.
 8. Existing drains, pipes, cables, overhead wires, sewer lines, water line and similar services encountered in the course of the execution of the work shall be protected against the damage by the contractor. 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.
 9. On account of security consideration, there could be some restrictions on the working hours, movement of vehicles for transportation of materials and location of labour camp. The contractor shall be bound to follow all such restrictions and adjust the programme for execution of work accordingly.
 10. For the safety of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreement, the contractors shall, in addition the provision of CPWD safety code and directions of the Engineer-in-charge, make all arrangements to provide facility as per the provision of Indian Standard Specifications (Codes) listed below & nothing extra shall be paid on this account.

IS 3696 Part I	Safety Code for Scaffolds and ladders
IS 3696 Part II	Safety Code for Scaffolds and ladders Part II ladders
IS 3764	Safety Code for excavation work
IS 4138	Safety Code for working in compressed air
IS 7293	Safety Code for working with construction machinery
IS 7969	Safety Code for storage and handling of building materials
IS 4130	Safety Code for demolition of buildings
 11. Nothing extra shall be paid for cartage of any material to the site of work.
 12. The contractor must take adequate precaution to ensure that no spillage of construction material takes place on to the carriageway. Failure to observe this will make the contractor liable to pay compensation @ Rs. 100/- (Rs. One Hundred only) per day per metre length of each carriage way as affected by spill over of any construction material subject to a maximum of 5% (five percent) of tendered cost of the work put to tender. The decision of Engineer-in-charge on this regard shall be final and binding on the contractor.
 13. The right to carry out the work either in conformity with or in a manner entirely different from the terms of this tender document that may be considered most suitable before or subsequent to the receipt of tenders due to exigencies of work, is reserved with the Engineer-in-charge.

14. For the execution of any items of work where any incidental work is actually required but not specifically stated in the tender, it is to be understood that the rate quoted by the contractor shall cover such charges also and nothing extra on account of such incidental charges, if any, shall be paid.
15. The contractor shall maintain in good condition all work till the completion of entire work allotted to him. From the commencement of the work to the completion of the same, the work is to be under the contractor's charge. The contractor is to be held responsible for and to make good all injuries, damages and repairs, caused by fire, traffic, floods or other natural calamities and no payment shall be made to the contractor on this account. Engineer-in-charge shall not be held responsible for any claims for injuries to persons/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the contractor or any other of his authorized representatives in his employment during the execution of the work. The compensation, if any, shall be paid directly to the department / authority / persons concerned, by the contractor at his own cost.
16. Engineer-in-charge shall have full powers to send workmen and employ on the premises to execute fittings and other work not included in the contract. For whole operations the contractor is to afford every reasonable facility during ordinary working hours provided such operations are carried out in such a manner as not to impede the progress of work included in this contract, in the opinion of Engineer-in-charge.

21.2 Additional Conditions

1. Before tendering, the tenderer shall inspect the site of work and shall fully acquaint himself about the conditions with regard to site, nature of soil, availability of materials suitable location for construction of godowns, stores and labour huts, the extent of leads and lifts involved in the work (over the entire duration of contract) including location conditions, traffic restrictions, obstructions and other conditions, as required for satisfactory execution of the work. His rates shall take into consideration all such factors and contingencies. No claim whatsoever shall be entertained by the Institute on this account.
2. The contractor must study the specifications & conditions carefully before tendering.
3. Before start of the work, the contractor shall submit the program of execution of work, which will include sequence of construction, get it approved from the Engineer-in-charge and strictly adhere the same for the timely completion of the project work.
4. The contractor shall have to make approaches to the site, if so required and keep them in good condition for transportation of labour and materials as well as inspection of works by the Engineer-in-Charge. Nothing extra shall be paid on this account.
5. The contractor shall at all times carry out work in a manner creating minimum interference in the flow of traffic as per direction of Engineer-in-charge.
6. The work shall be carried out in such a manner so as not to interfere or effect or disturb other works, being executed by other agencies, if any.
7. Any damages done by the contractor to any existing work shall be made good by him at his own cost.
8. The work shall be carried out in the manner complying in all respects with the requirement of relevant bye-laws of the local bodies under the jurisdiction of which the work is to be executed and nothing extra shall be paid on this account.
9. For completing the work in time, the contractor might be required to work, in two or more shifts including night shifts and no claim whatsoever shall be entertained on this account, 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 account for any other reason. No bitumen work should be undertaken between 8 PM to 8 AM. Necessary permission to work in delay time, shall be obtained by the agency from traffic police and other concerned Departments. Institute shall provide necessary assistance in this regard, on a best-effort basis.
10. The contractor shall make his own arrangements for obtaining electric connection(s), if required, and make necessary payment directly to the department concerned. The

Institute shall however make all reasonable recommendations to the authority concerned in this regard.

11. The contractor or his authorized representative shall always be available at the site of work to take instructions from Engineer-in-charge or his representative, and ensure proper execution of work. No work shall be done in the absence of such authorized representative.
12. The contractor shall maintain in good condition all works executed till the completion of entire work allotted.
13. No payment shall be made to the contractor for damage caused by rains, or other natural calamities during the execution of works and no claims whatsoever on this account will be entertained.
14. The temporary warning lamps shall be installed at all barricades during the hours of darkness and kept lit at all times during these hours.
15. The malba / garbage, removed from the site shall be disposed off by the contractor at any approved Municipal dumping ground or directed by the Engineer-in-charge.
16. All work and materials brought and left upon the ground by the contractor or by his orders for the purpose of forming part of the works are to be considered to be the property of the Institute and the same are not to be removed or taken away by the contractor or any other person without approval of the Engineer-in-charge, but the Institute is not to be, in any way, responsible for any loss or damage which may happen to or in respect of any such work or materials either by the same being lost or damaged by weather or otherwise.
17. The contractor shall be responsible to provide deep hand pump/tube well at site of work to make available potable and safe drinking water to labour engaged in execution of work at his own cost.
18. The rates for all items of work, unless clearly specified otherwise, shall be deemed to include the cost of all labour, materials, dewatering and other inputs involved in the execution of the items.
19. Unless otherwise specified in the schedule of quantities the rates tendered by the contractor shall be inclusive and shall be applicable for all heights, depths, leads and lifts involved and the execution of work in or under water and or liquid mud including making diversion channels if necessary.
20. The contractor shall construct suitable godown at the site of work for storing the materials safely from damage due to sun, rain, dampness, fire, thefts etc. He shall also employ necessary watch and ward establishment for the purpose and no extra claim whatsoever shall be entertained on this account.
21. The contractor will not have any claim in case of any delay by the Engineer-in-charge in removal of trees or shifting, removing of telegraph, telephone or electric lines

(overhead or underground), water and sewer lines and other structure etc. if any, which may come in the way of the work. However, suitable extension of time can be granted to cover such delays.

22. Contractor may be required to execute this work under foul position. The decision of the Engineer-in-charge whether the position is foul or not shall be final and the binding on the contractor and nothing extra for executing the work in foul position is payable, beyond what is providing in the schedule of quantities.
23. In the tender documents, the word "CPWD" shall mean IIM Rohtak wherever applicable.
24. The rates for all the items of the work unless otherwise specified shall include cost of all labour, materials, dewatering and removal of silt, mud, vegetation etc. and other inputs required for the execution of the work. Only the material stated in the schedule of quantities and in Schedule "B" shall be issued by the department. In case any material supplied free of cost by the department is lost / damaged after issue while in transit or from the custody of the contractor, recovery shall be made at the current replacement of cost of the material plus ten percent.
25. No claim for the idle labour, machinery and establishment on account of suspensions / stoppage of work for any reason whatsoever shall be admissible under any circumstances as well as after completion.
26. The work shall be executed and measured as per metric dimensions given in the schedule of quantities.
27. Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.
28. The contractor shall deploy the technical personnel on various items of work to be executed under this agreement as per clause 36(i) Schedule 'F'. No work shall be permitted without availability of the above mentioned technical personnel on respective items of work. The contractor shall intimate to Engineer-in-charge 24 hours in advance, in writing, the particulars of the technical personnel to be deployed on the various items of work. The cost of deployment of the above personnel shall be deemed to be included in the rates quoted by the contractor and nothing extra shall be payable on account of this.
29. Contractor shall within two weeks of award of work, submit to the Engineer-in-charge for his approval, list of measures for maintaining safety of manpower deployed for construction and avoidance of accidents.

21.3 PARTICULAR SPECIFICATIONS

1.0 GENERAL

- 1.1** The work, in general shall be executed as per the description of item, approved design and drawings, particular specifications & special conditions attached. MORTH specifications for road and bridge works (Fourth revision) 2001. CPWD specifications 2009 Vol.-I & II with correction slips upto the date of the opening of Tender and relevant specifications of B.I.S. with correction slips issued upto the last date of issue of tender. Where the aforesaid provisions and conditions are silent, relevant specialized literature and manufacturers' specifications shall be followed for the execution of work.
- 1.2** In case of discrepancy between the Schedule of Quantities, the specifications and/or the drawings; the following order of precedence will be followed:
- (i) Description of items in Schedule of Quantities
 - (ii) Particular specifications attached with tender documents
 - (iii) General specifications attached with tender documents
 - (iv) Drawings.
 - (v) CPWD specifications 2009 Vol.-I & II with upto date correction slips.
 - (vi) MORTH specifications for Road & Bridge work (Fourth revision) with correction slips issued upto the last date of issue of tender.
 - (vii) IRC specification / Codes.
 - (viii) Relevant Specifications of B.I.S.
 - (ix) Standard acceptable practice as approved by Engineer-in-charge
- 1.3** The contractor shall, at his own cost, construction, equip and establish a testing laboratory at site with necessary apparatus, instrument and equipment such as weighing scale, graduated cylinder, standard sieves, thermometer. Slump Cones etc. and engage the experienced technical staff for conducting day to day tests and to ensure that material conforming to prescribed standard only are used in the work. The Engineer-in-charge reserves right to conduct field tests to ensure that the quality is consistent with the prescribed specifications. If any material of end product is found defective or substandard, the same will have to be replaced / redone at the cost of contractor.
- 1.4** The work shall be executed mechanically unless otherwise directed by Engineer-in-charge. Following major machinery is to be arranged by the contractor:
- (a) J.C.B., pock lain and dumpers for excavation and disposal of excavated earth and road materials.
 - (b) Concrete Pump for placing the concrete.
- 1.5** All dismantled/excavated serviceable material shall be the property of Govt. which shall have to be handed over to the Engineer-in-charge by the contractor and proper account shall be maintained.
- 1.6** Material such as cement, fine sand, aggregates, bricks for execution shall be as per CPWD specification relevant agreement items.

22 UNDER GROUND DRAINAGE

22.1 EXCAVATION

(1) Alignment and Grading

The sewers are to be laid to alignment and gradients shown on the drawings but subject to such modifications as shall be ordered by the Engineer-in-Charge from time to time to meet the requirements of the works. No deviations from the lines, depths of cuttings or gradients of sewers shown on the plans and sections shall be permitted except by the express direction of the Engineer-in-Charge.

(2) Excavation in Tunnels

The excavation for sewers and works shall be open cutting unless the permission of the Engineer-in-Charge for the ground to be tunneled is obtained. Where sewers have to be constructed along narrow passages, the Engineer-in-Charge may order the excavation to be made partly in open cut and partly in tunnel and in such cases the excavated soil shall be removed at once so as not to block up the passage and shall be brought back later on for refilling of the trenches or tunnels.

(3) Opening out Trenches

In excavating trenches, etc. the soling, road metalling, pavement kerbing etc. and turf is to be placed on one side and preserved for reinstatement when the trench or other excavation shall be filled up.

Before any road metal is replaced, it shall be carefully shifted. The surface of all trenches and holes shall be restored and maintained to the satisfaction of the Engineer-in-Charge and of the owners of the roads or other property traversed and the Contractor shall not cut or break down any live fence or trees in the line of the proposed works but shall tunnel under them, unless the Engineer-in-Charge shall order to the contrary.

The Contractor shall grub up and clear the surface over the trenches and other excavation of all trees, stumps, roots and all other encumbrance affecting execution of the work and shall remove them from the site to the approval of the Engineer-in-Charge.

(4) Obstruction of Roads

The Contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and if insufficient space shall then be left for public and private transit, he shall remove the materials excavated and bring them back again when the trench is required to be refilled. The Contractor shall obtain the consent of the Engineer-in-Charge before closing any roads to vehicular traffic and the foot-walks must be kept clear at all times.

(5) Removal of Filth

All night soil, filth or any other offensive matter met with during the execution of the works, immediately after it is taken out of any trench, sewer or cess-pool, shall not be deposited upon the surface of any street or where it is likely to be nuisance or passed into any sewer or drain but shall be at once put into carts and removed to a suitable place to be provided by the Contractor.

(6) Excavation to be Taken to Proper Depths

The trenches shall be excavated to such a depth that the sewers shall rest on concrete as per specifications and drawings so that the inverts may be at levels given on the sections. In bad ground the Engineer-in-Charge may order the Contractor to excavate to a greater depth than that shown on the drawings and to fill up the excavation to the level of the sewer with concrete, broken stone, gravel or other materials. Any such extra excavation, if ordered by the Engineer-in-Charge, shall be extra as per provisions in the Contract conditions, but if the Contractor should excavate the trench to a greater depth than is required as per drawings without a specific order to that effect of the Engineer-in-Charge, the extra depth shall have to be filled up with concrete at the Contractor's own costs and charges to the requirements and satisfaction of the Engineer-in-Charge.

(7) Refilling

After the sewer or other work has been laid and proved to be watertight, the trench or other excavations shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and upto 75 cm above the crown of the sewer shall consist of the finest selected materials placed carefully in 15 cm layers and flooded and consolidated. After this has been laid, the trench and the other excavation shall be filled carefully in 150 mm layers with materials taken from the excavation, each layer being watered for proper consolidation unless the Engineer-in-Charge shall otherwise direct.

(8) Contractor to Restore Settlements and Damages

The Contractor shall, at his own costs and charges, make good promptly during the whole period of the works are in hand, any settlement that may occur in the surfaces of roads, berms, footpaths, gardens, open spaces, etc. whether public or private, caused by his trenches or his other excavations and he shall be liable for any accidents caused thereby. He shall also, at his own expense and charges, repair and make good any damage done to buildings and other property. If in the opinion of the Engineer-in-Charge, the Contractor fails to make good or pay or satisfy the expenses of making good such works / property, the Engineer-in-Charge shall be at liberty to get the work done by other means and the expenses thereof shall be paid by the Contractor or deducted from any money that may be or become due to him or recovered from him in any other manner according to the conditions of the contract.

(9) Disposal of Surplus Soil

The Contractor shall at his own costs and charges, provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled, the surplus soil shall be immediately removed, the surface properly restored and roadways and sides left clear.

(10) Timbering of Sewer & Trenches

The Contractor shall at all times support efficiently and effectively the sides of the sewer trenches and other excavations by suitable timbering, piling and sheeting and they shall be close timbered in loose or sandy strata and below the surface of the subsoil water level, without any extra cost.

All timbering, sheeting and piling with their wallings and supports shall be of adequate dimensions and strength and fully braced and strutted so that no risk of collapse or subsidence of the walls of the trench shall take place. The Contractor shall be held responsible and accountable for the sufficiency of all timbering, bracing, sheeting and piling used for, all damage to persons and property resulting from the improper quality, strength, placing, maintaining or removing of the same.

(11) Shoring of Buildings

The Contractor shall shore up all buildings, walls and other structures, the stability of which is liable to be endangered by the execution of the work and shall be fully responsible for all damages to persons or property resulting from accident to any of such buildings.

(12) Removal of Water from sewer

The Contractor shall at all times, during the progress of work, keep the trenches and excavations free from water which shall be disposed of by him in a manner as will neither cause injury to the public health nor to the public or private property nor to the work completed or in progress nor to the surface of any roads or streets, nor cause any interference with the use of the same by the public.

(13) Excess Excavation

If any excavation is carried out at any point or points to a greater width than the specified cross section of the sewer with its envelope, the same shall be filled with concrete by the Contractor at his own expenses and charge to the requirements of the Engineer-in-Charge.

(14) Width of Trenches

Unless specified otherwise by the Engineer-in-Charge, the width at bottom of trenches for pipes of different diameters laid at different depths shall be as given below :-

- a) For all diameters, upto an average depth of 120 cm, width of trench in cm = diameter of pipe + 30 cm.
- b) For all diameters or depths above 120 cm; width of trench in cm = diameter of pipe + 40 cm ; and
- c) Notwithstanding (a) and (b), the total width of trench at the top should not be less than 75 cm for depths exceeding 90 cm.

22.2 SALT GLAZED STONEWARE PIPES

(1) Specifications

Wherever specified for drainage/sewer lines, salt glazed stoneware pipes shall be used. These pipes shall be of first quality, straight, free from any roughness inside or outside and conforming to IS: 651-1980.

(2) Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix or as specified, with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipes jointer room to work right round the pipes and as short as practicable to admit the socket and allow the joint to be made.

If the bottom of the trench of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing.

The pipes shall be surrounded with 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix all around.

(3) Jointing

Tarred gasket of hemp yarn soaked in thick cement slurry shall first be placed round the spigot of each pipe and the spigot then shall be slipped home well into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and the gasket caulked home so as to fill not more than one fourth of the total depth of the socket.

The remaining depth of the socket shall then be filled with a stiff mixture of cement mortar 1:1 (1 cement: 1 fine sand). When the socket is thus filled, a fillet shall be formed round the joint with a trowel forming an angle of 45 with the barrel of the pipe.

22.3 REINFORCEMENT CEMENT CONCRETE PIPES

(1) Specifications

Wherever specified for drainage/sewer lines, reinforcement cement concrete pipes shall be used. These pipes shall be suitable for semi fluid These pipes shall be of first quality, straight, free from any roughness inside or outside and conforming to IS: 458-1988, NP2 or NP3 grade as specified in the Bill of Quantities.

(2) Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix or as specified, with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipes jointer room to work right round the pipes and as short as practicable to admit the socket and allow the joint to be made.

If the bottom of the trench of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing.

The pipes shall be surrounded with 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate of 40 mm nominal size) mix all around.

(3) Jointing

The joint is composed of specially shaped spigot and socket ends on concrete pipes. A rubber ring shall be placed on the spigot which shall be forced into the socket of the pipe previously laid. This compresses the rubber rings as it rools in to the annular space formed between the two surfaces of spigot and the socket, stiff mixture of cement mortar 1:2 (1 cement : 2 fine sand) shall then be filled into the remaining annular space and rammed with a caulking tool. After day's work any extraneous materials shall be removed form the inside of the of the pipe and newly made joint shall be cured.

22.4 MANHOLES

(1) General

The Contractor shall construct all manholes, chambers, etc. in first class brick work to such levels, dimensions and specifications as shown in the drawings or as specified in the Bill of Quantities.

(2) Base Concrete, Benching and Channels

All manholes shall have a base of cement concrete 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) 200 mm thick or as shown on drawings. Channeling and benching shall be formed to the full depth of the diameter of the pipe with cement concrete 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement.

(3) Masonry Work

Masonry work shall be done with first class bricks in cement mortar 1:5 (1 cement : 5 fine sand). All manholes shall be plastered 12 mm thick inside with cement mortar 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement. Manholes shall be plastered outside with cement mortar 1:4 (1 cement : 4 coarse sand).

(4) Cast iron Steps

All manholes above 800 mm depth, shall have cast iron of standard pattern foot rests and spaced 300 mm vertically or as shown on drawings.

The steps may be set staggered in 2 vertical runs which may be 380 mm apart horizontally. The topmost step shall be 450 mm below the manhole cover and the lowest not more than 300 mm above the benching.

(5) R.C.C. Slab

C.I. frames and covers of the specified size and weight shall be embedded in reinforced cement concrete slab 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) 15 cm thick, reinforcement shall consist of 12 mm dia. M.S. bars of 15 cm centre to center (bothways). Additional bars shall be provided under the C.I. frame.

(6) Size of Manholes and Covers

Size of manholes and manhole covers shall be as follows unless otherwise specified in the Bill of Quantities:

	Size of Manhole (inside dimensions)	Size and total weight of cover and frame	
1.	Manhole not exceeding 0.9 m depth	900 x 800 mm	600 x 450 mm (inside) S.F.R.C. cover
2.	Manhole exceeding depth 0.9 m made of	1200 x 900 mm	<u>Medium Duty</u> Dia-500 mm inside, S.F.R.C.
3.	Manhole exceeding	900 mm	Heavy Duty

	depth 0.9 m made of	circular	Dia-500 mm inside, S.F.R.C.
4.	Manhole exceeding depth 1.67 m made of	1200 mm circular	Heavy Duty Dia-500 mm inside, S.F.R.C.
5.	Manhole exceeding depth 2.29 m made of	1500 mm circular	Heavy Duty Dia-500 mm inside, S.F.R.C.

(7) Drop Manholes

Where it is impracticable to arrange the connection within 60 cm height above the invert of the manhole, the connection shall be made by construction of a vertical shaft outside the manhole chamber as shown in the detailed drawings. If the difference in level between the incoming drain and the sewer does not exceed 60 cm and there is sufficient room in manhole the connecting pipe may be directly brought through the manhole wall and fall accommodated by constructing a ramp in the benching of the manhole.

All manhole covers shall fit properly and bed evenly without rocking in their frames. Covers shall be sealed with grease upon final completion and testing.

(8) Lifting Keys

A set of lifting keys for each type of manhole cover shall be supplied by the Contractor.

22.5 RAIN WATER COLLECTION CHAMBER

The chamber shall be of brick masonry as specified and shall have a polycrete/ ferrocement grating with frame on top and C.I. grating with frame on side, both fixed in 15 cm thick cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size). The size of the chamber shall be taken as the clear internal dimensions of the polycrete/ ferrocement frame. The chamber shall have a connection pipe, the length of which in metre between the road gully chamber and the manhole of the drain shall not be less than one by forty (1/40) times the nominal diameter of pipe in mm (i.e. for 150 mm connection pipe, length shall not be less than 3.7 m and for 250 mm connection pipe length shall not be less than 6.25 m). The chamber shall be built at the location as shown on drawing or as fixed by the Engineer-in-Charge considering the site conditions.

23.0 EXTERNAL WATER SUPPLY

23.1 GALVANISED IRON (G.I.) PIPES FOR DOMESTIC WATER SUPPLY (INCLUDES MUNICIPAL SUPPLY UPTO UNDER GROUND RESERVOIR)

(1) Specifications

Where specified G.I. pipes for water supply inside and outside the building shall be genuine galvanised steel tubes conforming to IS:1239(Part-I)-1979 of specified grade with latest amendments.

All fittings shall be malleable iron galvanised fittings conforming to IS:1879(Part-1 to 10)-1975 with latest amendments. All fittings shall have manufacturer's trade mark stamped on it. Fittings in G.I. pipe lines shall include elbows, tees, bends, reducers, nipples, union, bushes, G.I. clamps of approved design, G.I. flanges with 3 mm rubber insertion, nuts, bolts, washers, etc. All fittings shall be tested at manufacturer's work. Contractors may be required to produce certificate to this effect from the manufacturers.

(2) Laying and Jointing

All excavation work for laying G.I. pipes shall be done as described in section 3.1 in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand (conforming to grading zone V) or soft soil. Pipes shall be protected by painting two coats of anti-corrosive bitumastic paint over a coat of primer. All the pipe surfaces shall be thoroughly cleared and dried before the application of the primer and shall be free of dirt, grease, oil, rust, scale or other foreign matter. The width of the trench shall be outside diameter of the pipe plus 30 cm. Pipes shall be laid atleast 90 cm. below the ground level (measured from surface of the ground to the top of pipe).

Screwed G.I. pipes shall be jointed with screwed socket joints, using screwed fittings. Care shall be taken to remove any burr from the end of the pipes after cutting. White lead with grummet of a few strands of fine hemp shall be applied while tightening. Other pipe jointing compound may be permitted if approved by the Engineer-in-Charge before starting the work. All pipes shall be fixed with G.I. holder bat clamps clear off the wall. If pipes are fixed in chases they shall be fixed in position by iron hooks. All piping shall be kept plugged at the end of day's work.

23.2 CPVC PIPE WORK

Wherever specified, CPVC piping system for water supply system shall be SDR 11 rated and of approved makes. All pipes and fittings shall comply with ASTM D 2846 standard.

All fittings shall be injection moulded. CPVC to CPVC jointing shall be fusion bonding type(Solvent Cement Type) using proprietary CPVC fusion compound. Transition fittings (for making connections with valves, faucets, other appurtenances and non CPVC pipes) shall have brass insert having threads as per IS: 554. **CPVC threaded fittings are not to be used.**

All CPVC pipework for water supply (both hot and cold) inside the building shall be carried out in a workmanship like manner as per the manufacturer's

recommendations. All materials shall be as specified in these specifications, bills of

quantities and drawings. All the brass threaded adaptors and specials shall be jointed properly using Teflon tape. For storage, cutting, jointing, installing and testing of CPVC material, manufacturer's instructions shall be strictly adhered to.

Solvent Cement : The jointing of pipes and plain fittings shall be by solvent cement of make and grade as specified and supplied by the manufacturer of CPVC piping system. It shall be insured that the solvent supplied is not used beyond the expiry period as mentioned on the packaging of the material.

HORIZONTAL SUPPORTS SPACING:

DIA	SPACING IN METRE AT WORKING TEMPERATURE			
	23° C	38° C	60° C	82° C
½ "	1.22 M	1.07 M	1.07 M	0.92 M
¾ "	1.53 M	1.37 M	1.22 M	0.92 M
1"	1.68 M	1.53 M	1.37 M	0.92 M
1 ¼ "	1.83 M	1.68 M	1.53 M	1.22 M
1 ½ "	1.98 M	1.83 M	1.68 M	1.22 M
2"	2.29 M	2.14 M	1.98 M	1.22 M

Curing Time: After the CPVC installation is completed, adequate time as per following schedule shall be provided for the curing of the of the joints before subjecting the system to pressure testing or putting it to use:

Ambient Temperature	Pipe Sizes ½' - 1 ¼"	Pipe Sizes 1 ½" - 2"
Above 16° C	½ hr.	1hr.
From 5° C - 16° C	1hr.	2hr.
Below 5° C	3hr.	6hr.

23.3 HDPE PIPEWORK

Wherever specified for external water supply including landscape irrigation, HDPE. Piping system shall be provided using specified materials and employing specially trained workmen.

HDPE PIPES

High Density Polyethylene (HDPE) pipes for potable water supply shall conform to IS : 4984-1978(Second Revision) (Material Grade PE-80) and be of appropriate pressure rating.

The pipes shall be reasonable round and shall be supplied in straight lengths or in coils as specified. The internal and external surfaces of the pipes shall be smooth and clean, free from grooving and other defects.

Pipes shall be manufactured using virgin material and shall be continuously and permanently marked with following information.

Manufacturer's Name

Standards
Size and Pressure rating

HDPE FITTINGS

- a) All Compression fittings shall be rated for 10 Kg/cm² suitable for HDPE pipes specified above.
- b) All Butt welded fittings shall be of 10 Kg/cm² rating and shall be of same make as Pipes.
- c) Wherever a branch or outlet of 50% or less dia is required, Clamp saddles shall be used instead of Tee. Saddles shall be Non metallic and shall be of same make as Compression fittings. Nuts and Bolts if used shall be SS 314.
- d) Union wherever used shall be PVC as per DIN standards and shall be of 16 Kg/cm² rating. Unions shall be double union type and shall be threaded.
- e) Flanges shall be selected to suit Valve flanges and shall be 10 Kg/cm² (Min) depending on pipe line material. All bolts, nuts and washers shall be SS 314.

LAYING AND JOINTING

All excavation work for laying HDPE pipes shall be done as described above in general. However, the special care must be taken to ensure that the hard objects like stones, rock pieces, tree roots etc. are not present. Pipes shall be bedded in sand or soft soil free from rock and gravel. Backfill upto 15 cm above the pipe shall also be of fine sand or soft soil. Pipes shall not be painted. The width of the trench shall be outside diameter of the pipe plus 45 cm. Pipes shall be laid atleast 60 cm. below the ground level (measured from surface of the ground to the top of the pipe).

HDPE pipes shall be butt jointed by heat fusion method in accordance with the following procedures. HDPE pipes shall not be threaded. Jointing procedure shall be as follows and shall be strictly adhered to obtain optimum quality of joints. skillful application of qualified technique, welder and the use of proper construction equipment in good condition shall be made to achieve sound joints in HDPE piping.

Preparation

Any kinks or buckles in pipe near its ends shall be removed by cutting out as a cylinder. The face of the joints to be welded shall be flat. Correct position and holding of pipe is necessary when sawing pipe to achieve this. For pipes 160 mm. OD and above, shaping tool may be used.

Whether pipes have been sawn or not, joint faces shall be slightly scrapped with a knife, prior to welding, to remove exposed layers which may lead to unsatisfactory joint. Both the sections of pipe to be welded shall be positioned by using rollers and/or wooden supports.

Welding

Butt heat-fusion joint procedure shall require the use of jointing device (welding jack) that holds the heat element (mirror) square to the ends of pipes, can compress

the heated ends together and holds the piping in proper alignment while the plastic hardens.

Temperature of joints should be 200° C. Surface temperature, of the heating mirror, must, therefore, be 210° C + 5° C. The faces of pipes to be joined shall be on either sides of the heating mirror and maximum of 0.4 kg/cm² contact pressure shall be applied. Contact pressure should not exceed this, otherwise the molten mass from the joint faces will be squeezed out prior to welding. Even with the lowest pressure a rim of molten material shall be formed on the ends of pipes being joined. Care shall be taken in the heating operation to prevent damage to the plastic material from over heating or having the material not sufficiently heated to ensure a sound joint. Direct application of heat, with a torch or other open flame is prohibited.

Approximate heating for series IV pipe may be taken as :-

32 mm OD pipe	:	1 minute
75 mm OD pipe	:	3 minutes
160 mm OD pipe	:	5 minutes

Heating time for pipes with lesser wall thickness may be according to experience and ambient temperature prevailing. Completion of heating is indicated by formation of a uniform rim of molten material at the edges of pipes.

Subsequent to heating, the pipes shall be removed from the heating mirror and shall be immediately joined by application of moderate pressure for 2-3 seconds, after which, pressure of approximately 0.6 Kg/cm² shall be applied for two minutes. After two minutes the pressure shall be increased to 1.2 kg/cm² and sustained for pipes upto 160 mm OD and 30 minutes for pipes 225 mm OD and larger.

Care shall be taken that the rim formed during welding is not too large. Pressure shall be maintained until the joint is hand-warm. After relieving pressure joint shall be allowed to cool completely before handling.

The electric heating mirror used shall be specially designed to meet the requirements of HDPE pipe welding. It should have a proper regulator to control and maintain its temperature during the welding procedure. It shall have P.T.F.E. cloth fitted on both sides to prevent adhesion of molten polyethylene on surface of the mirror.

Use of Crayons

The monochrome crayons (200° C & 220° C) shall be used to determine the temperature of mirror. At the correct temperature of 210° C the colour of 200° crayon mark shall change within 2 seconds. If the colour change takes longer time, the temperature is lower and if the colour change is immediate, the temperature is higher than necessary. As thin a layer as possible of crayon shall be used when checking. If the layer is too thick, the indications will be incorrect

23.4 VALVE CHAMBER

(1) Construction

Base concrete, masonry work and plastering shall be as described under sub-section MANHOLES.

(2) Size

The size of the valve chamber shall be as specified in the Bill of Quantities.

24.0 DOMESTIC WATER SERVICES

24.1 G.I. PIPE WORK

G.I. pipes for water supply outside the building shall be genuine galvanised steel tubes conforming to IS:1239(Part-I)-1979 of specified grade with latest amendments. All fittings shall be malleable iron galvanised fittings conforming to IS:1879(Part-1 to 10)-1975 with latest amendments. All fittings shall have manufacturer's trade mark stamped on it. Fittings in G.I. pipe lines shall include elbows, tees, bends, reducers, nipples, union, bushes, G.I. clamps of approved design, G.I. flanges with 3 mm rubber insertion, nuts, bolts, washers, etc. All fittings shall be tested at manufacturer's work. Contractors may be required to produce certificate to this effect from the manufacturers.

All pipe work for water supply (both hot and cold) inside the building shall be carried out in a workmanship like manner following CPWD specifications in general. All materials shall be as specified in these specifications, bills of quantities and drawings. In case specifications of a material is not mentioned or not clear in the above, the reference shall be made to CPWD specifications and the relevant Indian Standards/codes.

24.2 VALVES

(1) General

Each valve body shall be marked with cast or stamped lettering giving the following informations :

- a) The manufacturer's name or trade mark
- b) The size of the valve
- c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50 mm. For 65 mm dia and 80 mm dia., these shall be gate valve type and diameters above 80 mm, these shall be sluice valve type.

(2) Float Valve

Float valves 50 mm and smaller shall be of brass, gun metal or other equally suitable corrosion resistant alloy in accordance with IS:1703-1977 or approved equal. The float valves shall have copper or plastic floats suitably reinforced to hold the threaded insert. The float valves fixed to the system shall be secured with backnuts.

(3) Fullway Gate Valve

The valves shall be of quality approved by the Consultant/Engineer-in-Charge and shall generally conform to IS:778-1971.

(4) Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Consultant/Engineer-in-Charge. The body and ball shall be of copper alloy and stem seat shall be of teflon.

(5) Non-Return Valves

Non-return valves are to be IS:778-1984 manufactured from gun-metal or dezincification resistant brass.

(6) Pressure Reducing Valve

The valve shall be suitable for water application and shall conform to relevant BIS standard. The valve should be installed in a vertical portion on horizontal line. In all cases, a stop valve should be installed in an easily accessible position

on the inlet side of the pressure reducing valve. A safety valve and a pressure gauge must always be installed on the reduced pressure or outlet side of the pressure reducing valve. To avoid any dirt from entering the valve, it is advisable to fit a strainer on the inlet or high pressure line. The pressure reducing valve and accessories should conform to relevant BIS standard and of approved make.

(7) **Butterfly Valves**

The valve shall of cast iron conforming to relevant IS:13095. The valve shall be of quality approved by the consultant/Engineer-in-charge.

25.0 TESTING AND COMMISSIONING

25.1 GENERAL

The Contractor shall be responsible for testing and commissioning the entire services installation described in these specifications and will demonstrate the operation of the system of the entire Satisfaction of the Architect/Consultant and to the Owner approval.

25.2 METHOD OF TESTING

The test on various services shall be carried out as described herein as described in relevant Indian Standards and British Standards and also as directed by the Engineer-in-Charge The carrying out and recording of tests shall be agreed with the Architect/Consultant.

25.3 WATER FOR TESTING

Water for testing shall be obtained by the Contractor from an approved source. It shall be free from bacterial contamination silt, grit, sand etc. After testing, the Contractor shall satisfactorily dispose off all water, or it may be re used providing it is clean and is not contaminated.

25.4 TEST RECORDS

The Contractor shall be responsible for the keeping all records of tests and on completion shall provide records and reports of the tests in triplicate. All test records shall clearly identify the item of the test and must be signed by the Contractor's authorised representative and Engineer-in-Charge.

25.5 UNSATISFACTORY WORKS

If the tests reveal unsatisfactory materials, installation or adjustment, the Contractor shall, at his own expense, carry out such alternations or replacements as may be necessary to rectify the defective work. The Contractor shall then repeat the tests as necessary to establish the satisfactory nature of the alterations or replacements.

25.6 TESTING AT WORKS

All plants and equipments shall be tested at manufacturer's works before despatch and the test certificate in duplicate shall be forward to Architect/Consultant. The Contractor shall similarly provide a set of manufacturer's certified test curves for any pump installed under the Contract. All tests shall be in accordance with the appropriate Indian Standards and British Standards as applicable.

25.7 ON SITE TESTING

The Contractor shall provide on site all the necessary instruments, plant, equipment, materials, water, electricity and labour necessary for carrying out the specified tests. All tests shall be carried out as required to meet the construction programme and the Contractor shall include for all necessary isolation and other works as may be required for testing the whole or parts of the installation. The Contractor shall also be responsible for re-testing, if necessary, until satisfactory tests are achieved.

25.8 TEST PRESSURES

Pipe Line	Test Pressure	Period	Method
Water Mains, Fire Mains & Water Services.	5 kg/sq.cm. or maximum working pressure plus 50 percent whichever is greater.	2 Hours	Hydraulic Pressure Test
Underground Drainage	1.5 metres head of water at highest point	30 min.	Hydraulic Test
Foul Drainage above ground	i) Not more than 4.5 M head in any section	2 Hours	Hydraulic Test
	ii) 75 mm water gauge	3 min.	Air Test

25.9 TESTING OF VARIOUS SERVICES

(1) Water Services

Before the pipes for water supply are painted or covered they shall be tested to a hydraulic pressure of 5 kg/sq.cm or maximum working pressure plus 50 percent whichever is greater. Pressure shall be maintained for atleast 2 hours without appreciable drop in pressure. In addition to the sectional testing of water supply pipes, the Contractor shall test the entire installation on completion of the job to the entire satisfaction of the Engineer-in-Charge. The Contractor shall rectify all leakages and restore damage done to the building and furniture at his own cost.

(2) Underground Drainage

The sewer and drain lines shall be tested for water tightness and straightness as described below

i) Water Test:

Pipes and joints shall be subjected to a test pressure of atleast 1.5 m head of water at the highest point of the section under test. The test shall be carried out by suitably plugging the low end of the drain and filling the system with water. A knuckle bend shall be temporarily jointed in at the top end and a sufficient length of vertical pipe jointed to it so as to provide the required head. Or top end may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitably for observation.

ii) Test for Straightness and Observation.

Sewer lines shall be tested for straightness :

- a) By inserting at the high end of the sewer or drain a smooth ball of diameter 13 mm less than the pipe bore. In the absence of obstruction, such as yam or

mortar projecting through the joints, the ball should roll down the invert of the pipe and emerge at the lower end; and

- b) By means of a mirror at one end of the line and lamp at the other. If the pipe line is straight, the full circle of light can be observed. If the pipeline is not straight, this will be apparent. The mirror will also indicate obstruction in the barrel.

(3) Above Ground Foul Drainage

All soil, waste and vent pipes shall be tested by filling up the whole or part of stack with water. All openings for connections, etc. shall be suitably plugged. The total head shall however not exceed 4.5 metres.

Contractor shall remove and replace all pipes having holes, cracks etc. All leaking joints and access doors shall be replaced or remade to the entire satisfaction of the consultant. Water shall be retained in stack for a minimum period of 2 hours. After all plumbing fixtures are installed. Contractors shall apply the smoke test to the entire stack to the satisfaction of the Consultant.

(4) Sanitary Fixtures & Fittings

When the installation has been complete to the satisfaction of the Consultant, it shall be tested in the following manner :

- i) The entire system shall be slowly filled with water, allowing any trapped air to escape.
- ii) When all outlets are closed, the system shall be checked for water tightness. Each outlet shall then be checked for rate of flow and correct operation.
- i) Waste outlets of wash basins and sinks shall be plugged and the basin and sink bowls shall be filled upto over flow level. Plug shall be removed and waste pipe and trap shall be checked for leakage and floor drain (if fixture waste is connected to floor drain) shall be checked for overflow.

(5) Testing Manholes

All open channel manholes shall be tested with water to a height of 1 metre above the channel invert or as otherwise directed. The water level shall be retained for a 2 hour period without appreciable loss. When the water is released the benching shall be inspected to ensure that there are no cracks.

25.10 FLUSHING OUT AND STERILISATION OF PIPEWORK AND TANKS

It is essential that all internal water services, external mains and tanks are thoroughly flushed out prior to being put into service and that drinking and domestic water services mains and tanks are sterilised in accordance with clause 13 of IS : 2065-1983 – Code of Practice for Water Supply in Buildings.

The Contractor shall be responsible for making any temporary pipe work connections required.

Following completion of sterilisation of every part of the drinking and domestic water system, the Contractor is to ensure that satisfactory bacteriological samples are obtained and tested at an approved laboratory and the result approved by the Architect/Consultant prior to completion of the contract and handing over to the Owner.

25.11 OPENING AND CLOSING OF CUTOUTS:

The contractor shall utilise specified cutouts and sleeves provided during the construction to prevent the breakage. The annular space in between the pipes and sleeves shall be filled and tighten by using the approved and guaranteed fire retarded sealant. In case of sleeves or cutouts are misplaced or not located then the contractor will make the provision for cutouts or sleeves in walls, columns, slab etc at his own cost, with prior permission of the project manager. Nothing extra shall be paid to the contractor on this account for making and sealing the cutouts and sleeves. No cutout or sleeves shall be provided in walls, slabs, terraces after completion of water proofing or finishing works only on the approval of the project manager such cutouts or sleeves may be provided, and the work will be finished by the contractor with necessary water proofing membrane as directed by the project manager at his risk and cost.

25.12 CLAMPS, SUPPORTS AND FASTENERS:

In all types of work all supports, hangers and clamps to be fixed on RCC beam, walls, columns, slab, boundary wall and piers by means of approved galvanized expandable anchor fasteners in drilled hole of correct size and should be sufficiently strong to carry the load of pipes etc. Drilling should be done by approved power drill as recommended and approved by the manufacturers of anchor fasteners.

Failure of any fastening device shall be the entire responsibilities of the contractor and he will replace such defective fasteners at his own cost. Project manager in the interest of work may use such clamps, fasteners, hangers etc for other services also.

The project manager may modify the design and utilization of clamps, hangers, supports, fasteners contractor is not entitled to refuse such modification, only extra cost incurred will be compensated by the project manager on his discretion.

To facilitate the C P fittings etc, the making of hole or cutouts and making good the same should be in engineering manners if any tiles, stone slabs etc are damaged then contractor will replace the same in nice manner at his own cost, Only trap cutting at the drain point, floor trap points are exclusive from the scope of the contractor.

**LIST OF APPROVED MAKE OF MATERIALS
(FOR CIVIL WORKS)**

S. No.	Materials	Vendors
1.	Earth work	
1.1	Chlorpyriphios (Pre-construction treatment)	DE-NOCIL , Bayer
1.2	Damp proof material	Impermo, Duraseal, ACCO-proof
2	Concrete works	
2.1	Cement (OPC)	ACC, Ultratech, Coromandel, RAMCO, Chettinad
2.2	White cement	ACC, Birla, JK White
2.3	Chemical Admixtures	MC Bauchemie, Sika, FOSROC, Choksey Chemicals
2.4	Expansion Joint Board	Supreme Industries, SIL FILL or Equivalent
3	RCC works	
3.1	Reinforcement steel	SAIL, TATA (TISCO), RINL
4	Steel work	
4.1	Structural Steel	SAIL, TATA (TISCO), RINL, Jindal
4.2	MS pipe, Tubes, Bar, Flats, Angle, Tee Sections	SAIL, TATA (TISCO)
5	Brick works	
5.1	AAC blocks	Xtralite from Ultratech, Aerocon from HIL, Siporex India Limited
5.2	Concrete blocks	
6	Wood & PVC work	
6.1	Wooden Flush Doors	Kutty, Green ply, Century, Kit ply, Ravela door, Kailash, Shakthi, Merino
6.2	Water proof ply	Green ply, Garnet, Century, Kit ply, Anchor , Merino
6.3	Commercial ply	Archidply, Century, Donear, Green Ply, Kitply, Anchor, Merino
6.4	Laminate	Greenlam Century, Merino, Royal Touch, Kitply, Formica, Decolam
6.5	Pre-laminated particle board – exterior grade	Novapan/Merino/Green Lam/Kitlam, Ecoboard Associated / Arclid ply/Century
6.6	Gypsum Board	Saint Gobain, Lafarge, Boral Board, Armstrong
6.7	Melamine Polish	Asian paints, melamine Gold wood fin of Pidilite Industries, Timbertone of ICI Dulux.
6.8	Door Hardward	Dorma, Kich, Classic, Haffle, Ozone, Geze
6.9	Hydraulic door closers/floor springs	Godrej, Hardwyn, Dorma, Everite
6.10	Locks/Latches	Dorset, Godrej, Harrison, plaza, yale

6.11	Metalic Steel Fire Door	Shakti Met Door, Promat, Godrej
6.12	Fire smoke Seal	Hilti, Raven
6.13	Fire Rated Hardware	Dorma, Ingersolrand, Geze
6.14	Non Metallic Fire Door	Shakti Met Door, Naviar / Promat, Godrej
6.15	Stainless steel screws for fabrication and fixing of windows.	Kundan/puja/Atul
6.16	Butt Hinges openable Window shutters	Haffle , Alu Alpha
6.17	Mild Steel Butt Hinges/ Piano Hinges	Jolly, Garg, AMIT,Jyoti
6.18	Nuts Bolts/ Screws	Kundan, Puja, Atul
6.19	Concealed Tower Bolt	Dorma, Ingersolrand, Alu Alpha
6.20	Acoustic Insulation	U.P. Twiga Ltd, Lloyd Insulation, Saint Gobain,
6.21	Glass/ reflective Glass	Saint Gobain, Asahi, Pilkington, Glaverbel
6.22	Clear Float Glass	Saint Gobain, Asahi, Pilkinton
6.23	Source for tempering Refl.Glass / Clear	FUSO, Saint Gobain, Gurind, Impact Safety
6.24	Fire rated glass	Pyoswiss of Saint Gobain, pyran of schott, Pilkington
7.	Flooring	
7.1	Vitrified Tiles	NITCO, RAK, Kajaria, Johnson Somany
7.2	Glazed Ceramic tiles	NITCO, RAK, Kajaria, Somany, Johnson
7.3	Synthetic sports flooring	Armstrong, LG, Wonder floor
7.4	Linoleum sports flooring	Armstrong, Forgo, Gerflo
7.5	False Floor	Hewetson, Unifloor, Unitile, kebao, Pinnacle
7.6	Engineered wood flooring	Armstrong, wernel, Pergo
7.7	Floor Springs (for Non-DSR items)	Dorma , Ingersoland , GEZE
7.8	Cement Concrete Parking tiles	NITCO, Poddar, Eurocon, Dazzle ultra.
7.9	Interlocking Concrete Blocks	Ultra, Shree, Hindustan Tiles, Vyara Tiles Pvt., Ltd. Nitco
7.10	High Density fibre (HDF)	Pre-Laminated board Pergo, Armstrong
8	Finishing	
8.1	Paint/primer/oil bound distemper, Acrylic paint	Asian Paints, ICI Dulux, Nerolac, Berger, Jotun
8.2	Water proof cement paint	Snowcem India Ltd, Asian Paints, Berger,
8.3	Synthetic enamel paint	Berger, Nerolac, Asian, ICI
8.4	Cement based wall putty	JK wall putty, Birla wall case, Asian Paints, Altek.
8.5	Acrylic textured plaster	Asian Paints, Spectrum paints, Heritage.
8.6	Ready mix Cement plaster	Wall plast, Ultretech, Madras cement Ltd.
8.7	Melamine polish	Asian paints, wodfin Timberstone, Polycure

8.8	Fire Retardant paint	Jotun, Hilti, Akzonobel
8.9	Mirror Glass	Modi Guard, Saint Gobain, Asahi, Atul
8.10	Anti Corrosive	Bitumastic Paint Asian / Berger / Shalimar
8.11	Epoxy Paint	Asian /Berger /Shalimar
8.12	Epoxy Coating	BASF , Forsoc , Laticrete
8.13	Silicon coating	Dowcorning, BASF, GE, Wecker
9	Aluminium work	
9.1	Aluminium systems/ anodized aluminum fittings for doors / windows / windows	Schueco, Bhoruka, Kawneer, Hardima, Everite, Sigma
9.2	Aluminium Fittings	Classic, crown, Jyoti
9.3	Aluminium Sections	Hindalco /Jindal /Bhoruka /Indal
9.4	Friction stay hinges	Earl-Bihari
9.5	E.P.D.M. Gaskets	Anand/Roop/Bohra/Hanu/Amees Rubber
9.6	Silicon Gaskets	Sree Gaurav, Roop
10	Water proofing	
10.1	Water proofing compound	Fosroc, BASF, Sika, Pidilite, CICO, Impermo, Acco proof
10.2	Membrane Waterproofing system	BASF, STP limited, Texsa, WR Grace, Pidilite, Hydro tech ltd.
10.3	Chemical Waterproofing system	BASF, MC-Bauchemie, Sika, Sunanda Specialty Coatings, Perma Construction Aid Pvt. Ltd. Forsoloc, Pidilite
10.4	Water stops	Hydrotite, BASF, Hydroswell
11.1	PVC Perforated Pipes	Rex Polyextrusion Ltd, Akash Enterprises, Zenplas Pipes Pvt. Ltd
11.2	Play equipments	Koochie Play, Playworld Systems
12	Miscellaneous	
12.1	Structural Sealant	Dow Corning, Wacker, GE, Fowroc, BASF
12.2	Polysulphide sealant	Pidilite, Chemetall-Raj, Fosroc, choksey chemicals, Tuff seal
12.3	Bitumen Impregnated Board	Shalitek or equivalent
12.4	Polyethylene backer rod	Supreme Ind. Ltd. Or equivalent
12.5	Epoxy	Fosroc / STP / CICO / Ardex
12.6	False Ceiling Members (Perimeter, ceiling section, intermediates, angles etc.)	Armstrong, Gyp. Steel of India Gypsum Ltd (Saint Gobain)
12.7	Welding rod	ADVANI, Esab
12.8	Metal Deck sheet	TATA, SAIL
12.9	Shear Stud / Connector	KOCO or equivalent
12.10	Clamp. Rebar, Chemical fastener	Hilti, Fischer, Wurth
12.11	Anchor Fasteners / bolts	Hilti, Fischer, Halfen
12.12	Masking Tapes	3M, Sun Control, Wonder Polymer
12.13	Dash Fasteners	Hilti, Fischer, Anchor, Kundan.

12.14	Stainless Steel Bolts, Washers and Nuts	Kundan / Puja / Atul , Hilti
12.15	Stainless Steel Pressure Plate Screws	Kundan / Puja / Atul
12.16	Stainless Steel Friction Stay hinges	Hetich , Haffle , Securistyle , Earl Bihari, ROTO
12.17	Weather Silicon make and grade	Dow Corning / Momentive (GE)
12.18	Structural Silicon	Dow Corning / Momentive (GE)
12.19	GRC Jali	Terrafirma , Ecovision & Mahesh GRC
12.20	Stainless Steel	Salem , Jindal , SAIL
12.21	Polycarbonate Sheet	Danpalon, Alcox, Polygal, V.A. Corporation, Joy Fab, Yadav Engineering
12.22	Post tensioning system	CRUX , VSL , Utracon , BBR
12.23	PT Strands	DP Wires , Tata , Usha Martin
12.24	Adhesive	Dunlop, Vamorganic, Sika, Forsoloc
12.25	Grouts	Balendura, Lativete, Kerakoll, Weber
12.26	Solar studs/Median markers	3M, Avery Dennison, Nikkalite
12.27	Polycarbonate Convex Mirrors, Rubberised road hump	Unique safety solutions
12.28	Air transfer grills Cool grills	Pune, Systemair India
13	Public Health Engg.	
13.1	Vitreous Commodes / wash basin	Hindware, Roca, Parryware, Kohler
13.2	Water supply fixtures / fittings like bib cocks, shower panels	Jaguar, Parryware, Kohler
13.3	GI Pipes	TATA, Zenith, Jindal.
13.4	GI pipe fittings	Zoloto, Unik, HB, ICS
13.5	RCC Pipes	Indian Hume Pipe, AI-Hume pipe , Madurai spun pipes, Jain & Co.,
13.6	Ductile Iron covers & gratings	Neco or approved equivalent
13.7	Ductile Iron pipes	Lanco, Jindal, Kesoram, Electrosteel,
13.8	DI fittings	Electrosteel, Kartar
13.9	SCI pipes	Neco Kesoram, electrosteel
13.10	SWR PVC pipes and fittings	Supreme, Astral , Finolex, Prince.
13.11	CPVC pipe and fittings	Supreme, Astral , Finolex, Prince.
13.12	UPVC pipes	Supreme, prince, Finolex
13.13	Water supply valves	Zoloto, RB Leader , ARCO
13.14	Kitchen sinks	Nirali or Hindware , Johnson , Franki Diamond
13.15	CI Manhole cover	Neco , BIC
13.16	SFRC Cover and grating	Kutty , KK , Advent , Newtech
13.17	Air release valves	Kirloskar, RBM, Kartar
13.18	CI double flange sluice valve	Kirloskar , RBM , Kartar
13.19	Plastic Encapsulated Foot Rest	KK India , KGM , Accurate Buildcon
13.20	Gun Metal valves	Zolto , leader , sant , Andco India

13.21	CI Double flanged sluice valves	Kirloskar , IVS , BURN , Zoloto , Leader
13.22	CI Double flanged Non-return valves	Kirloskar
13.23	Butterfly valves	KSB, Advance, Kirloskar, SKS
13.24	Galvanized malleable iron fittings Conforming to IS: 1879	Unik/ Zoloto-m
13.25	Stoneware Pipes, Gully traps	ISI marked of approved
13.26	HDPE Pipes and Butt Fittings	Jain /Hasti/ Dura-line/ Relpipe
13.27	HDPE Compression Fittings, Converters and Adapters	Plasson, Israel/ Palaplast, Greece/ Alprene, Italy / MAIS, Saudi Arabia
13.28	Ball Valves	
13.29	Steel Fibre Re-inforced Concrete Manhole Covers and Gratings	K.K. / Pragati
13.30	CI Manhole covers	RIF/ Neco
13.31	HDPE Valve Box	MAIS, Saudi Arabia / Rain Bird / Palapast/ Ajay Ind. Corp
13.32	Underground Pipe Protection Wrapping	IWL - Pypkote
13.22	Expansion Bolts	Hilti / Canon
13.34	GI Hanger for Pipes / Adjustable Hanger	Chilly/ GMGR/ Camry
13.35	PVC Encapsulated Steel Foot Rest	KGM
13.36	Fire Retarder sealant	Super Sera/ Fosroc
13.37	Spray applied PUF thermal insulation for roof treatment	Pidilite, Lloyd Insulations(India) Pvt. Ltd., BASF
13.38	Glass mosaic tiles	Italia, Palladio, Bisazza
13.39	Sandwich PUF paneled roofing sheets	Lloyd Insulation (India) Pvt. Ltd., Zindal Mectec Pvt Ltd.
14	Polycarbonate sheet	Lexan, Makralon

**GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR REMOVAL OF DEFECTS
AFTER COMPLETION OF WORK IN RESPECT OF WATER PROOFING WORKS.**

This Agreement made this day of by and between, (Name of the contractor, hereinafter call Guarantor of the one part) and the Indian Institute of Management Rohtak (hereinafter called the Institute 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 INSTITUTE of the other part where by the Guarantor inter alia, undertook to render the buildings and structures in the said contract recited, completely water and leak proof.

And whereas the Guarantor agreed to give a guarantee to the effect that the said structures will remain water / leak proof for ten years from the date of completion of work.

Now the Guarantor hereby guarantees that water proofing treatment given by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be ten years to be reckoned from the date completion of work.

Provided that the Guarantor will not be responsible for leakage caused by earthquakes or structural defects or misuse of roof or alterations and for such purpose

- a) Misuse of roof shall mean by operation, which will damage roofing treatment, like chopping of firewood, chiselling and cutting, drilling holes and nailing and things of the similar nature, which might cause damage to the roof.
- b) Alteration shall mean construction of an additional storey or a part of roof or construction adjoining to existing roof, where by roofing treatment is removed in parts.
- c) The decision of the Engineer-in-Charge with regard to cause of leakage shall be final.

During this period of guarantee, the Guarantor shall make good all defects and in case of any defects being found, render the building water proof at his own cost, to the satisfaction of the Engineer-in- Charge 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 Institute through 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 execute the necessary rectification or commits breach there under then the Guarantor will indemnify the Principal and his successors against all loss, damage, cost expense or otherwise which may be incurred by him by reasons of any default on the part of GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and / or damage and / or cost incurred by the Institute, the decision of the Engineer-in-Charge will be final and binding on the parties.

In witness whereof these presents has been executed by the Guarantor_____and by_____and for and on behalf of the Indian Institute of Management on the day, month and year first above written.

Signed, sealed and delivered by (Guarantor) in the presence of:

1.

2.

Signed for and on behalf of Institute by _____ in the presence of:

1.

2.

**GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR STRUCTURE GLAZING
AND OTHER RELATED WORKS AFTER COMPLETION OF WORK**

This Agreement made this day of by and between, (Name of the contractor, hereinafter call Guarantor of the one part) and the Indian Institute of Management Rohtak (hereinafter called the Institute 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 INSTITUTE of the other part where by the Guarantor inter alia, undertook to carry out structural analysis and design , preparation of shop drawings , getting the structural design and shop drawings vetted from the Principals of the structure glazing system, setting out, fabrication, supply, assemble, install, align and fix to the building structure the structure glazing units and execute other related works , all as specified and set out in the contract and as per the correct international / national standards.

AND WHEREAS THE GUARANTOR agreed to give a guarantee (for all works as stated above) for the following:

1. System

- Structural design has been carried out for design loads, as specified, thermal stresses, building movements and the consequent deflections without compromising the performance characteristics.
- That deflections in the framing members shall be within permissible limits as specified.
- Structural stability, safety, integrity and required performances of the work for all design loads and building movements as specified.

2. Material

- Glass (Single, Laminated or DGUs) – Substrate, coatings, lamination of laminated glass, insulation of DGUs. Replacement of broken glass panes (breakage not attributable to vandalism or accident), defective insulated glazed units (evident due to condensation or dirt between the lites, failure of seal and damage to internal glass panes, staining, damage to the soft coating etc.) during the guarantee period.
- Sealants – Material used, performance of sealant used, usage as per the requirement of structural design and functional requirement, compatibility with different substrate and sealants, bite size, quality assurance during sealing of DGUs and fixing glass to glass and glass to the aluminium frame, etc.
- EPDM / Silicone gasket – for ozone resistance and other properties as specified etc.
- Aluminium - material quality, tempering requirement, suitability of aluminium grade and anodizing etc.
- Anchor fasteners – suitability and strength requirements as per manufacturers' specifications etc.
- Aluminium composite panel cladding - Material quality and PVDF coating / lumiflon-based fluoro polymer resin coating for colour retention, chalking resistance, humidity resistance, hardness and gloss retention etc as specified.

3. Performance

- Water tightness, wherever specified in the Contract.
- Workmanship
- Integrity of system during movements within and relative to the building structure.

- Indemnify the Institute against all claims of whatsoever nature due to defective designing by the contractor, material & workmanship etc. and /or non-performance of the work during the guarantee period.

NOW THE GUARANTOR hereby guarantees that the work executed by him shall perform to the specified standards of quality and workmanship during the guarantee period of ten years to be reckoned from the date of completion of work.

During this period of guarantee, the guarantor shall make good all defects and if any defect is noticed during the guarantee period, it shall be rectified by the guarantor within seven days of issue of notice to the guarantor, at least temporarily, to the satisfaction of the Engineer-in-Charge, till the permanent rectification of the defects / replacement of defective materials is carried out by the guarantor, in maximum four months period, retaining same aesthetic and other functional parameters of the original work. If not attended to, the same shall be got done by the Institute through other agency at the risk and cost of the guarantor which shall be final and binding on the guarantor.

That if the Guarantor fails to execute the necessary rectification or commits breach there under, then the Guarantor will indemnify the Institute against all loss, damage, cost expense or otherwise which may be incurred by him by reasons of any default on the part of Guarantor in performance and observance of this supplementary agreement. As to the amount of loss and / or damage and / or cost incurred by the Institute, the decision of the Institute will be final and binding on the parties.

In witness whereof these presents has been executed by the Guarantor_____and by_____and for and on behalf of the Indian Institute of Management on the day, month and year first above written.

Signed, sealed and delivered by (Guarantor) in the presence of:

- 1.
- 2.

Signed for and on behalf of Institute by_____in the presence of:

- 1.
- 2.

GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR THE WORK OF FIRE
CHECK DOOR AFTER COMPLETION OF WORK

This Agreement made this day of by and between, (Name of the contractor, hereinafter call Guarantor of the one part) and the Indian Institute of Management Rohtak (hereinafter called the Institute 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 INSTITUTE of the other part where by the Guarantor inter alia undertook to render the work contract recited structurally stabile, 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 stabile and garneted against workmanship, finishing and materials.

NOW the Guarantor hereby guarantees that work executed by him will remain structurally stable after the expiry of defect liability period prescribed in the contract for the minimum life of Five years.

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 Institute by some other agency at the Guarantor's risk and cost. 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 breaches 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 Institute, the decision of the Engineer-in-charge will be final and binding on both the parties.

In witness whereof these presents has been executed by the Guarantor_____and by _____and for and on behalf of the Indian Institute of Management on the day, month and year first above written.

Signed, sealed and delivered by (Guarantor) in the presence of:

- 1.
- 2.

Signed for andon behalf of Institute by_____ in the presence of:

- 1.
- 2.

GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR THE WORK OF ANTI-TERMITE TREATMENT

This Agreement made this day of by and between, (Name of the contractor, hereinafter call Guarantor of the one part) and the Indian Institute of Management Rohtak (hereinafter called the Institute 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 INSTITUTE of the other part where by the Guarantor inter alia, undertook to render the buildings and structure in the said contract recited, completely termite proof

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said structure will remain termite proof for ten years to be reckoned from the date after the maintenance period prescribed in the contract expires.

NOW THE GUARANTOR hereby guarantees that the anti-termite treatment provided by him will render the structures completely termite proof and the minimum life of such anti-termite treatment shall be ten years to be reckoned from the date of expiry of defect liability period prescribed in the contract.

Provided that the Guarantor will not be responsible for damages caused due to structural defects or misuse of premises/area.

a) Misuse of premises shall mean any operation which will disturb the chemical barrier like excavation under floors, breaking of walls at G.L. disturbing the treatment already carried out.

The decision of the Engineer-in-Charge with regard to cause of damage shall be final.

During this period of guarantee, the Guarantor shall make all the arrangements to do the post constructional anti-termite treatment in all the buildings in case of any termite nuisance being found in the building, to the satisfaction of the Engineer-in-Charge at the cost of Guarantor and shall commence the work for such treatment within seven days from the date of calling upon him to rectify the defects, by the Engineer-in-Charge, failing which the work shall be got done by the Institute by some other agency at the Guarantor's risk and cost. 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 breaches there under, then the guarantor will indemnify the Institute 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 Institute, the decision of the Engineer-in-charge will be final and binding on both the parties.

In witness whereof these presents has been executed by the Guarantor_____ and by_____ and for and on behalf of the Indian Institute of Management on the day, month and year first above written.

Signed, sealed and delivered by (Guarantor) in the presence of:

- 1.
- 2.

Signed for and on behalf of Institute by _____ in the presence of:

- 1.
 - 2.
-

GUARANTEE TO BE EXECUTED BY CONTRACTOR FOR ALUMINIUM WORKS

This Agreement made this day of by and between, (Name of the contractor, hereinafter call Guarantor of the one part) and the Indian Institute of Management Rohtak (hereinafter called the Institute 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 INSTITUTE of the other part where by the Guarantor inter alia, undertook to render the work of aluminium in the said contract recited, completely structurally safe, water tight and free from defects in functional performance of glass, glazed units, anodizing, aluminium sections, EPDM/Silicon gaskets and sealants.

AND WHEREAS the Guarantor agreed to give a guarantee to the effect that the said work of aluminium in the said contract recited will remain structurally stable, completely leak proof and guaranteed against faulty material and workmanship, powder coated finishing for ten years from the date of expiry of defect liability period stipulated in the contract.

NOW the Guarantor hereby guarantees that aluminium works executed by him will remain structural stable completely leak proof and guaranteed against faulty material and workmanship, powder coated finishing for ten years from the date of expiry of defect liability period stipulated in the contract.

The decision of the Engineer-in-charge with regard to cause of defect(s) shall be final.

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

That if the guarantor fails to make good all the defects, commits breaches there under, then the guarantor will indemnify the Institute 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 Institute, the decision of the Engineer-in-charge will be final and binding on both the parties.

In witness whereof these presents has been executed by the Guarantor_____ and by_____ and for and on behalf of the Indian Institute of Management on the day, month and year first above written.

Signed, sealed and delivered by (Guarantor) in the presence of:

- 1.
- 2.

Signed for and on behalf of Institute by_____ in the presence of:

- 1.
- 2.

PART-D
ELECTRICAL & MECHANICAL
(INTERNAL WORKS)

TERMS AND CONDITIONS FOR INTERNAL AND EXTERNAL ELECTRICAL WORKS

General Conditions:

- 1.0 All the works shall be carried out as per CPWD General specification for Electrical Works, Part-I (Internal)-2013 (or Latest) Part-II (External)-1994 (or Latest); amended up to date and should also comply with relevant provisions of the Indian Electricity Rules and Acts as applicable, amended up to date.
- 2.0 The contractor is advised to visit the site of work to have an idea of the execution of work; failure to do so shall not absolve their responsibility to do the work as specified in agreement.

3.0 Rates:

- 3.1. The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor, watch and ward of all materials (including those supplied by the department, if any) for the work at site etc
- 3.2. Prices quoted shall be firm.

4.0 Taxes and Duties:

- 4.1.1. Construction Worker's Welfare Cess The works contract tax shall be deducted from the bills of the contractor as applicable in the State in which the work is carried out, at the time of payments.

5.0 Mobilization Advance:

No mobilization advance shall be paid for the work, unless otherwise stipulated in tender papers for any individual works/ composite work.

6.0 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.

7.0 Works to be arranged by the Institute:

Unless and otherwise specified in the tender documents, the following works shall be arranged by the Department:

- (i) Supply of materials to the contractor as stipulated in the tender documents.

8.0 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 equipments 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 switch board 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 equipments, components and materials for the work

9.0 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.

10.0 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.

11.0 Tools for handling and Erecting:

All tools and tackles required for handling of equipments 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.

12.0 Payment Terms:

Payment shall be made as per the relevant clauses of Form 8 forming part of the tender documents.

13.0 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.

13.1. 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.

14.0 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 contractor 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.

15.0 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.

16.0 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.
- (iii) 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.

17.0 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**). 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.

18.0 Conformity to IE act, IE Rules, and standards:

18.1. 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.

19.0 General requirements of components:

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

20.0 Inspection of materials and equipments:

- 20.1. Materials and equipments to be used in the work shall be inspected by the departmental officers. Such inspection will be of following categories:
- (i) Inspection of materials / equipments 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 go downs to ensure delivery of genuine materials at site.
 - (iv) To receive materials after physical inspection at site.
- 20.2. 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 firm will be required to procure material like exhaust fans, MCB's & DB's, switches & sockets, wires & cables, conduits and switchgears 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.
 - (iv) Inspection at factory or at go down of the manufacturer, as required, shall be arranged by the firm for a mutually agreed date. Certificate for genuineness of the fittings shall have to provided duly signed by the manufacturer's officer not below the rank of Regional Manager.
 - (v) Delivery of material shall be taken up only with the consent of department, after

clearance of the material.

- (vi) Department shall reserve the right to waive inspection in lieu of suitable test certificate, at its discretion.

20.3. Similarly, for fabricated equipments, 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.

21.0 Ratings of components:

- 21.1. 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.
- 21.2. 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.

22.0 Conformity to standards:

- 22.1. All components shall conform to relevant Indian Standard Specifications wherever existing. Materials with ISI certification mark shall be preferred.
- 22.2. 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.

23.0 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.

24.0 Workmanship:

- 24.1. 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.
- 24.2. 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.
- 24.3. Use of quality materials: Only quality materials of reputed make as specified in the tender will be used in work.
- 24.4. 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, powder/ epoxy paint plant, proper testing facilities, manned by qualified technical personnel. These shall be as per make / item approved.

25.0 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.

26.0 Commissioning on completion:

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

27.0 Completion plan and completion certificate:

27.1. 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.

27.2. 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.

28.0 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/ equipments or components thereof shall be rectified/ repaired to the satisfaction of the Engineer-in-charge. The firm will be required to submit guarantee of fans and fittings from the anufacturer to the department.

29.0 Supply of fittings, fixtures & other material:

The procurement of material for the works will be programmed as per the progress of work in consultation with Engineer-in-Charge. The firm will be required to submit a detailed programme and prior to the procurement will seek approval of the department. The direction of the department regarding timing & necessity of getting such material will be final & binding on the firm.

INTERNAL AND EXTERNAL EI WORKS

Additional Conditions

1. The work shall be carried out strictly in accordance with CPWD specifications for Electrical Works 2013 (internal) and 1995 (External) as amended upto date and in accordance with Indian Electricity Rules, 1956, Indian Electricity Act, 1910 as amended upto date and as per instructions of the Engineer-in-Charge including as below and nothing will be paid extra.
2. All materials to be used on this work shall be ISI marked & shall be got approved from the Technical sanctioning authority/Engineer-in-Charge before installation at site unless otherwise not covered under ISI.
3. PVC insulated copper conductor wire used shall be multi-standard FR grade for which nothing extra shall be paid.
4. The work shall be carried out according to approved drawings/details which shall be subsequently issued to the successful tenderer for execution of work and as per instructions of Engineer-in-Charge who will have the right to change the layout as per requirement at site and the contractor shall not have any claim due to change in layout. The work shall be executed by skilled person Licensed by the approved authorities.
5. All damages done to the building during execution of electrical work shall be the responsibility of the contractor and the same will be made good immediately at his own cost to the satisfaction of the Engineer-in-Charge. Any expenditure incurred by the department in this condition shall be recovered from the contractor and decision of the Engineer-in-Charge about recovery shall be final.
6. The bad workmanship will not be accepted and defects shall be rectified at contractor's cost to the satisfaction of the Engineer-in-Charge. The programme of electrical works is to be co-ordinated in accordance with the building work and no claim for idle labour shall be entertained.
7. All the debris of the electrical works should be removed and the site should be cleared by the contractor immediately after the accruing of debris. Similarly any rejected material should be immediately cleared off from the site by the contractor.
8. The contractor or his representative is bound to sign the site order book as and when required by the Engineer-in-Charge and to comply with the remarks therein.
9. The size of conduit and wiring shall be got approved from the Engineer-in-Charge before taking up the execution.
10. The contractor shall make his own arrangement at his own cost for electrical / general tools and plants required for the work. Main Board and Main Distribution Board: The work shall be carried out according to the drawings / details are as approved by the

Engineer-in-Charge. The contractor shall have to get the samples approved before the whole lot is brought to site and it shall include all inter connections etc. All termination of electrical cables in panel / feeder pillars DB's, cable-looping box etc. shall have to be done with proper thimbles / lugs using crimping process. Copper thimbles / reducer shall be used for copper cable and Aluminium cable nothing extra will be paid for the same.

11. All materials shall be supplied and used in items of works by the contractor should be of standard and approved quality. They should be got approved from the Engineer-in-Charge or his authorized representative before installation otherwise no payment will be made for an unapproved or rejected material used on the works and the same shall be removed at his cost from site or work.
12. The contractor shall have to prove bonafides of the make of materials by producing necessary documentary evidence. They are advised to obtain prior approval of Engineer-in-Charge for proposed make of material, before bringing material to site work.
13. Location of Light fixtures, cable routes etc. should be got approved from the Engineer-in-Charge before execution.
14. All interconnection in the panel, DB, cable-looping boxes shall be carried out with suitable cable commensurate with the current carrying capacity of incoming and outgoing cables complete with thimbles etc. as required for which nothing extra shall be paid.
15. All panels, DB's, cable-looping boxes will be numbered and marked with paint / name plate and nothing extra will be payable on this amount.
16. All MCB, MCCB, MCB, DB's, RCBO's, RCCB with DB's shall be of same make / manufacturer.
17. Modular Switch / Socket's / Plates / Computer outlet / Telephone outlet and all accessories shall be of the single make only be provided. The contractor shall have to make the edges around the boxes wherever required shall have to be made by the contractor for which nothing extra shall be paid. The galvanized metal box shall be of the standard thickness as the GI boxes besides other requirement.
18. All the material should be ISI Marked unless otherwise clarification is not available.
19. All concealed works shall have to be done in the presence of Engineer-in-Charge or his authorized representative.
20. The contractor shall make his own arrangement for carriage of material to the site.
21. The entire installation shall be at the risk and responsibility of the contractor until these are tested and handed over to the department.
22. Notwithstanding the schedule of quantities, all items of interrelated works considered

necessary to make the installation complete and operative are deemed to be included shall be provided by the contractor at no extra cost.

23. The connection, inter connection, earthing and inter earthing shall be done by the contractor wherever required and noting extra shall be paid on this account. 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. The contractor shall have to provide the fish wire after removing the choking of the conduits. Even if subsequently the conduits are found choked, the choking will be get removed and / or the new conduits shall be provided at the risk and cost of the contractor.
25. The makes of material have been indicated in the list of acceptable makes. No other make will be acceptable. The material to be used in the work shall be got approved from the Engineer-in-Charge before use at site. The Engineer-in-Charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.
26. No material shall be brought to site without the approval of Engineer-in Charge. All fixtures and fittings shall be procured just before the installation.
27. 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.
28. Contractor shall provide polythene/PVC plastic cover for all MDB's/SDB's/DB's, panels, feeder pillars etc to protect them from rust/damages, during execution of work till the work is actually completed and handed over to the department.
29. 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.
30. 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.
31. 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.

32. All concealed work and earthing shall be done in the presence of the Engineer-in-charge or his authorized representative.
33. 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.
34. All floor-mounted panels 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.
35. 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.
36. 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.
37. 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.
38. 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.
39. 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.
40. MCCBs shall be used with terminal spreaders and all terminals shall be shrouded to avoid direct contact.
41. All measuring and indicating instruments shall be protected through MCB's and isolating switches.
42. General arrangement drawing of the switchboard shall be got approved from the Engineer-in-Charge before commencement of manufacturing.
43. 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.

44. Conduit layout as per switching arrangement shall be prepared by contractor and got approved from the Engineer-in-Charge before slab casting.
45. 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.
46. 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.
47. M.S. dash fastener shall be used for installation of fittings and fixtures in ceiling and for providing suspenders for the angle support, conduiting, cable tray etc. for which nothing extra shall be paid
48. All CI/metal boxes & junction boxes should be cleaned properly and painted from inside before wiring & fixing the accessories.
49. Cables:-
 - (a) Cables shall be bought from manufacturer only as per approved NIT.
 - (b) The length of the cables required shall be measured w.r.t. site condition and these shall be delivered in section of approved length only, to avoid jointing as far as possible.
 - (c) Cable delivery shall be scheduled in consultation with department only.
 - (d) All cable's shall be offered for inspection by department prior to dispatch, department reserve the right to wave of inspection so required in lieu of proper test certificates.

2.0 GENERAL DESCRIPTION:

2.1 Scope:

2.1.1 These specifications together with the Engineer's plans cover the Electrical System works for Internal & External Electrical Works.

2.2 Extent of Work:

2.2.1 Supply, laying, testing and commissioning of under mentioned items shall form a part of contractor's scope of work.

- (e) Wiring for internal Distribution
- (f) Lighting Fixtures
- (g) Complete power wiring to socket outlets, power equipments etc.
- (h) Distribution boards
- (i) External development

2.2.2 This specification states the requirements for the supplying, assembling, fixing in position, connecting, inspecting, testing and leaving in working order new, modified or additional electrical installations.

2.2.3 The work shall comprise the whole of labour and unless otherwise indicated all the materials necessary to form a '**complete installation**' and such tests, adjustments and commissioning as are prescribed in subsequent clauses and as may otherwise be required to give an effective working installation to satisfaction of the Engineer-in-Charge.

2.2.4 The words 'complete installation' shall mean not only the items of electrical equipment conveyed by these specifications, but all the incidental sundry components necessary for the complete execution of works and for proper operation of the installation, whether or not these sundry components are mentioned in detail in tender documents issued in connection with the contract.

2.2.5 Adequate protection of equipment during transit shall be provided by manufacturers and the contractor shall ensure adequate protection on site. The contractor shall advise the Engineer-in-Charge of any damage that occurs to equipment including finishes and shall carry out repairs as directed by the Engineer-in-Charge.

2.3 Drawings:

2.3.1 Drawings have been prepared by the consultants, for all the above items of work. The tenderer shall submit his quotation strictly in accordance with these specifications and drawings.

2.3.2 Drawings and documents shall be provided by the consultant. The rearrangement of the equipments shall be done by the Contractor with the approval of Engineer-in-Charge if necessary. The shop drawings shall be prepared by the Contractor in accordance with section "**DRAWINGS AND DOCUMENTS BY CONTRACTOR**" and got them approved by the consultant or Engineer-in-Charge.

2.4 Regulations:

2.4.1 Each installation shall comply with all the relevant statutory requirements and regulations including the following:

- a) Regulations under the Electricity Acts:
- b) Factories Acts and Regulations:
- c) Health and Safety at work etc. Act and regulations:
- d) 'Regulations for Electrical Installations' issued by the Institution of Electrical Engineers including all the appendices contained therein and referred to herein as the "IEE Wiring Regulations"
- e) Regulations and requirements of Indian Telecom and the local electricity, gas and water Undertakings.

2.5 Standards:

2.5.1 The complete installation shall comply with all relevant Indian Standards, Indian Codes of Practice, where indicated, with other Standards and specifications and all amendments thereto. The relevant issues shall be those current three months before the date for return of tender, unless alternative dates are indicated.

2.5.2 Where practicable, each item of equipment shall be clearly and indelibly marked to indicate the standard with which it complies. Alternatively a certificate of compliance shall be provided.

2.5.3 Where equipment or services are indicated to be manufactured or provided under a particular certification, licensing or quality assurance scheme, the manufacturer or supplier shall be a current participant in the relevant scheme. A certificate of compliance shall be provided.

2.5.4 Equipment not manufactured in the India shall be of a standard, which ensures its compliance with all appropriate IS Standards.

2.6 Approval:

2.6.1 The Engineer-in-Charge's approval shall not relieve the contractor of his contractual responsibilities and obligations. The contractor shall be responsible for discrepancies, errors or omissions on drawings or other documentation supplied by him, whether they have been approved by the Engineer-in-Charge or not due to incorrect information given in writing by the Engineer-in-Charge. The Contractor shall be responsible for ensuring that equipment complies with the specified requirements.

1.0 WIRING:

1.1 Scope:

1.1.1 The scope of this section covers the supply, erection, testing and commissioning of conduits & wiring for lighting and power. Wiring shall be carried out in accordance with relevant I.S. rules and regulations.

1.2 System of wiring:

- 1.2.1 All lights and power wiring shall be carried out in surface conduits or recess wiring in conduits or floor ducts as specified in the BOQ.
- 1.2.2 I.E.E. regulations shall be applicable for all material and workmanship.
- 1.2.3 The wiring to be carried out in such a manner that specified 'Power' wiring shall be kept separate and distinct from 'Lighting' wiring. The wiring shall be done on the distribution system with main and branch distribution boards at convenient physical and electrical centers as shown in drawings. All conductors shall be run as far as possible along the walls and ceiling and above false ceiling so as it can be easily accessible and capable of being thoroughly inspected. In all types of wiring, due consideration shall be given for neatness and good appearance.
- 1.2.4 The balancing of load in three wire or poly phases installations shall be arranged before hand to the satisfaction of Engineer-in-charge. Circuits on opposite side of a three wire system or on different phase of poly phase system shall be kept apart at a minimum distance of 2m (6.6.ft) unless they are enclosed in earthed metal casing suitably marked to indicate the risk of dangerous shock due to voltage between the conductors contained in them. In large or important areas, light and socket outlet points shall be distributed over more than one circuit as directed.
- 1.2.5 Medium pressure wiring and associated apparatus shall comply in all respects with the requirements of IEE rules.
- 1.2.6 No wiring shall be carried out until the appropriate tests required in Section "Inspection and Testing" have been done and the Engineer-in-Charge has given his clearance for wiring to commence.
- 1.2.7 At expansion joints, adequate slack shall be left in the cables.
- 1.2.8 Where conduits are installed for wiring by others, a draw wire shall be provided between each draw-in position.
- 1.2.9 Cables forming part of communication circuits shall have identification sleeves at their terminations. Identification shall be consistent with the relevant wiring diagrams.

1.3 Joints & Looping Back:

- 1.3.1 The wiring shall be done in a 'looping System'. Phase or live conductors shall be looped at the switch box and neutral/earth conductor can be looped either from the light, fan or socket outlet.
- 1.3.2 No bare or twist joints shall be made at intermediate points in the through run of cables, unless the length of final sub circuit or sub-main or main is more than the length of the standard coil given by the manufacturer of the cable.
- 1.3.3 Termination of multistrand conductors shall be done using suitable crimping type thimbles.

1.4 Rigid Steel Conduits And Conduit Accessories

- 1.4.1 All rigid conduit pipes shall be of steel and be ISI marked. The wall thickness shall be not less than 1.6mm (16 SWG) for conduits upto 32 mm dia and not less than 2mm (14

- SWG) for conduits above 32 mm dia. These shall be solid drawn or reamed by welding, and finished with galvanized or stove enameled surface.
- 1.4.2 The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given sizewise in *Table-I* and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run. No steel conduit less than 20mm in diameter shall be used.
 - 1.4.3 The conduit wiring system shall be complete in all respects including their accessories.
 - 1.4.4 All conduit accessories shall be of threaded type, and under no circumstances pin grip type or clamp grip type accessories shall be used. Bends, couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works. Saddles for surface conduit work on wall shall not be less than 0.55 mm (24 guage) for conduits upto 25 mm dia and not less than 0.9 mm (20 guage) for larger diameter (as per Table-II). The corresponding widths shall be 19 mm & 25 mm.
 - 1.4.5 Unless otherwise indicated, protection against corrosion of conduits and conduit fittings for general use inside buildings shall be of Class 2.
 - 1.4.6 Adaptable and circular conduit boxes with their covers shall provide a minimum degree of protection of IP41 when used inside building and IP44 when used outside buildings or at other locations as indicated.
 - 1.4.7 When conduit boxes are installed flush with the building fabric, overlapping covers shall be fitted.
 - 1.4.8 Flexible steel conduit for general use inside buildings shall be of type A with protection against corrosion equivalent to Class 2. Adaptors shall be of solid type.
 - 1.4.9 Unless otherwise indicated, accessory boxes used with steel conduit shall be made of metal.
 - 1.4.10 Accessory boxes shall be suitable for flush or surface mounting, as indicated. Unless otherwise indicated, metal boxes for general use inside buildings shall be of steel of medium category against corrosion.
 - 1.4.11 Accessory boxes shall be of adequate depth to accommodate the accessories without causing compression of the cables. Generally boxes shall be 75 mm deep, but for lighting switches installed flush in plaster finish with multi-cored sheathed cables, 65 mm depth boxes may be used.
 - 1.4.12 Earthing terminals shall be fixed inside each accessory box and on the grids of grid switches. The earthing terminal of each grid shall be connected by a separate protective conductors to the earthing terminal of the box.
 - 1.4.13 Front plates of accessories shall be of material and finish as indicated, but generally finish of various types of accessories in the same area shall match. For flush mounting, plates shall overlap the boxes. For surface mounting, plate shall match the profile of box, without overlap.
 - 1.4.14 Where pilot lamps are required, they shall comprise a neon lamp with resistor and a red coloured lens, unless otherwise indicated.
 - 1.4.15 Accessories with their boxes and front plates shall provide a minimum degree of protection of IP41 when used inside buildings and IP54 when used outside buildings or at other locations where indicated.
 - 1.4.16 Accessory boxes shall be fixed to the fabric of building, independent of connecting cables or conduits. Where the accessories have a minimum degree of protection of IP54, the fixings shall not reduce that protection.

1.5 Installation: Common for Recessed and Surface Conduit work

1.5.1 Conduit Joints

- a) The conduit work of each circuit or section shall be completed before the cables are drawn in.
- b) Conduit pipes shall be joined by means of screwed couplers and screwed accessories only. Threads on conduit pipes in all cases shall be between 13mm to 19mm long, sufficient to accommodate pipes to full threaded portion of couplers or accessories.
- c) Cut ends of conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of the conductors while pulling them through such pipes.
- d) The Engineer-in-charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.
- e) No bare threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti corrosive preservative or covered with approved plastic compound.

1.5.2 Bends in Conduits

- a) All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with a bending radius of not less than 7.5 cm, or alternatively, by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.
- b) No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet.
- c) Conduit fittings shall be avoided as far as possible on conduit system exposed to weather. Where necessary, solid type fittings shall be used.

1.5.3 Other Requirements

- a) If the protective finish of any material has been damaged, those materials shall either not be used or any remedial work shall be approved by the Engineer-in-Charge before use. Conduits shall be clean and free from oil.
- b) Steel Conduits shall be connected by means of a coupler and an externally screwed bush. Bushes shall be tightened by using spanners. Pliers and toothed wrenches shall not be used.
- c) Where a terminal block is to be accommodated in a circular conduit box, an extension ring shall be fitted to the box, of sufficient depth to ensure adequate space for the terminal block and cables.
- d) The length of thread on the ends of steel conduits shall match that in the conduit fittings or equipment and exposed threads will not be permitted. Running couplings with backnuts may be used with conduit having Class 2 protection, but where the protection is Class 4 only, manufactured running joints will be accepted. Exposed thread on running couplings shall be given a coat of zinc-paint.
- e) Conduit shall be cold bent on site with a suitable bending tool and sand filling, without deforming its cross section.
- f) Draw in conduit boxes shall be incorporated at intervals not exceeding the following:

Straight run	10 m;
Run with one or two bends	10 m;
Run with three bends	5 m;
Run with four bends	5 m;
- g) Unless otherwise indicated, conduit buried in concrete shall have at least 30mm depth

- of cover; it shall be securely fixed to prevent movement during pouring and vibrating of the concrete. Conduit in plaster shall have at least 5 mm depth of cover.
- h) Where conduits cross expansion and settlement joints occur in the building structure, suitable provision shall be made to allow for movement of the structure. The Contractor shall submit his proposals for the approval of Engineer-in-Charge.
 - i) Where conduit passes through an external wall, a conduit box shall be fitted on the inside of the wall and after wiring, filled with an inert permanently plastic compound having a high insulation value.
 - j) Conduit shall be installed in screeds only where indicated or after receipt of the Engineer-in-Charge's approval. Conduit boxes in floors, other than for- agreed outlets will not be permitted.
 - k) Open ends of conduit shall be temporarily plugged immediately after installation to prevent ingress of water and solid materials.
 - l) Method to be used for forming fire barriers at fire resistant structural elements such as floors and walls shall be submitted for the Engineer-in-Charge's approval.
 - m) Installed conduits shall be cleaned internally with a swab before cables are drawn-in.
 - n) If the protective finish of conduit is damaged after fixing, the damage shall be made good in a manner approved by Engineer-in-Charge.

1.6 Installation-Additional requirements for Surface Conduit work

1.6.1 Painting before erection

- a) The outer surface of conduit including all bends, unions, tees, junction boxes, etc. forming part of the conduit system, shall be adequately protected against rust when such system is exposed to weather, by being painted with 2 coats of red oxide paint applied before they are fixed.

1.6.2 Fixing conduit on surface

- a) Conduit pipes shall be fixed by saddles, secured to suitable approved plugs with screws in an approved manner at an interval of not more than one metre, but on either side of the couplers or bends or similar fittings, saddles shall be fixed at a distance of 30 cm from the center of such fittings. The minimum width and thickness of the ordinary clips or the girder clips for different sizes of conduits shall be as given in **Table-II**.
- b) Where conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles clips or clamps as required by the Engineer in charge.
- c) In long distance straight run of conduit, inspection type couplers at reasonable intervals shall be provided, or running threads with couplers and jam nuts shall be provided.

1.7 Installation-Additional requirements for Recessed Conduit work

1.7.1 Making Chase

- a) The Chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.
- b) In the case of buildings under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.
- c) In case of exposed brick/ rubble masonry work, special care shall be taken to fix the conduit and accessories in position along-with the building work.

1.7.2 Fixing Conduits in Chase

- a) The conduit pipe shall be fixed by means of stipples, j-hooks, or by means of saddles, not more than 60 cm apart, or by any other approved means of fixing.
- b) All threaded joints of conduit pipes shall be treated with some approved preservative compound to secure protection against rust.

1.7.3 Fixing Conduit in RCC Work

- a) The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.
- b) Fixing of standard bends or elbows shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors.
- c) Location of inspection/ junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

1.7.4 Fixing Inspection Boxes

- a) Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.
- b) These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be per IS: 2667-1977.
- c) Suitable ventilating holes shall be provided in the inspection box covers if directed.

1.8 PVC Conduit and Conduit Accessories:-

- 1.8.1 All non-metallic conduit pipes and accessories shall be of suitable material complying with IS:2509-1973 and IS:3419-1989 for rigid conduits and IS:9537-2000 for flexible conduits. The interior of the conduits shall be free from obstructions. The rigid conduit pipes shall be ISI marked.
- 1.8.2 The conduits shall be circular in cross-section. The conduits shall be designated by their nominal outside diameter. The dimensional details of rigid non-metallic conduits are given in Table-III.
- 1.8.3 No non-metallic conduit less than 20 mm in diameter shall be used.
- 1.8.4 The conduit wiring system shall be complete in all respect including accessories.
- 1.8.5 Rigid conduit accessories shall be normally of grip type.
- 1.8.6 Flexible conduit accessories shall be of threaded type.
- 1.8.7 Bends, couplers etc. shall be solid type in recessed type of works, and may be solid or inspection type as required, in surface type of works.
- 1.8.8 Saddles for fixing conduits shall be heavy gauge non-metallic type with base.
- 1.8.9 The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given size wise in Table-1 and the number of cables per conduit shall be exceeded. Conduit sizes shall be selected accordingly in each run.
- 1.8.10 The erection of conduits of each section shall be completed before the cables are drawn in.

1.9 Installation-Common aspects for both recessed and surface conduit works:-

1.9.1 Conduit Joints

- a) All joints shall be sealed/cemented with an approved cement. Damaged conduit

pipes/ fittings shall not be used in the work. Cut ends of conduit pipes shall have no sharp edges nor any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.

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

1.9.2 Bends in Conduit

- a) All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.
- b) Radius of bends in conduit pipes shall not be less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet to out-let.
- c) Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured, and that the internal diameter is not effectively reduced.

1.10 Installation-Additional requirements for surface conduit work

- a) Conduit pipes shall be fixed by heavy gauge non-metallic saddles with base, secured to suitable approved plugs with screws in an approved manner, at an interval of not more than 60 cm, but on either side of couplers or bends or similar fittings, saddles shall be fixed at a closer distance from the centre of such fittings. Slotted PVC saddles may also be used where the PVC pipe can be pushed in through the slots. The minimum width and thickness of the ordinary clips or the girder clips for different sizes of conduits shall be as given in Table-II.
- b) Where the conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips as required by the Engineer-in-charge. Where it is not possible to use these for fixing, suitable clamps with bolts and nuts shall be used.
- c) If the conduit pipes are liable to mechanical damage, they shall be adequately protected.

1.11 Installation-Additional requirements for recessed conduit work

1.11.1 Make Chase

- a) The chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.
- b) In the case of buildings under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.
- c) In case of exposed brick / rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

1.11.2 Fixing Conduit in Chase

- a) The conduit pipe shall be fixed by means of staples, or by means of non-metallic saddles, placed at not more than 60 cm apart, or shall be fixed by any other approved means of fixing.
- b) At either side of the bends, saddles/staples shall be fixed at a distance of 15 cm from the centre of the bends.

1.11.3 Erection in RCC Work

- a) The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.
- b) Fixing of standard bends or elbows shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors.
- c) Location of inspection/ junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

1.11.4 Fixing of Inspection Boxes

- a) Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.
- b) These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be per IS: 2667-1988.
- c) Suitable ventilating holes shall be provided in the inspection box covers if directed.

1.12 Under Floor Trunking:

- 1.12.1 Under Floor Trunking for convenience outlet points, telephone outlets and computer outlet points shall be provided as per details given in drawings. Ducts will be manufactured from GI/MS as mentioned in BOQ with a reinforcing web as per relevant BS or relevant standards of the country of manufacture.
- 1.12.2 Triple compartment system for convenience outlets, telephone outlets and computer data outlets will be provided as specified in the BOQ. Two types of trunking shall be provided, flush floor system with removable modular covers and removable compartment partitions and underfloor tracks as shown in the drawings or as specified in the BOQ.
- 1.12.3 Service outlet boxes and junction boxes shall be constructed from same finish as the ducting, with top frames adjustable for height at each corner. Segregation of compartments of the ducting shall be maintained through the boxes.
- 1.12.4 Each service outlet box shall have outlet units as indicated. Segregation shall be provided between power outlets and telephone outlets, with separate lids and each section shall be fitted with a cable guard or grommet. The complete assembly shall comply with requirements of Indian Telecom.
- 1.12.5 Lids of service outlet boxes and floor ducting shall be of same make unless otherwise indicated. Lids shall be arranged to accommodate the floor finish as indicated.
- 1.12.6 Under floor ducting shall be straight and level and adjusted in height to relate to the finished floor level, as indicated.
- 1.12.7 Where ducting cross expansion and settlement joints occur in the building structure, suitable provision shall be made to allow for movement of the structure. The Contractor shall submit his proposals for the approval of Engineer-in-Charge.
- 1.12.8 Open ends of ducts shall be temporarily plugged immediately after installation to prevent ingress of water and solid materials. The boxes of under floor ducting shall be fitted with temporary lids immediately after they are installed and they shall be maintained as effective protection against ingress of water and solid material until the permanent lids are fitted after screeding is complete.
- 1.12.9 Method to be used for forming fire barriers at fire resistant structural elements such as

floors and walls shall be submitted for the Engineer-in-Charge's approval.

1.12.10 Installed ducts shall be cleaned internally with a swab before cables are drawn-in.

1.12.11 If the protective finish of ducting is damaged after fixing, the damage shall be made good in a manner approved by Engineer-in-charge.

1.13 Routes and Segregation:

1.13.1 In case the routes of conduit and ducting are not shown on the drawings, they shall be determined by the Contractor and approved by Engineer-in-Charge before work is started. This requirement shall apply where the conduit or duct is concealed within the building fabric as well as where they are on the surface.

1.13.2 Conduit and ducting shall be parallel with lines of building construction and properly aligned except where conduit is permitted in floor screeds. Conduit buried in wall finishes shall run vertically only, unless Engineer-in-Charge gives approval to deviate from this requirement.

1.13.3 A minimum clearance of 150 mm between conduits shall be allowed from any equipment/ Low current services conduit like Telephone/Computer/CCTV/ pipe work or duct work. Distance shall be measured from the external surface of any lagging. In event of difficulty in achieving this requirement, Engineer-in-Charge shall be informed.

1.14 Wires:

1.14.1 The type and size of wires shall be as indicated in the BOQ. All the material supplied and used by the contractor shall be new. Wires shall have copper conductors unless otherwise specified, and the size shall be as per IS standards unless specified.

1.14.2 All wires shall comply with relevant IS. Type of wire to be used shall be as specified in the BOQ.

1.14.3 The colour identification of wires shall comply with the IEE wiring regulations for all categories of circuits. Core identification colours shall extend throughout the length of PVC insulated wires. Core identification for sound distribution or public address systems shall be in grey colour.

1.14.4 Wires shall be protected throughout their length by trunking, ducting, conduit and equipment enclosures. Framework or partitions may be used, but only where indicated or with the approval of Engineer-in-Charge.

1.14.5 Wires carrying direct current may, if desired, be bunched whatever their polarity, but wires carrying alternating current, if installed in metal conduit shall always be bunched so that the out going and return wires are drawn into the same conduit.

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

1.14.7 Wires shall comply with relevant IS for LV & ELV circuits.

1.14.8 Where conduits cross expansion and settlement joints in the building structure, suitable provision shall be made to allow for movement of the structure. The Contractor shall submit his proposals for the approval of the Engineer-in-Charge.

1.14.9 Conduits entering voids shall terminate not less than 22 mm clear of the building fabric. Open ends of conduit shall be temporarily plugged immediately after they are installed to prevent ingress of water and solid materials.

1.14.10 Where wires pass through joints, the number and size of holes shall allow for easy withdrawal and replacement of cables. The diameter of holes shall not exceed 1/6th the depth of the joints. They shall be approximately on the centre line and shall be not less than 75 mm between centres. Joints shall not be notched.

- 1.14.11 The method to be used for forming fire barriers at fire resistant structural elements such as floors and walls shall be submitted for the Engineer-in-Charge's approval.
- 1.14.12 Where wires enter a metal enclosure, they shall be protected by grommets or secured by wires clamps.
- 1.14.13 Wires shall be looped between outlet points and as far as practicable, intermediate joints shall not be used.
- 1.14.14 Wires fixed to the surface, except in ducts, shall be protected up to a height of 1500 mm by high impact PVC channel.
- 1.14.15 Wires shall have identification sleeves at their terminations.
- 1.14.16 Identification shall be consistent with the relevant wiring diagrams.

1.15 Switches:

- 1.15.1 Switches shall be single pole unless otherwise indicated. Their current ratings shall be as indicated, allowance being made for any inductive or capacitive load.
- 1.15.2 Wall mounted switches located inside buildings shall have rocker type actuating members unless otherwise indicated. Where mounted adjacent to one another, they shall be grouped in a multi gang box with a common front plate.
- 1.15.3 Pull cord operated switches shall be fixed to white moulded plastic mounting blocks, which in turn shall be fixed to a circular conduit box. Where the conduit boxes are flush with the finish, mounting block shall overlap them. Pull cords shall be white or natural colour and the lower end shall terminate in a moulding of rubber or plastic material.

1.16 Socket Outlets:

- 1.16.1 Socket outlets shall be of type and rating as indicated. Pilot contacts shall be provided where indicated.
- 1.16.2 Socket outlets shall be switched where indicated. On socket outlets rated at 16A and located inside buildings, the switches shall be single pole and have rocker type actuating members unless otherwise indicated.
- 1.16.3 Socket outlets for wet locations shall be provided with covers, which shall be screwed on. Any cover required to achieve total enclosure and to ensure the required degree of protection against moisture shall be securely fixed to socket outlet.
- 1.16.4 Sockets/Telephone/TV/CCTV/Music/Shaver Socket outlets shall be of the type as mentioned in the BOQ.

1.17 Plugs:

- 1.17.1 ISI marked Plugs shall be provided as indicated. Plug bodies shall be of metal, plastic or other material as indicated.
- 1.17.2 Plugs rated at 16A shall be of a non-resilient material unless otherwise indicated.
- 1.17.3 Fuse plugs shall be fitted with fuses rated as indicated.

1.18 Terminal Blocks:

- 1.18.1 Conductors shall be clamped between metal surface and no screws shall make direct contact with conductors.
- 1.18.2 The design shall be such as to maintain sufficient contact pressure to ensure connections on negligible impedance at all times.
- 1.18.3 Metal in contact with conductors shall be 85% copper alloy and any screws shall be of metal that is electrolytically compatible with the copper alloy. The moulded housing shall be an insulating material suitable for the maximum operating temperature of the

conductor.

1.19 Mounting Heights:

- 1.19.1 Mounting heights shall be as follows unless otherwise indicated in the drawings, where decision shall be obtained by contractor before start of work.
- 1.19.2 Where difficulty in locating accessories or equipment occurs the Engineer-in-Charge shall be informed.

1.20 Supports And Fixings:

- 1.20.1 Support shall be positioned within 300 mm of each bend and conduit box. Conduit boxes shall be fixed to fabric of building independent of the conduit. Where the conduit boxes have a minimum degree of protection of IP44, the fixing shall not reduce that protection.
- 1.20.2 Conduits shall be fixed in accordance with under mentioned Table. No shot firing shall be used and no drilling or welding of structural steel work shall be done without the approval of Engineer-in-Charge

1.21 Protective Conductor:

- 1.21.1 Protective conductor shall be drawn through ducting and non-screwed metallic conduit.
- 1.21.2 Where live conductors terminate at or loop into terminals adjacent to an appliance or accessory, the protective conductor shall be terminated. Properly using earth studs, earth terminal block etc. so the case may be.
- 1.21.3 A protective conductor shall be installed within each length of steel conduit and connected to an earthing terminal at each end of the conduit.

MOUNTING HEIGHTS (for accessories and equipment)	
<i>Accessories or Equipment</i>	<i>Height (mm)</i>
<i>Lighting Switch</i>	<i>900</i>
<i>Socket outlet</i>	
Location:	
<i>General</i>	<i>230</i>

1.22 Outlet Boxes

- 1.22.116 SWG MS/G.I. boxes of the required sizes shall be provided to house the Switch/sockets/Telephone/TV/Computer outlets as may be required/ mentioned in BOQ. These shall be so designed that there is ample space at the rear and at the sides to accommodate conductors at the conduit entries. These shall be completely concealed leaving edges flush with wall surface unless mentioned otherwise. Should the outlets have mounting grid plates, adequate supports shall be provided.

1.22.2 Screws and nuts shall be cadmium or zinc electroplated or passivated.

1.23 Draw Boxes/ Inspection Boxes

1.23.1 16 SWG Mild Steel/GI draw/inspection boxes of adequate dimensions minimum size 75 mm x 75 mm shall be provided at convenient points on walls to facilitate long runs of conductors. They will be completely concealed with 3 mm Perspex/ hylam covers flush with plate work. These boxes will, as far as possible, be located where found suitable by the Engineer-in-Charge.

1.24 Protection of Conduits

1.24.1 To safeguard against filling up with plaster etc. all the outlet and switch boxes will be provided with temporary covers and plugs within the tendered cost which shall be replaced by sheet / plate covers as required. All screwed and socketed joints shall be made fully water tight by the use of white lead for steel conduits.

1.25 Cleaning of Conduit Runs

1.25.1 The entire conduit system including outlets and boxes shall be thoroughly cleaned after completion of erection and before drawing in of cables.

1.26 Laying of Dummy Conduit

1.26.1 The dummy conduits shall be the same as conduits for Electrical work and as specified before. The minimum size shall be 20 mm dia. Junction boxes shall be provided at distance not exceeding 10 m. The Contractor must make such modifications as the system designer / manufacturer desires in consultation with the Owners / Architects. These conduits shall be provided with steel draw boxes of at least 14 SWG.

1.27 Fish Wires

1.27.1 To facilitate drawing of wiring through conduits/ G.I / Steel pipes etc., G.I. fish wire of 14 SWG, wherever needed, shall be provided along with recessed conduit / pipes, without any extra cost.

TABLE CONDUIT FIXING

1. Fixing of Conduit

<u>Location</u>	<u>Type of fixing</u>
Floor screeds	Saddles
Buried in plaster or render	Crampets or saddles
Above false ceilings	Spacer bar saddles
Surface	Distance Saddles

2. Fixing of Saddles, Conduit Boxes

<u>Building Fabric</u>	<u>Type of fixing</u>
Structural steelwork (type to be approved by Engineer-in-Charge)	Purpose made clamps

Table –I
Maximum number of PVC insulated 650/1100 V Grade Aluminium/Copper conductor
cable conforming to IS:694/1990

Nominal Cross sectional area of cond. in sq. mm	20mm		25mm		32mm		38mm		51mm		64mm	
	S	B	S	B	S	B	S	B	S	B	S	B
1	2	3	4	5	6	7	8	9	10	11	12	13
1.5	5	4	10	8	18	12	-	-	-	-	-	-
2.5	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	6	9	7
35	-	-	-	-	-	-	3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

NOTE:-

- The above table shows the maximum capacity of conduits for a simultaneous drawing in of cable.
- The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit which deflect from The straight by an able of more than 15 degrees.
- Conduit sizes are the nominal external diameters.

TABLE-II
Girder Clips or Clamps

S.NO.	Size of conduit	Width	Thickness
1	20 mm	19mm	0.9mm (20 SWG)
2	25 mm	19mm	0.9mm (20 SWG)
3	32 mm & above	25mm	1.2mm (18 SWG)

TABLE-III
Dimensional details of rigid non-metallic conduits. (All dimensions in mm)

S.No.	Nominal Outside diameter (in mm.)	Maximum outside- diameter (in mm.)	Minimum inside- diameter (in mm.)	Maximum permissible eccentricity (in mm.)	Maximum permissible ovality (in mm.)
1.	20	20+0.3	17.2	0.2	0.5
2.	25	25+0.3	21.6	0.2	0.5
3.	32	32+0.3	28.2	0.2	0.5
4.	40	40+0.3	35.8	0.2	0.5
5.	50	50+0.3	45.0	0.4	0.6

2.0 **MCB DISTRIBUTION BOARDS:**

2.1 **Scope:**

2.1.1 The scope of this section covers Supply, installation, testing and commissioning of Miniature circuit breaker boards and Miniature Circuit breakers. Miniature circuit breaker boards shall comply with BS 5486 part 12 a clause 2.2 and 2.3. They shall have a fault withstand classification of class 1 unless otherwise indicated.

2.2 **MCB Distribution Boards**

2.2.1 These distribution boards shall be used for control of all lighting/power circuits and shall consist of Single / Double / Triple Pole / Triple Pole and Neutral / Four Pole Miniature Circuit Breakers mounted in double cover design, dust tight, heavy gauge sheet steel enclosures preferably zinc coated with powder coating finish.

2.2.2 Distribution Boards shall be flush or surface pattern according to the requirements of their location and shall incorporate isolators / MCB and circuit switches as specified in bill of quantities.

2.2.3 All MCBs shall be connected to the electrolytic copper busbars with direct bolted connections.

2.2.4 Earthing bar and neutral bars shall be provided having sufficient ways to enable each cable to be connected to a separate terminal. Neutral connections shall be corresponding in position to phase connections.

2.2.5 Distribution boards shall have phase barriers and PVC ducts for all interior wiring. All distribution boards shall have removable end plates at top and bottom and handles with provision for locking.

2.2.6 Phase barriers shall be provided in the 3-phase distribution Boards.

2.2.7 In TP&N distribution boards, neutral busbars shall have one outgoing terminal for each outgoing circuit.

2.2.8 Size of SDB shall be selected to cater to extra space on the bus for mounting ELCBs in addition to number of outgoing MCBs specified in the BOQ.

2.2.9 A multi-terminal bar for the circuit protective conductors shall be provided for both insulated and metal cased boards, with one terminal for each outgoing circuit. It shall be directly connected to the earthing terminal without dependence on the exposed conductive parts of the enclosure.

2.2.10 Identification of each MCB way shall be by numbering. Identification in the neutral busbar and protective conductor bar shall clearly relate each terminal to its respective

MCB way.

- 2.2.11 Spare MCB ways shall be provided as indicated in BOQ. Where specific ratings are indicated, MCB shall be incorporated otherwise the ways shall be left blank but suitable for future additions. Suitable number of blanking plates shall be fixed in the DB if the space for MCB is left blank.
- 2.2.12 A separate Junction box of min. height of 150 mm shall be provided for extra lengths of outgoing circuit wires on Top/Bottom (as required) to avoid jumbling of wires within the main section of SDB. The junction box will be properly earthed alongwith the SDB.
- 2.2.13 MCB DBs shall be factory fabricated of reputed manufacture and the make shall be as specified in BOQ/ List of approval.

2.3 Miniature Circuit Breakers

- 2.3.1 Miniature circuit breakers shall be designed and tested strictly in accordance with the relevant parts of Indian standards and shall consist of spring accelerated quick-make and quick break action mechanism fitted in moulded cases of high di-electric strength plastic or urea. Fixed and moving contacts shall have silver tungsten contacts.
- 2.3.2 Miniature circuit breakers used shall be of "B" Series for Normal lighting circuits and Normal Power/Geyser Loads. For AC loads, Tungsten lamps fittings, Sodium/Mercury Discharge lamps "C" Series shall be used unless otherwise specified.
- 2.3.3 Miniature circuit breakers shall have a minimum breaking capacity of 10 KA at 415 V unless otherwise specified.
- 2.3.4 Make of MCB shall be as specified in the BOQ / List of Approved Makes.

2.4 ELCBs

- 2.4.1 ELCBs shall be designed and tested strictly in accordance with the relevant parts of Indian standards. Fixed and moving contacts shall have silver tungsten contacts.
- 2.4.2 ELCBs used shall be of Rating and sensitivity as specified in the BOQ.
- 2.4.3 ELCBs shall be ordinarily be for Earth Leakage protection unless otherwise specified.
- 2.4.4 Make of ELCB shall be as specified in BOQ/ List of Approved Makes.

3.0 LUMINAIRES & LAMPS:

3.1 Scope:

- 3.1.1 The scope of this section comprises of Supply, erection, testing and commissioning of lighting fixtures for internal lighting, wherever required, of the specified models.
- 3.1.2 Without restricting to the generality of the foregoing, this section shall include luminaries, lamps and accessories necessary and required for the installation.
- 3.1.3 Whether specifically mentioned or not, the luminaries and lamps shall be provided with all fixing devices, terminal blocks, holders etc. as required.

3.2 General Requirements:

- 3.2.1 All the luminaries and lamps shall be of best quality and as per approved makes. Wherever alternative makes are specified the choice of selection shall remain with the Engineer-in-Charge.
- 3.2.2 The luminaries and lamps shall be fixed in a neat work man like manner, true to level and in accordance with manufacturer's instructions.
- 3.2.3 The luminaries and lamps shall be provided with such accessories as are required to complete the item in working condition whether specifically mentioned in the specifications, drawings or not.

3.3 Luminaries:

- 3.3.1 Luminaries shall comply with relevant IS.
- 3.3.2 Unless otherwise indicated, enclosure of luminaries shall provide a minimum degree of protection of IP20 when located within buildings and IP44 when located outside buildings, but luminaries mounted externally; and less than 2 M above finished ground or paved level shall be IP54 unless specified in BOQ.
- 3.3.3 Unless otherwise indicated, luminaries, both with and without built-in ballast or transformers shall be suitable for direct mounting on normally flammable surface.
- 3.3.4 Where specific requirements related to flame propagation and flammability of translucent covers are indicated, certificates of tests shall be submitted to the Engineer-in-Charge. The tests shall comply with relevant IS.
- 3.3.5 Terminal blocks for connection of the supply cables shall be of adequate size for the size of conductors forming the loop in wiring unless separate tails are required. Wherever indicated, the terminal block shall incorporate a fuse of suitable type and rating.
- 3.3.6 Ballasts for tubular fluorescent lamps shall have a maximum value of harmonics complying with the colour headed "without H Marking" in Table VII of BS 288. Power factor correction shall be provided and this shall not be less than 0.85 lagging unless otherwise indicated.
- 3.3.7 Translucent covers and reflective surfaces shall be clean at the completion of the works.

3.4 Lamps:

- 3.4.1 Lamps shall be of the type and ratings as indicated.
- 3.4.2 All lamps shall be supplied and installed by the contractor unless otherwise directed.
- 3.4.3 Lamp caps shall be suitable for the lamp holders listed socket by means of a locking ring.

3.5 Support and Fixings:

- 3.5.1 Where fluorescent luminaires 1200 mm or more in length are supported directly by the conduit system, they shall be fixed to two circular conduit boxes both of which shall form an integral part of the conduit system.
- 3.5.2 Where the weight of a luminaire is supported by a conduit box or cable trunking, the fixing of the conduit box or trunking shall be adequate for the purpose and approved by Engineer-in-Charge.
- 3.5.3 Luminaires fitted with tungsten filament lamps and having metal back plates shall not be fixed directly to conduit box in which thermoplastic material is the principal load bearing member.
- 3.5.4 Support of luminaires from cable trunking shall be by means of proprietary clamps or brackets.
- 3.5.5 Where luminaries are supported from the structure other than by the conduit system, the supports shall be adequate for the purpose and approved by Engineer-in-Charge.
- 3.5.6 Luminaires mounted on or recessed into suspended ceilings shall not support luminaires unless specifically shown and approved.
- 3.5.7 For wall mounted luminaires, the mounting height shall be 1900 mm above finished floor level, measured to the center of the conduit box, unless otherwise indicated.

3.6 Wiring Connections:

- 3.6.1 Where luminaires, are fixed at places other than circular conduit boxes or are

supported by pedants or chains, the final circuit wiring shall terminate at a terminal block in the conduit box.

- 3.6.2 Where luminaires having fluorescent tubes are fixed direct to circular conduit boxes, the final circuit wiring may be terminated within the luminaire unless otherwise indicated. The wiring shall enter each luminaire at the conduit entry nearest to the terminal block and where a loop in wiring system is used, leave by the same entry; wiring shall not pass through a luminaire unless the approval of the Engineer-in-Charge.
- 3.6.3 Where luminaires are mounted on or recessed into a suspended ceiling, connection shall be by flexible cord from a plug-in ceiling rose unless otherwise indicated. The plug-in ceiling rose shall be located not more than 500 mm from the access in the ceiling and shall be firmly supported, unless otherwise approved by the Engineer-in-Charge.
- 3.6.4 Cables and flexible cords for final connections to luminaries shall be suitable for the operating temperature of the luminaire.
- 3.6.5 The size of final connection cables or flexible cords shall be as indicated.
- 3.6.6 Cables and cords passing close to a ballast within a luminaire shall be suitable for the operating temperature of the ballast.
- 3.6.7 A protective conductor shall connect the earthing terminal or earthing contact of each luminaire to an earthing terminal incorporated in the adjacent conduit box. Where the final connection is by flexible cord, the protective conductor shall form part of the cord.

4.0 LIGHTNING PROTECTION:CONVENTIONAL TYPE

4.1 Scope:

- 4.1.1 The scope of work under this section covers the specifications for supply, installation, connection, testing and commissioning of lightening protection system consisting of the following:-
 - a) Air termination network
 - b) Roof Conductors
 - c) Down conductors
 - d) Joints
 - e) Bonds
 - f) Testing joint
 - g) Earth termination network
 - h) Earth Electrode

4.2 Standards:

- 4.2.1 The lightning protection system shall comply with IS: 2309/ 1989 and Indian Electricity Act and Rules.

4.3 System :

- 4.3.1 The lightning protection system shall be installed as indicated on the drawings or in case such is not available, the contractor shall prepare one as per IS-2309/1989 and get the same approved by Engineer-in-charge.
- 4.3.2 As air terminals shall be installed on the highest roof of the building, the air terminals shall be joined to horizontal roof conductor by means of rivets/clamps.
- 4.3.3 Roof conductor shall be laid horizontally on the roof as indicated on the drawing.
- 4.3.4 Down conductor shall be installed on the vertical surface of the building.

- 4.3.5 The down conductor shall be joined with roof conductors in the method as prescribed by the code. A test joint shall be provided in the down conductor 1000 mm above the ground level at a place, which is easily accessible for testing.
- 4.3.6 The down conductor shall be joined with earth termination network or to the earthing station as indicated on the drawing.
- 4.3.7 Aluminium should not be used underground, or in direct contact with walls. All air terminations shall be of GI and all down conductors shall be of GI or aluminium, except where the atmospheric conditions necessitate the use of copper or copper clad steel for air terminations and down conductors or as specified.
- 4.3.8 The recommended shape and minimum sizes of conductors for use above and below ground are given in *Table-IV* and *Table-V*.
- 4.3.9 The earthing station and the earthing conductor shall be as per section under heading "EARTHING".

4.4 Component Parts:

4.4.1 Air Terminals:

- a) An air termination shall consist of a vertical conductor framed into a spike with a three prong made of copper/phosphor or bronze and fixed onto 20 mm dia copper rod of at least 2 metre above the network.
- b) If Portions of a structure vary considerably in height, any necessary air terminations or air terminations network for the lower portions should be bonded to the down conductors of the taller portions, in addition to their own down conductors.

4.4.2 Roof Conductors:

- a) The horizontal air terminations shall consist of a grid network of suitable size of copper/GI tapes fixed on the surface of the roof and no part of the roof should be more than 9 metres from the nearest horizontal air terminations.
- b) All metallic projections, chimneys, ducts, vent pipe, railings, gutters etc., on or above the main surface of the roof of the structure shall be bonded to and form a part of the air termination network.
- c) The method and nature of the fixing shall be simple, solid and permanent.

4.4.3 Down Conductors:

- a) Air termination shall be connected to the earth terminations by suitable size of copper/GI Tapes fixed on to walls of the structures. The tapes shall be securely fixed in position by means of brass saddles and metallic fasteners. The number of down conductors shall be decided as per the stipulations of the code of practice CP:326/IS:2309.
- b) The number of down conductors shall be as follows :-
 - (i) A structure having a base area not exceeding 100 sq.m shall have only one down conductor.
 - (ii) For a structure having a base area exceeding 100 sq.m, the number of down conductors shall be equal to smaller of the following:
 - (iii) One, for first 100 Sq m. plus one more for every 30 sq.m or part thereof in excess of the first 100 sq.m or one for every 30 m of perimeter.
- c) Where the down conductors are laid underground, they shall be laid at a depth of 750 mm below the ground level, buried in trench, covered with 100 mm thick layer of sand and protected by cable protection tiles.
- d) A down conductor shall follow the most direct path possible between the air terminals

and the earth termination. Where more than one down conductor is used, the conductors should be arranged as evenly as practicable around the outside walls of the structures as indicated in the drawings.

- e) The method and nature of fixing should be simple, solid and permanent.
- f) Due attention shall have to be given to climatic conditions and possible corrosion and the accessibility for maintenance and inspection purposes.
- g) The size of the down conductor shall be similar to roof conductor/air termination network.
- h) Each down conductor shall be provided with a testing joint in such a position that, it is convenient for testing. (About 1000 mm above Ground level).
- i) Provision when external route is not available:-
 - (i) Where the provision of external routes for down conductors is impracticable, for example, in buildings of cantilever constructions from the first floor upwards, down conductors should not follow the outside contours of the building. To do so would create a hazard to persons standing under the over hang. In such cases, the down conductors may be housed in an air space provided by a non-metallic and non-combustible internal duct and taken straight down to the ground.
 - (ii) Any suitable covered recess, not smaller than 76 mm x 13 mm, or a suitable vertical service duct running the full height of the collecting may be used for this purpose, provided it does not contain a unarmoured or a non-metal sheathed cable.
 - (iii) In cases where an unrestricted duct is used, seals at each floor level may be required for fire protection. As far as possible, access to the interior of the duct should be available.
 - (iv) The Lighting protective system should be so installed that it does not spoil the architectural or aesthetic beauty of the buildings.
- j) Bonding to prevent side flashing:-

Any metal in, or forming a part of the structure, or any building services having metallic parts which are in contact with the general mass of the earth, should be either isolated from or bonded to the down conductor. This also applies to all exposed large metal items having any dimension greater than 2m whether connected to the earth or not.

4.4.4 Joints:

- a) The lightning protection system shall have as few joints as possible.
- b) In down conductors below ground level, there shall be no joints. Where joints are necessary, they shall be mechanically and electrically effective and shall be made as to exclude moisture completely.
- c) Joints and bonds shall be mechanically and electrically effective e.g. clamped, screwed, bolted, riveted or welded.
- d) With overlapping joint, the length of overlapping shall not be less than 20mm for all types of conductor.
- e) Contact surfaces shall be first cleaned, then inhibited from oxidation with a suitable non-corrosive compound.
- f) Joints of dis-similar metals should be suitably protected against bimetallic action and corrosion. In general, joints for strips shall be tinned, welded or brazed and at least double riveted. Clamped or bolted joints shall only be used on test points or on bonds to existing metal.

- g) The lightning conductor shall be secured at not more than 2 Meter apart for horizontal run and 1.0 M for vertical run by fasteners resistive to corrosion.

4.4.5 Bonds:

- a) External metal on or forming part of a structure has to discharge full lightning current. Therefore, the bond to the lightning protective system shall have a cross-sectional area not less than that bond shall be suitably protected against corrosion.
- b) Bonds shall be as short as possible.
- c) Structures, supported by overhead electric supply, telephone & other lines must not be bonded to a lightning protecting system without the approval of the appropriate Authority.

4.4.6 Testing points:

- a) Each down conductor shall be provided with a testing point at 1000 mm above the ground level convenient for testing but in accessible for interference. No connection, other than direct to an earth electrode, shall be made below a testing point. Testing points shall be phosphor bronze, gun metal, copper or any other suitable material duly approved by the Engineer-in- charge.

4.4.7 Earth terminations:

- a) Each down conductor shall have an independent earth termination. It should be capable of isolation for testing purposes.
- b) Water pipe system should not be bonded to the earth termination system.
- c) The earth terminations shall be complete in all respects with chamber and cover etc. as per the detailed specifications.
- d) The resistance of earth electrode shall not exceed 2 Ohms. Wherever required to limit the resistance of earthing, several earth electrodes may be interconnected extending added.

4.4.8 Fasteners:

- a) Conductors shall be securely attached to the building or other object to be protected by fasteners, which shall be substantial in construction, not subject to breakage and shall be made of galvanized steel or other suitable material. If the fasteners are made of steel, they should be galvanized to protect them against corrosion.
- b) The lightning conductor shall be secured not more than 1.2m apart for horizontal run, and 1mtr for vertical run.

4.5 Earth Resistance:

4.5.1 The resistance from any part of the lightning protection system to earth shall not exceed 5 ohm before any bonding has been affected to metal in or on a structure or to services below ground. If the value obtained exceeds the specified 5 Ohm, it shall be reduced by adding to the number of earth electrode.

4.5.2 In addition, the resistance from the earth electrode to the nearest test clamps shall not exceed 1.0 Ohm.

4.6 Method of Measurement:

The complete earth conductor shall be measured and paid per unit length, including air termination network, down conductor, test joints and earthing termination network.

4.7 Inspection:

All lighting protective system shall be examined by an engineer-in-charge. A routine inspection shall be made periodically.

4.8 Testing:

4.8.1 Suitable testing links shall be provided at required points as per the code of practice CP 326/IS 2309.

4.8.2 The ohmic resistances of the lightning protective system complete with air terminations but without earth connection should be measured and this should be a fraction of an ohm.

4.8.3 Earth resistance shall be measured in accordance with IS 3043. The Contractor shall carryout tests on completion of the installation and submits the readings for approval.

Table-IV

Shapes and minimum sizes of conductors for use above ground

S.No.	Material and Shape	Minimum size
1.	Round copper wire or copper clad steel wire	6mm diameter
2.	Stranded copper wire	50sqmm. or

Table-V

Shapes and minimum sizes of conductors for use below ground

<u>S. No</u>	<u>Material and Shape</u>	<u>Minimum Size</u>
---------------------	----------------------------------	----------------------------

5.0 FEEDER PILLAR:

Feeder Pillar shall be made of CRCA sheet of 2mm thickness, totally enclosed, rigid floor mounted, air insulated, cubicle type, out door, vermin and dust proof on 415 Volts, 3 phase, 50 cycles system.

5.1 Standards:

The equipment shall be designed to conform to the requirements of:

- i. IS:8623 – Factory Build Assemblies of switchgear and control gear.
- ii. IS:4237 – General requirements for switchgear and control gear for voltages not exceeding 1000 volts.

- iii. IS:2147 – Degree of protection provided by enclosures for low voltage switchgear and control gear.
- iv. IS:375 – Marking and arrangement of busbars.

5.2 Construction:

Feeder Pillar shall be :

- i. Of the metal enclosed, outdoor type, floor mounted, free standing construction.
- ii. Made up of the requisite vertical sections, which when coupled together shall form continuous dead front switchboards.
- iii. Provide dust and damp protection, the degree of protection being not less than IP:54 as per IS : 2147.
- iv. Be provided with hinged type doors fitted with neoprine gaskets for water proofing and dust proofing.

The feeder pillar shall be constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses, as the effects of humidity, which are likely to be encountered in normal service.

6.0 INSPECTION AND TESTING:

6.1 General:

- 6.1.1 Inspection and testing shall be done in accordance with the IEE Wiring Regulations, the requirements of this Section and as indicated.
- 6.1.2 Inspection shall include a physical check that all equipment has been securely fixed and that all electrical connections are mechanically sound.
- 6.1.3 In addition to the test at the completion of each installation, certain tests shall be done during the progress of the Works as required by relevant clauses of these specifications.

6.2 Information:

For equipment supplied under the contract, the Contractor shall obtain from manufacturers the time/current characteristics of all protective devices for automatic disconnection of supply and provide copies to the Engineer-in-Charge and to the person or persons carrying out the inspection and testing, in addition to meeting the requirements of clause.

6.3 Testing Methods:

- 6.3.1 The Engineer-in-Charge shall be notified of the method to be used for each type of test and the notification shall be given not less than 28 days before the final tests are to be made. The tests shall be carried out in accordance with the methods set out in the IEE Wiring Regulations, subject to the requirements of following clauses.
- 6.3.2 For testing, continuity of protective conductors and equi-potential bonding AC source shall be used unless the Engineer-in-Charge agrees otherwise.
- 6.3.3 The method used to verify the effectiveness of the protection afforded by a residual current-operated device shall give the operating time and the current used shall not exceed 100% of the nominal setting of the device. For a fault voltage operated device, the test voltage between the exposed conductive part and earth shall not exceed 50 volts. In addition to the tests simulating an appropriate fault condition, any test facility incorporated in the device shall be operated to test its effectiveness.
- 6.3.4 High Voltage tests on LV cables and factor assemblies shall comply with the

- requirements for site testing in the appropriate British Standards.
- 6.3.5 Alternative methods to those set out in the IEE Wiring Regulations may be proposed for the approval of the Engineer-in-Charge, but they shall be not less effective than those in the Regulations.
- 6.3.6 Where necessary to prevent damage to components of equipment, the equipment shall be disconnected for the duration of the relevant tests.

6.4 Power Cables:

- 6.4.1 Tests shall be made immediately on completion of the installation of power cables to demonstrate that the phase sequence is correct at all end connections.
- 6.4.2 Where indicated, LV cables shall be tested at high voltage in accordance with these specifications.
- 6.4.3 LV cables not required to be high voltage tested, shall be tested for insulation resistance as soon as their installation is complete. The test voltage shall be 500V DC for installations rated up to 500V and 1000V Dc for installations rated up to 1000V. Tests shall cover all permutations between each conductor, screen, metallic sheath, armour and earth.
- 6.4.4 The over sheaths of cables laid under ground shall be given a voltage withstand test after backfilling of the trenches is complete but before termination.

6.5 Control And Communication Cables:

- 6.5.1 Cables shall be tested as soon as their installation is complete to ensure that the cores are continuous and they have not been crossed and the insulation resistance is satisfactory. Insulation tests shall cover all permutations between each conductor, screen, metallic sheath, armour and earth.
- 6.5.2 For polyethylene and dry paper-insulated communications cables, the insulation resistance for each conductor shall be not less than 1500 L mega ohms, where L is the cable length in Kilometres. The measured resistance of each conductor shall not exceed the calculated resistance by more than 5%; the calculated value will be made available by the Engineer-in-Charge.

6.6 Conduit And Trunking:

- 6.6.1 Where conduit is cast in situ in reinforced concrete, it shall be checked for freedom from blockage and steel conduit shall be tested for electrical continuity as soon as the shuttering has been removed.
- 6.6.2 Steel conduit and bus duct systems shall be inspected and tested before any wiring is installed; under floor ducting shall be inspected and tested before screeding.

6.7 Earth Electrodes:

The resistance of each earth electrode, whether for earthing of protective conductors, lightning protection or an electrical system, shall be checked immediately after installation of the electrodes and the results submitted to the Engineer-in-Charge.

6.8 Earth Fault loop impedances:

- 6.8.1 The measured earth fault loop impedance for each circuit shall be checked against the maximum value as indicated.
- 6.8.2 Where the maximum value is exceeded the Engineer-in-Charge shall be informed.

6.9 Records And Certificates:

- 6.9.1 Inspection and test results shall be recorded on the forms provided by the Authority. Two copies shall be submitted to the Engineer-in-Charge within 7 days of each test.
- 6.9.2 When all inspections and tests results are satisfactory, a Completion Certificate and an Inspection certificate shall be given to the Engineer-in-Charge not later than the date of completion of the works. The certificates shall be given in the form laid down in the IEE Wiring Regulations for electrical installations and BS 5266 for emergency lighting systems.
- 6.9.3 The values of prospective short-circuit current and earth fault loop impedance at the origin of the installation shall be recorded on the Inspection certificates.

7.0 DRAWINGS AND DOCUMENTS BY CONTRACTOR:

7.1 Extent of Provision:

- 7.1.1 **Unless** otherwise indicated, the Contractor shall provide the shop drawings and documents specified these specifications.
- 7.1.2 General layout drawings shall be drawn to a scale of 1:50 and detailed layout assembly drawings to a scale of 1:20. If more details is necessary scales of 1:10, 1:2 and 1:1 may be used.
- 7.1.3 The numbers of sets of drawings and documents to be supplied shall be as indicated.

7.2 Shop Drawings And Documents:

- 7.2.1 Shop drawings and documents including diagrams and schedules shall show the details of the Contractor's proposals for the execution of the works and shall include everything necessary for the following purposes:
- (a) To illustrate in details, the arrangement of the various sections of the works and to identify the various components;
 - (b) To integrate the works with the detail of the building and other installations.
- 7.2.2 Shop drawings shall include:
- a) General layout drawings showing the location of all equipment including cable; cable tray, conduit ducting and earth electrodes;
 - b) Detailed layout drawings showing the location of all equipment including cable, cable tray, conduit and ducting in switch rooms and plant rooms;
 - c) Assembly drawings of factory Built equipment and site built assemblies;
 - d) Detailed layout drawings showing the connection of cable and conduit to equipment;
 - e) Detailed layout drawings showing the connections through ceiling voids and vertical shafts;
 - f) System diagrams, circuit diagrams and wiring diagrams for all installations and equipment.
- 7.2.3 Diagrams shall comply with relevant IS. Interconnection diagrams shall indicate the type of cable, conductor size and terminal numbering.

7.3 Builder's Work Drawings:

- 7.3.1 Builder's work drawings shall show fully dimension details of all builders work required in connection with the works together with the overall size and weight of equipment.
- 7.3.2 Where the Engineer-in-Charge agrees, holes may be marked out on site instead of being shown on drawings.

7.4 As Built Drawings:

- 7.4.1 As-built drawings, including diagrams and schedules shall show all the information necessary so that each installation can be operated, maintained, inspected and tested so as to prevent danger, as far as is reasonably practicable. They shall incorporate the information necessary for the identification of the devices performing the functions of protection, isolation and switching, and their locations. The value of prospective short-circuit current and earth fault loop impedance at the origin of the installation shall be recorded on the appropriate system diagram.
- 7.4.2 Circuit details including loading, route, destination and where buried, the depth below finished ground level shall be shown for each cable, conduit, and ducting. Conductor size and material and the type of insulation of all cables shall be shown together with the number of cores in each cable, the number of cables in each conduit, trunking or ducting. Where identification is by colour of insulation or sheath, this shall be shown. Joints and draw boxes shall be shown.
- 7.4.3 Where incoming supply cables are installed by others, they shall also be shown as described above.
- 7.4.4 Drawings shall indicate whether conduit or ducting is surface mounted, concealed in ceiling, spaces in wall chases, in floor screeds or cast in situ.
- 7.4.5 All earthing conductors, main equipotential bonding conductors, main earthing terminal or protective conductors and supplementary equipotential bonding conductor shall be identified with function, origin route, destination, conductor size and material, type of insulation and where buried, the depth below finished ground level test points shall be indicated.
- 7.4.6 Earth electrodes shall be identified to their types, dimensions, material and depth below finished ground level. The nature of the soil and any treatment that has been given to it or special fill that has been used in the installation shall be identified.
- 7.4.7 Details of each item of equipment including luminaires shall include electrical characteristics, classification, degree of protection against ingress of solids and liquids, class of protection against corrosion and manufacturer's name and reference.
- 7.4.8 Diagrams shall comply with relevant clauses of these specifications and they shall be supplemented with physical arrangement drawings to assist the location and identification of component parts of equipment.
- 7.4.9 During the course of the works, the contractor shall maintain a fully detailed record of all changes to ensure that the as-installed drawings are in all respects accurate.
- 7.4.10 Each drawing shall be in accordance with relevant IS to ensure suitability for micro-filming and shall be on durable translucent material, other than paper, of a standard size A0 to A4 in accordance with relevant IS. The words 'AS-BUILT' shall be placed in 19 mm block letters adjacent to the title block of each drawing together with the name of the site and the section of the works, the title of the installation, the date of completion of the works, the Authority's contract number and the name of the Contractor.
- 7.4.11 A draft of each as built drawing shall be submitted to the Engineer-in-Charge before final issue is made.

7.5 Maintenance And Operating Instructions:

- 7.5.1 For each electrical installation, system and individual equipment forming part of the works, the maintenance and operating instructions shall include:
- a) A description of the extent and manner of operation, including duration periods

- of standby systems;
- b) A description of the method used for compliance with Regulation 413-3 of the IEE wiring Regulations together with time/current characteristics for all protective devices or automatic disconnection of supply.
 - c) Copy of the inspection certificate and all the test records.
 - d) A copy of any certificates of compliance with relevant standards or schemes as may be required.
 - e) Comprehensive instructions for the switching on, operation, switching off and isolation, and for dealing with emergency conditions.
 - f) Instructions for any precautionary measures necessary.
 - g) Instructions for servicing, including frequency and materials to be used, to maintain the equipment in good and safe condition.
 - h) The names and addresses of suppliers of all major components together with the type and model reference, serial number, duty rating and the order number and date.
- 7.5.2 Maintenance and operating instructions shall be indexed and contained in ring binders with stiff covers. The name of the site and the Authority's contract number shall be printed on the front and spine with, where more than one volume is necessary, a suitable identification title. The date of completion of the works shall be included on a flyleaf.
- 7.5.3 Copies of manufacturer's data may be incorporated to supplement the descriptions and instructions required in relevant clause but shall not replace them. Only data relevant to the works shall be included. Where non relevant data appears on the same sheet, it shall be cleared marked to show that it is not applicable. The data shall be cross referenced within the text and included in the index; if possible, it shall be contained in the ring binders, but where this is not possible, suitably protected box files or folder shall be provided, identified in accordance with relevant clause.
- 7.5.4 A draft of the maintenance and operating instruction shall be submitted to the Engineer-in-Charge before the final documents are issued.

8.0 SAFETY REQUIREMENTS:

8.1 Scope:

- 8.1.1 Safety procedures as laid down in Indian Standards shall be strictly followed during erection and commissioning.
- 8.1.2 The safety provisions required under the IEE Rules shall be provided for which no extra payment shall be made.

* * * * *

LIST OF APPROVED MAKES OF MATERIAL

1.	M.S.CONDUIT PIPE	-	BEC/M KAY/ NIC/AKG/STEEL CRAFT (ISI MARKED-ERW)
2.	PVC INSULATED COPPER CONDUCTOR WIRES.	-	RR CABLE /POLYCAB/HAVELLS/BATRA HANLAY/GRANDLAY/ BCH/ L&T
3.	MODULAR PLATE TYPE SWITCH/ SOCKET WHITE & ITS BOXES	-	LEGRAND (MOSAIC)/SCHNEIDER (CLIPSAL) (OPALE)/ WIPRO NORTHWEST) PLATIA/ MK (WRAPOROUND)/ HAVELLS (CRABTREE)
4.	PREWIRED MCB DB/ISOLATOR	-	LEGRAND/SCHNEIDER/L&T / SIEMENS
5.	MCB'S / RCCBS	-	LEGRAND (LEXIC) / SCHNEIDER (MULTI-9)/L&T (HAGER) / SIEMENS (BETAGUARD)
6.	MCCB'S UPTO 250A (THERMAL RELEASE) MCCB'S ABOVE 250A (MICRO PROCESSOR RELEASE)	-	LEGRAND (DPX)/ SCHNEIDER (NS)/ L&T (D-SINE)/ SIEMENS (VL)
7.	XLPE ALUMINIUM CONDUCTOR ARMOURED CABLES UPTO 110V GRADE	-	FINOLEX/RR CABLE /POLYCAB / HAVELLS/ BATRA HANLAY/ GRANDLAY / ELEKTRON
8.	COPPER CONDUCTOR CONTROL CABLE	-	FINOLEX/RR CABLE /POLYCAB / HAVELLS/ BATRA HANLAY/ GRANDLAY / ELEKTRON
9.	AMMETER & VOLTMETER	-	AUTOMATIC ELECTRIC/MECO/ RISHLINE (L&T) / RISHAB/ CONZERV/ NEPTUNE
10.	CT'S	-	AUTOMATIC ELECTRIC/ KAPPA/ RISHABH
11.	CONTACTORS, TIMERS	-	L&T/GE POWER CONTROL/SIEMENS

12.	PROTECTIVE RELAYS	-	SCHNIEDER/ L&T/ AREVA
13.	SELECTOR SWITCH	-	KAYCEE/SALZER/ L&T/ C&S/AE
14.	INDICATING LIGHTS (L.E.D TYPE)	-	VAISHNO/ CONCORD/ L&T/GE/ KAYCEE
15.	CABLE TRAYS	-	SLOTCO/ STEELWAYS/ EQUIPTECH
16.	BRASS COMPRESSION GLAND/ LUGS/ FERRULES	-	DOWELLS/ SWASTIK/ JOHNSON
17.	GI WIRE FOR LOOP EARTHING	-	HOT DIP GALVANISED. MAKE TO BE GOT APPROVED.
18.	EARTH LEAKAGE CIRCUIT BREAKER (RCCB) ISI MARKED	-	LEGRAND/DATAR/NEPTUNE / SCHNEIDER/L&T
19.	MODULAR TYPE FAN REGULATOR	-	LEGRAND (MOSAIC)/SCHNEIDER (CLIPSAL) (OPALE)/ WIPRO (NORTHWEST) PLATIA/ MK (WRAPOROUND)/ HAVELLS (CRABTREE)
20.	POWER DISTRIBUTION PANEL AND MOTOR CONTROL CENTRE	-	SPC ELECTROTECH, ADLEC ,ADVANCE PANEL , TRICOLITE, ABB, SYSTEM POWER CONTROL, SIEMENS,SCHNEIDER
21.	AIR CIRCUIT BREAKER (3/4 POLE		ABB (E-MAX), LARSEN & TOUBRO (U POWER), SIEMENS (3 WT) SCHNEIDER ELECTRIC (MASTERPACT NW)
22.	AUTOMATIC TRANSFER SWITCH		CUMMINS ASCO(GE)
23.	CONTROL TRANSFORMER/POTENTIAL TRANSFORMERS		AUTOMATIC ELECTRIC/ PRECISE
24.	CURRENT TRANSFORMER (EPOXY CAST RESIN)		AUTOMATIC ELECTRIC/ PRECISE/ MATRIX
25.	PROTECTION RELAY		
	A. NUMERIC TYPE		ALSTOM/ ABB/ SIEMENS
	B. ELECTROMAGNETIC TYPE		ALSTOM/ EASUN REYROLLE
26.	INDICATING LAMPS LED		LARSEN & TOUBRO (ESBEE)/ SIEMENS

	TYPE AND PUSH BUTTON		
27.	OVERLOAD RELAYS WITH BUILT IN SINGLE PHASE PREVENTER		LARSEN & TOUBRO/ ABB/ SIEMENS
	A. ELECTRONIC DIGITAL METERS (A/V/PF/HZ/KW/KWH) WITH LED DISPLAY		SECURE/ CONZERV/ ELMEASURE/ L&T
	B. ELECTRO_MAGNETIC METERS		SECURE/ CONZERV/ ELMEASURE/ L&T
28.	POWER CAPACITOR		L & T – MDXL/ EPCOS (GAS FILLED)/ ABB/ SIEMENS
29.	LT JOINTING KIT / TERMINATION		RAYCHEM/ SAFE KIT
30.	CEILING FAN		CROMPTON GREAVES/ USHA
31.	LIGHTING FIXTURE		
	A. FLUORESCENT/LED		PHILIPS/WIPRO/GE/OSRAM/TRILUX/ INSTA POWER
	B. INCANDESCENT/ HALOGEN/PL/METAL HALIDE)		PHILIPS/ WIPRO/ GE/ OSRAM/ TRILUX/ INSTA POWER
	C. EXIT SIGN		PROLITE/ GLOLITE/ THORN/ KLITE
32.	ELECTRONIC BALLAST FOR FLUORESCENT		PHILIPS/ WIPRO/ GE/ OSRAM/ TRILUX/ INSTA POWER
33.	SELECTOR SWITCH, TOGGLE SWITCH		SALZER (LARSEN & TOUBRO)/ KAYCEE
34.	TIMER		SCHNEIDER ELECTRIC (TELEMECHANIQUE)/ ABB/ MDS LEGRAND LARSEN & TOUBRO/ GE POWER CONTROL/ SIEMENS
35.	BATTERIES LEAD ACID		EXIDE/ STANDARD
36.	SEALED MAINTENANCE FREE BATTERIES		SHINKOBE (VRLA)/ EXIDE/ HITACHI
37.	BATTERY CHARGER		VOLSTAT/ CROMPTON GREAVES/ CHHABI ELECTRICALS/ CALDYNE
38.	CABLE TRAYS (FACTORY FABRICATED) / RACEWAYS		PROFAB ENGINEER/ RICO STEEL/ M M ENTERPRISES/ NEEDO
35.	ADVANCED LIGHTNING PROTECTION/ SURGE PROTECTION DEVICES / CHEMICAL EARTHING		LPI/ ERICO/ NIMBUS/ INDELEC/ DUAL MESSIN/ ABB – PULSAR
36.	CAT-5/6 CABLE		BELDON/ SIEMON/ PANDUIT
37.	SANDWICH CONSTRUCTION BUS DUCTS / RISING MAINS/		CONTROL & SWITCHGEAR/ ODREJ (HENIKWON)/ POWER PLUG / MALAYSIA/ SCHNEIDER ELECTRIC –

	TAP OFF BOXES		ILINE/ L&T MEGADUCT
38.	CABLE GLANDS DOUBLE COMPRESSION WITH EARTHING LINKS		BALIGA LIGHTING /COMET/COSMOS
39.	BIMETTALIC CABLE LUG		DOWELL'S (BILLER INDIA PVT. LTD.)/COMET/ HAX BRASS (COPPER ALLOY INDIA LTD.)
40.	INVERTER		APC/ NUMERIC / LUMINOUS/ MICROTEK

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
FIRE FIGHTING SYSTEM**

TECHNICAL SPECIFICATIONS AND SCOPE OF WORK

1 SCOPE OF WORK

This contract shall include the following services :

- a) Installation of External and Internal Hydrant System and First Aid Hose Reels.
- b) Installation of Automatic Sprinkler System in Admin Block and Seminar Hall.
- c) Installation of Portable Fire Extinguishers.
- d) Installation of Fire Fighting Pumping system and associated pipe work
- e) Identification and labeling of the pipe work and equipment under the scope of this contract.

The Tenderer shall include for the supply, unless otherwise mentioned, delivery, installation, connection, commissioning and testing of all materials and equipment to provide a complete Fire Fighting Installation as described hereunder.

2 STATUTORY APPROVALS

Fire Fighting Installation shall be in conformity with the regulations of local Fire Department and TAC.

The Contractor shall be responsible for obtaining the approval of the Local Fire Department for the installation done under the scope of work. The work will not be considered as complete unless the N.O.C. from Chief Fire Officer is provided.

2.1 SITE CONDITIONS

It is assumed that before tendering the Contractor would have visited the site and familiarized himself with all the local conditions and means of transportation and communications. No claim of whatsoever nature would be entertained at a later date on account of the Contractor's ignorance of the local conditions.

2.2 STANDARD AND CODES OF PRACTICE

The work shall be carried out as per the enclosed Specifications of Work and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with National Building Code 2005, relevant Codes of Practice and Standards as issued by Bureau of Indian Standards (B.I.S. - all with the latest amendments) wherever applicable, Fire Protection Manual & Sprinkler Regulations of Tariff Advisory Committee (TAC) & NFPA (USA) Publications.

2.3 WORKMANSHIP

All the work shall be carried out in a workmanship like manner and as per the best practices of the trade.

2.4 DRAWINGS AND DOCUMENTS

2.4.1 General

- i) The Drawings provided with the Specification shall be treated as confidential documents and must not be copied or loaned to any other party without the express permission of the Owner.
- ii) The Drawings are intended as a guide to the firms tendering and give approximate positions of pipes, conduits, cable runs and/or equipment only and in measuring from these drawings, the Tenderer must make due and proper allowance for all necessary diversions from the straight line, rises or falls as may be required for the proper execution of the works.

Detail drawings in all cases shall be worked to in preference to those of a more general nature and figured dimensions where indicated shall be followed in preference to scale.

Where necessary, the exact positions of plant and/or equipment will be decided by the issue of further drawings, but no claim for extra payment due to insufficient information on this scope will be entertained.

In any case of doubt as to the interpretation of either Drawings and/or Specification, the Tenderer must refer the matter to the Owner prior to the submission of his Tender.

- iii) It is to be clearly understood that this Tender is to be absolutely inclusive for the proper completion of the whole of the works specified to the true intent and meaning of the specification and/or Drawings and the description therein contained shall be read conjointly and together and no error, inconsistency, discrepancy in the Drawings and/or Specification will relieve the Contractor of his obligations to include for an hand-over the

work in the true meaning and intent of the Specification and/or Drawings, complete in every respect.

Should any portion of the works which would reasonably and obviously be inferred as necessary for the installation as a whole not be expressly specified, the Contractor shall provide and execute such work as part of the Contract and shall not be entitled to any extra payment of that account.

- iv) The Contract Drawings and such other drawings as may be furnished to the Contractor during the progress of the Works shall be considered as illustrating between the Drawings and the Specification, the Contractor shall execute the work in accordance with the decision of the Owner. If modifications are necessary, the Contractor shall submit modifications to the Owner for approval before such modifications are executed.
- v) All Drawings and Specification are the property of the Owner.
- vi) The Contractor will be required to give and obtain all necessary site and other particulars and to agree such details with the Owner. The Contractor must also obtain details of any other Contractor's work affected by his work and shall work in close co-operation with all such firms or persons concerned.
- vii) The Contractor shall be responsible for any damage caused to buildings and contents and works by reason of, arising out of, or incidental to, or in connection with the execution of any work in the Contract Documents.

The Contractor shall permit nothing to be done which may injure the stability of the Works, or existing buildings and no cutting through floors or walls will be allowed other than where required by the Drawings, without the sanction of the Owner.

- viii) The Contractor shall submit to the Owner for approval, before the work is commenced, a copy of all working details and installation drawings and shall also supply sufficient copies for the use of the Builder and other interested parties.

These drawings must be submitted by the Contractor as soon as possible after the order is placed to give ample time for all parties concerned to study and comment thereon.

- ix) The work described on any working drawings submitted shall be carefully checked by the Contractor for all clearance, field conditions, maintenance of architectural conditions and proper co-ordination with all trades on the job. To this end, the Contractor, during the construction drawing stage, shall ensure that he co-ordinates drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Owner.

The equipment layout is to be detailed on the drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

- x) Pipework drawings must be fully detailed, showing all pipework in double line and indicating the precise size of fittings, valves and equipment, position of hanger supports with reference numbers must be indicated and a large scale detail must be given,

showing the type and method of installation of each type of hanger. A schedule is to be included on each drawing, showing details of the type of hanger fixings and references number for each type.

All general layout drawings shall be drawn 1/50 scale, unless agreed otherwise with the Owner. Toilet piping layouts, details and hangers, cleanouts, methods of fixing of all fittings and fixtures including pipes, detailed cross sections of service ducts, etc., are to be drawn to 1/10 scale.

- xi) The Contractor shall provide a detailed programme incorporating working drawing production which can be read in conjunction with the building construction programme.
- xii) The Contractor shall prepare schedules and drawings showing precise details of holes in concrete, block works etc., base frames or support required and the like. The schedules shall show in detail the builder's work required to be performed by all other trades for the mechanical and electrical installations. These drawings and schedules, in an approved form, must be submitted to an properly approved by the Architect before any structural work requiring holes or other modifications is constructed.
- xiii) The Contractor shall submit all drawings as prescribed hereunder. All drawings shall be supplied in the form of a second negative and signed by a principal of the Contract. After approval, the negative will be signed by the Owner and returned to the Contractor. The Owner will take as many prints from this negative as he requires for his own use.

Signed and approved drawings will not be departed from unless a signed variation or omission certificate is issued in writing by the Owner. Drawings returned to the Contractor for alteration or amendment shall be re-submitted to the Owner for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with the revision number or letter and the date of the revision.

- xiv) Should the Contractor prove unable to produce satisfactory "Working Drawings" or be unable to produce drawings to conform to the progress of the work, the Owner reserves the right to take whatever steps are necessary to have drawings undertaken by others and debit the Contractor's account.

Any decision taken by the Owner to have working drawings produced elsewhere will not relieve the Contractor of his contractual obligations and the Contractor must provide to the Owner all necessary details, physical dimensions, descriptive literature, etc., of all equipment to be incorporated on drawings within 10 days of a request from the Owner.

2.4.2 Manufacturers' Data

- i) Manufacturers' performance data, certified factory drawings of apparatus, giving full information as to capacity, dimensions, materials and all information pertinent to the adequacy of the submitted equipment shall be submitted for approval.

Manufacturer names, sizes, catalogue numbers and/or samples of all materials shall be submitted for approval.

Submittals and working drawings should, as far as possible be complementary so that drawings and submittals can be cross checked.

- ii) Order of equipment submitted for approval must be accompanied by relevant drawings, technical data, catalogues and samples, Where data, certified drawings or other required information is not available until after orders have been placed, the Owner will give provisional approval until all requested drawings and information have been supplied to the Owner and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Owner in accordance with the progress of the work.

2.4.3 Operating and Maintenance Manual, Test Certificate etc

- i) The Contractor shall furnish six copies in bound form of an instruction manual and test certificates containing all information applicable to this section of the Works. This manual is to be similar in design and content to those to be provided under other services.

The manual shall contain a comprehensive written description of the Works, outlining the operation of the systems and maintenance procedures.

2.4.4 "As Installed " Drawings

- i) The Contractor shall arrange to keep on Site a full set of drawings showing the progress of the Works, which must be kept upto date.

The Contractor shall keep a record as the work proceeds of any work installed not in accordance with the drawings. On completion of the Works the Contractor shall supply three clear coloured prints of each applicable drawing, showing the exact position of all apparatus, pipe lines, services, control valves, switchgear, etc., together with diagrams, schedules, etc. to the Owner's requirements and in addition on complete set of plastic negatives.

The word "AS INSTALLED DRAWINGS" shall be clearly indicated on all drawings adjacent to the title block.

2.5 RATES

The rates quoted for any particular item by the tenderer shall be inclusive of the cost of material, erection, connection, testing, labour, supervision, tools, plant, transportation, excise duties and taxes, contingencies, breakage, wastage and all other sundries for all levels.

The rate shall also be inclusive of cutting holes, making chases in RCC/brick work, inserting sleeves and making good the same with two hours fire rated materials. No claim for extra would be entertained on this account.

The quantities mentioned in BOQ may vary (increase or decrease) to any extent without any change in prices and it should not be treated as breach of contract..

2.6 FIRE FIGHTING INSTALLATION DRAWINGS

The Fire Fighting Installation drawings issued from time to time to the Contractor are diagrammatic but shall be following as closely as actual construction and work will permit. Any deviation from the drawings required to conform to the building construction shall be made by the Contractor at his own expenses. The architectural drawings shall take precedence over the services drawings as far as the Civil and other trades works are concerned.

2.7 DISCREPANCIES IN THE DRAWINGS

Should there be any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Architect/Consultant/Project Managers and his decision would be final and binding on the Contractor.

2.8 INSTRUMENTS FOR MEASUREMENT AND TESTING

The Contractor shall provide, free of cost, all equipments, instruments, labour and all other allied assistance required by the Owner/Architect or their representatives for measurement and testing of the works.

2.9 CO-ORDINATION WITH OTHER TRADES

The Contractor shall be responsible for coordinating this work with works of other trades sufficiently ahead of time to avoid unnecessary hold ups. Hangers, sleeves, recesses etc. shall be left in time as the work proceeds.

2.10 PROTECTION

All work shall be adequately protected, to the satisfaction of the Owner/Project Managers/Architect/Consultant, so that the whole work is free from the damage throughout the period of construction upto the time of handing over.

Special care must be taken to prevent damage and scratching of all fittings and fixtures. Tool marks on exposed fixtures shall not be accepted. Protective paper on fixtures shall be removed with hot water only at the final completion of the work.

Before handing over the work, the Contractor shall clean all elements of the complete installation, remove plasters, splashes, stickers, rust stains and all other foreign matter and leave every part in acceptable condition and ready for use to the satisfaction of the Owner/Architect/Consultant/Project Managers.

3 **PIPE WORK**

3.1 MATERIALS

The pipe work shall be done in black mild steel pipes of 'Heavy' grade conforming to IS:1239 (Part I)-1990 for upto 150 mm dia pipe and IS:3589-1991 for pipes above 150 mm dia.

Fittings: All fittings up to 50 mm dia shall be **UL and FM approved Ductile Iron**. Fittings above 50 mm dia shall be heavy duty mild steel with weldable ends. All fittings shall be conforming to relevant Indian Standards and shall have manufacturer's trade mark stamped on it. Fittings in M.S. pipe lines shall include elbows, tees, bends, reducers, nipples, union

For welded joints forged steel fittings of approved type with "V" groove shall be used.

Fabricated fittings shall not be permitted generally. However, if use of any fabricated fitting is found necessary by the Project Manager, fabrication of such fitting shall be taken up by the Contractor on the written directives of the Project Manager in a workshop following proper welding procedures. For fabricating a 'Tee' connection pipes shall be drilled and reamed and joint only welded. Gas cutting of pipes shall not be permitted. Fabricated 'Tee' out of M.S. plates shall not be used.

All fittings shall be tested at manufacturer's work. The Contractor may be required to produce certificate to this effect from the manufacturers.

3.2 JOINTING

The pipes and fittings upto 50 mm diameter shall be threaded joints using Teflon Tape on the threads or welded joints as per the site requirements with prior approvals from Project Manager. Joints for pipe and fittings above 50 mm diameter shall be welded joints. Care shall be taken to remove any burr from the end of the pipe after cutting..

3.2.1 Welded Joints

General

The welding of pipes in the field should comply with IS:816, 1969. Electrodes used for welding should comply with IS:814, 1991.

Joints between M.S. pipes and fittings shall be made with pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner Butt welded joints shall not be acceptable. Care shall be taken to remove any burr from the end of the pipe after cutting.

All welders must be fully qualified and proof of an operator's qualification shall be either the Contractor's record of suitable tests passed within the previous six months or tests made before the commencement of the work.

The Contractor must submit to the Owner the names of the welders who will be employed on the work, together with documentary evidence of their competency.

Any welder considered by the Owner as not having the skill necessary for the work will at once be barred from further welding on the site or in the Contractor's workshop.

The Owner may instruct the Contractor to cut out typical welded joints for inspection and the Contractor shall include for the removal of such pieces and re-making joints to the satisfaction of the Owner. The Contractor shall include in his Tender for the cost of removing all such pieces for inspection and re-making joints.

Care must be exercised by the Contractor to ensure that the welding flux does not project into the bore of the tube. All welds shall be good, clean metal, free from slag inclusions and porosity, of even thickness and regular contour, well fused with the parent metal and finished smooth.

Where site welding is carried out in proximity to inflammable materials, the Contractor must take special precautions to protect the materials from risks of fire.

Testing of Welded Joints

The welded joints shall be tested in accordance with procedure laid down in IS:3600 (Part I) : 1985. One test specimen taken from at least one field joint out of any 10 shall be subjected to test.

If the results of the tensile test do not conform to the requirements specified, retests of two additional specimen from the same section shall be made, each of which shall conform to the required specifications. In case of failure of one or two, extensive gouging (scooping out) and repairing shall be carried out as directed by the authority.

If internal pressures exceed 1.5 MPa (15 kgf/cm²), special attention should be given to the assembly of the pipe and the first run of weld. Non-destructive testing of the completed weld may be carried out on pipe-lines by radiographic (see IS:4853 : 1982) or ultrasonic method (see IS:4260, 1986)) as agreed upon between the Owner and the Contractor.

3.2.2 Screwed Joints

Joint for black steel pipes and fittings shall be metal to metal threaded joints using Teflon tape on the threads.

3.2.3 Flanged Joint

M. S. Flanges shall be as per IS: 6392 and shall be faced. Rubber or asbestos gasket shall be inserted between the joints.

Flange shall be provided for jointing all type of valve, appurtenances, pumps, connection with other type of pipes, to water tanks and other places necessary and required as per good for engineering practice.

Flanged joints shall be avoided on straight runs as far as possible.

3.2.4 Unions

Provide approved type of dismantable unions on pipes lines 50 mm and below in similar places as specified for flanges.

3.3 LAYING AND FIXING

a) Above Ground :

Exposed pipes on walls and ceilings shall be fixed with standard pattern G.I. holder bat clamps on angle iron frames embedded in walls or suspended from ceiling. The clamps shall be spaced at regular intervals in straight lengths as per the following table :-

Dia of Pipe	Horizontal Length	Vertical Length
(MM)	(M)	(M)
25	2.4	3.0
32	2.7	3.0
40	3.0	3.6
50	3.0	3.6
65	3.6	4.5
80	3.6	4.5
100	4.0	4.5
150	4.5	5.4

Additional supports are to be provided at every change of directions and branch-offs

b) Under Ground:

The trenches for the underground mains shall be 75 cm wide at top and excavated to a depth so that a minimum 1 meter of cover above the crown of the pipe is available after backfilling.

The pipes shall be evenly laid in the trenches after coating and wrapping as described hereinafter and covered with fine sand 150 mm all around. Any damage to coating and wrapping shall be made good before backfilling.

c) Protection of Underground Pipes:

The underground steel pipes shall be protected by coating and wrapping. The coating and wrapping shall be done, in general, as per IS:10221 – 1982 using Coal Tar Based Anticorrosion Tape conforming to IS: 15337 -- 2003 .

If specified in Bill of Quantities, the proprietary pipe protection system shall be provided as per the Manufacturers recommendation. The proprietary system shall be of approved make.

d) Anchor Blocks

Suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer and high pressure should be provided at all bends, tees and such other locations as directed by the Owner. Exact location, design, size and mix of the concrete block shall be approved by the Architect / Consultant prior to the execution of the work.

3.4 PAINTING AND FINISH

All pipe work and supports should be thoroughly cleaned applied with a coat of primer and minimum two coats of enamel paint of approved shade. The paint shall have a minimum two hours fire rating.

4 VALVES & OTHER ACCESSORIES

4.1 GENERAL

Each valve body shall be marked with cast or stamped lettering giving the following information.

- a) The manufacturer's name or trade mark
- b) The size of the valve
- c) The guaranteed working pressure

Isolating valves on the water supply lines shall be full bore ball valve type for pipe diameters upto 50 mm. For 65 mm dia and above these shall be butterfly valves.

4.1.1 Full Way Ball Valve

The valves shall be of full bore type and of quality approved by the Consultant/Project Manager. The body shall be hot pressed brass nickel plated. The ball shall be of brass, hard chromium plated, machined to a micro smooth finish. Handle shall be of hard aluminium alloy epoxy painted. Stem seat shall be of PTFE. The valve shall conform to EN 29000- ISO 9000.

4.1.2 Butterfly Valves

The valve shall be of cast iron conforming to relevant IS:13095. The valve shall be of quality approved by the consultant/Owner.

4.1.3 Non-Return Valves

Non-return valves are to be IS:778-1984 manufactured from gun-metal or dezincification resistant brass.

4.1.4 Fullway Gate Valve / C.I.Sluice Valve

The Fullway Gate Valve shall be of quality approved by the Consultant/Owner and shall generally conform to IS:778-1971.

The C.I.Sluice Valve of size 50 mm dia and above shall conform to IS:14846 .

4.1.5 Air Release Valve

Air Valves are to be provided on all high points in the system. These shall be 25 mm dia screwed inlet forged brass/cast iron single acting air valves connected with ball valve on inlet side.

4.1.6 Drain Valve

Drain Valves are to be provided at all low points in the system for draining the water. These shall be 40 mm dia full way ball valve fixed on 40 mm dia black steel pipe.

4.1.7 Flow Switch

Flow switch shall be provided on sectional mains and branch lines of sprinkler systems as indicated on drawings, or necessary and required and directed by the Project Manager.

Flow switch should be suitable to actuate at a minimum of flow of single sprinkler and shall be suitable for connection to a central annunciation panel.

4.2 PRESSURE SWITCHES

Pressure Switches shall be differential type for operation of all pumps and for the various duties and settings required. Pressure switches shall be for heavy duty operation and of approved make. All pressure switches shall be factory calibrated.

5. FIRE FIGHTING APPARATUS & FITTINGS

5.1 EXTERNAL YARD HYDRANT

- i. The external hydrants shall be controlled by a cast iron butterfly valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be single outlet conforming to I.S:908-1975 with flanged riser of required height to bring the hydrant to correct level above ground.
- ii. Contractor shall provide for each external fire hydrant two numbers of 63 mm dia. 15 mm long rubberised fabric linen hose pipe with gunmetal / stainless steel (grade AISI 304) male and female instantaneous type couplings machine wound with G.I. wire (hose to I.S.:636 Type A and couplings to I.S:903 with M.S. certification), gunmetal / stainless steel (grade AISI 304) branch pipe with nozzle to I.S:903.

5.2 INTERNAL HYDRANTS (LANDING VALVES)

- i. The internal hydrant shall be single headed gunmetal / stainless steel (grade AISI 304) landing valve conforming to I.S:5290-1993, with individual shut off valves and cast iron wheels. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.
- ii. Instantaneous 63 mm dia outlet conforming to I.S:903 for fire hydrants shall be of standard pattern approved and suitable for fire brigade hoses.
- iii. Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 mm long rubberised fabric linen hose pipes with gunmetal / stainless steel (grade AISI 304) male and female instantaneous type coupling machine wound with G.I. wire (hose to I.S:636 Type A and couplings to I.S:903 with I.S certification), fire hose reel, gunmetal / stainless steel (grade AISI 304) branch pipe with nozzle I.S:903.

5.3. FIRST AID FIRE HOSE REEL

The First Aid Fire Hose Reels must be of type II and shall have 30 metre of 20 mm dia bore reinforced rubber hose fitted with shut-off gun metal/ stainless steel (grade AISI 304) nozzle. The hose reel shall be conforming to IS:884 - 1985.

5.4. FIRE HOSE CABINET

The Fire Hose Cabinet of sizes suitable to accommodate equipment as specified in bill of quantities shall be fabricated of 16 gauge CRCA M.S. sheet and powder Coated in fire red colour. Its door shall be hinged type having lock and reinforced glass panel.

The fire hose cabinet for yard hydrants shall be weatherproof type of size suitable to accommodate 2 nos. of 15M long 63mm diameter R.R.L. hoses with female & male gunmetal/ stainless steel (grade AISI 304) coupling and branch pipes.

Wherever masonry shaft is available to house equipment, only the glazed front panel is to be fixed as required and as specified in bill of quantities.

5.5 SPRINKLER HEADS

Sprinkler heads shall be of gunmetal and quartz bulb type with a temperature rating of 68 deg. Centigrade or as specified in the bill of quantities. These shall be of type and quality approved by the local fire service and TAC.

5.6 INSTALLATION VALVE FOR SPRINKLER SYSTEM

- a) Installation valves shall be installed in the pump room.
- b) Installation valve shall comprise of a cast iron sluice valve with gunmetal trim, pressure gauge, double seated clapper check valves as alarm valve with pressure gauge, test valve and orifice Assembly and drain pipe with pressure gauge, bye pass on check valve to regulate differential pressure and false alarm, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system.
- c) Contractor shall submit his detailed shop drawings showing the exact location, details of installation of the valves and alarms.

5.7 SPRINKLER ANNUNCIATION PANEL

Supply and installation of Sprinkler Annunciation Panel is not in the scope of this contract. The control cables from the flow switches are to be terminated in the Automatic Fire Alarm System Control & Indicating Panel, the supply of which is in the scope other contract. However, the Contractor would responsible for coordinating with the other agency for connecting, testing and commissioning of the said panel.

5.8 PORTABLE FIRE EXTINGUISHERS

Portable Fire Extinguisher shall be of type and as mentioned in the Bills of Quantities. All fire extinguishers must conform to the relevant Indian Standards and must bear the ISI Certification Mark. These shall be installed and maintained in accordance with IS:2190 - 1971.

6. PUMPING SYSTEM

The Pumping System shall consist of electric motor driven as well as diesel engine driven fire pumps of duty as specified in the bill of quantities. The major items under this head shall be as follows :

6.1 PUMPS

All fire pumps shall meet the following duty requirements :

- (i) Pumps should deliver atleast 150% of the rated discharge at a head of 65% of the rated head
- (ii) The shut off head shall not exceed 120% of the rated level.

Pumps shall be centrifugal type driven by either an electric motor or a diesel engine. However, wherever specified in Bill of Quantities, the jockey pump may be vertical inline type of stainless steel construction.

The casing will be of the volute type designed to ensure correct velocity distribution manufactured in close grained cast iron and complete with air release cock, drain plug and delivery pressure gauge connection.

The impeller will be of the shrouded type manufactured in close grained gun metal/bronze and keyed to the shaft. It will have balancing holes to achieve hydraulic balance and reduce pressure in the stuffing box and prolong the packing life. The impellers shall be dynamically balanced Connecting shaft shall be stainless steel with bronze sleeve and grease lubricated bearings. Close grained gun metal impeller wear rings will be fitted on both sides of the impeller to preserve running clearances.

Pumps shall be connected to the drive by means of spacer type love joy couplings, which shall be individually balanced dynamically and statically. The coupling jointing the prime movers with the pump shall be provided with a sheet metal guard.

Pumps shall be provided with approved type of mechanical seals.

The pumps shall have ratings as mentioned in Bill of Quantities. The pump shall meet the requirements of the Tariff Advisory Committee.

A Diesel Engine driven fire pump shall be provided as a standby arrangement. In the event of power supply not being available or non starting of Electric Motor driven pumps after the preset time, the Diesel Engine driven pump should start operating. If the diesel pump does not start, the system should be locked out and the audio visual alarm should be initiated.

6.2 ELECTRIC MOTORS

Rating of the selected motor shall be equivalent to the motor required for a pump capable of 150% of the rated discharge.

Electrically driven pumps shall be provided with totally enclosed fan cooled induction motors or as specified in Bill of Materials. For fire pumps the motors should be rated not to draw starting current more than 3 times normal running current. Motors shall be wound for class B insulation and winding shall be vacuum impregnated with heat and moisture resistant varnish glass fibre insulated. Motors shall be suitable for 415 volts, 3 phase 50 cycles A/C supply and shall be designed for 38 deg C ambient temperature. Motors shall conform to I.S:325. Motors shall be capable of handling the required starting torque of the pumps.

Motors for fire pumps shall meet all requirements and specifications of the Tariff Advisory Committee.

6.3 DIESEL ENGINES

The diesel engine shall be water cooled type and capable of developing 150% more B.H.P at 1500 r.p.m. as required by the pump specified in the Bill of Quantities. The engine should be mounted along with the pump on suitable common robust MS channel on cast iron bed plate with vibration clamping arrangement with cushy foot or similar mountings. Engine exhaust pipe is to be insulated with asbestos taping followed by painting with aluminium paint.

The fuel tank shall be of welded steel construction conforming to relevant IS standard and having storage capacity sufficient to allow the engine to run on full load for 6 hrs. including inter connecting fuel pipework fuel in the tank. The tank shall be mounted above the engine to provide or gravity feed. A hand operated pump connected to the fuel tank shall also be provided for transferring the fuel from the drum at floor level to the elevated storage tank.

Engine shall be direct injection type with low noise and exhaust emission levels. Noise level of the engine shall not exceed 105 DBA (free field sound pressure) at 3 metres distance.

The speed of the engine shall match the pump speed for direct drive.

The engine shall be self starting type upto 4 deg C and shall be provided with one 24 volts heavy duty DC battery, starter, cut-out, battery leads complete in all respects.

The engine shall be provided with an oil bath or dry type air cleaner as per manufacturer's design.

Engine shall be suitable for running on high speed diesel oil.

The entire system shall be mounted on a common structural base plate with antivibration mountings and flexible connections on the suction and delivery piping.

6.4 OPERATING SEQUENCE OF FIRE PUMPS

Fire pumps shall operate on drop of operating pressure in the fire mains in the following sequence:

- a) The operating pressure in the mains is to be maintained at 8.0 kg/cm².
- b) The jockey pump shall start automatically the moment pressure drops to 7.0 kg/cm² and stop when the pressure reaches 8.0 kg/cm² again.
- c) In case, after the start of jockey pump, the pressure still keeps on falling, the main fire pump shall start at 6.5 kg/cm². Jockey pump shall stop when main pump starts.
- d) In the event of electrical or mechanical failure of main fire pump to start, the diesel engine driven pump shall cut in when the pressure in the mains fall down to 6.0 kg/cm².
- e) Both main fire pump and engine driven pumps should be stopped manually by starter push buttons only.
- f) Main Fire and Sprinkler pumps shall start independently and automatically on fall of pressure but stopping of the pump shall be shall be by manual push button from the MCC panel.

6.5 AUDIO VISUAL ALARM

An electrically operated fire alarm system shall be provided which is connected to the fire & sprinkler pumps to indicate their operation visually by a blinker lamp and by an approved type of audible alarm.

7. PUMP CONTROL PANEL

7.1 GENERAL

The Control Panel for fire fighting system shall be housed in wall / floor mounted, dust and damp proof sheet steel cabinet with hinged front access door and shall have the suitable rating star-delta starters, timers, relays, necessary selector switch, for automatic and manual operation, indicating lamps, to show the status of each pump, single phase preventors, dry suction cut off, etc. and all other switch gear necessary for the satisfactory functioning of the hydrant system & sprinkler system.

Control Panels are to be suitable for 3 phase 4 wire 415 Volts 50 Hz system with a fault level of 31MVA at 415 volts.

Panel are to be metal clad, cubicle type totally enclosed, floor mounted and air insulated. The total height of the switchboard is to be not more than 2100 mm. Panels are to be extensible on both sides and shall conform to IP - 54 as per IS :2147

7.2 STANDARDS

The equipment shall be designed to conform to the requirements of :

- i) IS : 8623 - Factory built assemblies of switchgear and controlgear.
- ii) IS : 13497 - General requirements for switchgear and controlgear for voltages not exceeding 1000 Volts.
- iii) IS : 13947 - Degrees of protection provided by enclosures for low voltage switchgear and controlgear.
- iv) IS : 375 - Marking and arrangement of busbars.

Individual equipment housed in control panel shall conform to the following IS specifications.

- i) Fuse Switch & Switch Fuse Units - IS : 13947

ii)	H.R.C. Fuselinks	-	IS : 9224
iii)	Current Transformers	-	IS : 2705
iv)	Voltage Transformers	-	IS : 3156
v)	Relays	-	IS : 3231
vi)	Indicating Instruments	-	IS : 1248
vii)	Integrating Instruments	-	IS : 722
viii)	Control Switches & Push Buttons	-	IS : 6875
ix)	Contactors	-	IS : 13947
x)	MCCB	-	IS : 13947

7.3 CONSTRUCTION DETAILS

Cubicle shall be mounted on a base folded channel of thickness 3 mm. All doors, side walls and interior separations shall be of CRCA MS sheet of thickness 2 mm. Insulation barriers and protective screens shall be provided wherever required.

Apparatus forming part of the control panel shall have the following minimum clearances:

i)	Between phases	-	25 mm.
ii)	Between phases and neutral	-	25 mm.
iii)	Between phases and earth	-	25 mm.
iv)	Between neutral and earth	-	19 mm.

Creepage distances shall comply to those specified in relevant standards.

7.4 MOULDED CASE CIRCUIT BREAKERS

MCCB shall conform to IS - 13947 and be rated for the currents as shown on the single line diagram. They shall have a short circuit rating as specified else where.

All MCCB shall be provided with an adjustable thermal overload trip device together with an adjustable magnetic short circuit release. The MCCB shall have a trip free toggle mechanism, and dolly shall come to midway position and the trip operates.

The operating mechanism shall be quick make and quick break and trip free and contacts shall be single break type with arcing contacts located within arc chutes.

The MCCB shall be suitable for both vertical and horizontal mounting.

7.5 SWITCH FUSE UNITS / FUSE SWITCH UNITS

Fuse switch units shall be of the load break heavy duty type suitable for cubicle mounting with front operation. The switches shall conform to the requirements of IS : 13947 and shall be suitable for being fitted with HRC fuse links conforming to IS : 13703. The operating handles shall be interlocked with the opening of the door. The switches shall however be provided with a defeat interlock.

7.6 CURRENT TRANSFORMERS

Current transformers shall be of the ring type suitably fixed between insulating pieces and clamped. They shall conform to the requirement of IS : 2705 and shall have current ratio and outputs and accessories as specified.

7.7 INSTRUMENTS

Indicating instruments shall be flush mounting type square of required size and conforming to the requirement of IS : 1248.

7.8 BUS BARS

The bus bar shall be of Aluminium strip designed for a continuous current of specified rating and fabricated from bars conforming to grade E - 91 of IS : 5082. Each bar shall be provided with flexible expansion links as approved.

The bars shall be suitably supported with fibre glass reinforced epoxy supports to withstand the short circuit forces possible.

7.9 CONTROL WIRING

- i) All control wiring shall be carried out with 1100 / 660V grade single core PVC cable conforming to IS : 694 having stranded copper conductors of minimum 1.5 sq.mm. section for potential circuits and 2.5 sq.mm. section for current transformer circuits.
- ii) Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.

iii) Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type and of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.

iv) All control circuit fuses shall be mounted in front of the panel and shall be easily accessible.

7.10 LABELS

Labels shall be of anodized aluminium, with white engraving on black background. They shall be properly secured with fasteners.

7.11 TESTS

The design of the control panel shall have been type-tested in accordance with following sections of CI.8 : 1:1 of IS : 8623 :

- a) Verification of temperature rise limits.
- b) Verification of dielectric properties.
- c) Verification of short circuit strength.

Routine tests shall be conducted on control panel in accordance with CI. 8 : 1 : 2 of IS : 8623 and shall comprise :

- i) Inspection of the panel including inspection of wiring and electrical operational tests where necessary.
- ii) Dielectric tests.
- iii) Checking of Protective Measures and electrical continuity of the protective circuits.

7.12 METAL TREATMENT AND FINISH

All steelwork used in the construction of the switchboards should have undergone a rigorous metal treatment process as follows :

- i) Effective cleaning by hot alkaline degreasing solution followed by cold water rinsing to remove traces of alkline solution.

- ii) Pickling in dilute sulphuric acid to remove oxide scales and rust formation, if any, followed by cold water rinsing to remove traces of acidic solution.
- iii) A recognised phosphating process to facilitate durable coating of the paint on the metal surfaces and also to prevent the spread of rusting in the event of the paint film being mechanically damaged. This again, shall be followed by hot water rinsing to remove traces of phosphate solution.
- iv) Passivating in de-oxalite solution to retain and augment the effects of phosphating.
- v) Drying with compressed air in a dust-free atmosphere.
- vi) Two coats of stoving synthetic enamel epoxy paint to the specified shade of IS : 5. The total thickness of paint should not be less than 25 microns.

7.13 FIRE PANEL DRAWINGS

The contractor shall furnish the G.A. and control circuit wiring diagram drawings for approval

Detailed catalogues for all bought out equipment shall be made available for scrutiny and approval.

After completion of all works 3 sets of all final approved drawings covering G. A. Circuit diagrams, Single line diagrams for total system are to be made available

8 TESTING AND COMMISSIONING

8.1 GENERAL

The Contractor shall be responsible for testing and commissioning the entire services installation described in these specifications and will demonstrate the operation of the system of the entire satisfaction of the Owner/Architect.

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Contractor shall provide all tools, equipment, digital metering and testing devices required for the purposes.

The entire fire fighting piping system shall be tested at minimum 14 kg/cm² pressure. The test pressure shall be maintained for at least 2 hrs.

8.2 METHOD OF TESTING

The test on fire fighting installation shall be carried out as per the provisions of various Codes of Practice, fire protection manual of Tariff Advisory Committee and National Building Code.

The carrying out and recording of tests shall be agreed with the Consultant/Project Manager/Architect.

The following method of testing of hydrant and sprinkler installation shall be followed in general :

Fire Hydrant System

- i. Pressurise the fire hydrant installation by running the main fire pump and once the required pressure is achieved, switch off the pump.
- ii. Open bypass valve and allow the pressure to drop in the system. Check that the jockey pump cuts-in and cuts out at the pre-set pressures. If necessary adjust the pressure switch for the jockey pump. Close by-pass valve.
- iii. Open hydrant valve and allow the water to flow into the fire water tank in order to avoid wastage of water. The main fire pump should cut-in at the pre-set pressure and should not cutout automatically on reaching the normal line pressure. The main fire pump should stop only by manual push button. However the jockey pump should cut-out as soon as the main pump starts.
- iv. Switch off the main fire pump and test check the diesel engine driven pump in the same manner as the electrically driven pump.

- v. When the fire pumps have been checked for satisfactory working on automatic controls, open fire hydrant valves simultaneously and allow the hose pipes to discharge water into the fire tank to avoid wastage. The electrically driven pump should run continuously for eight hours so that its performance can be checked.
- vi. Diesel engine driven pump should also be checked in the same manner as given in para above by running for eight hours.
- vii. Check each landing valve, male and female couplings and branch pipes for compatibility with each other. Any fitting which is found to be incompatible and does not fit into the other properly shall be replaced by the contractor. Landing valves shall also be checked by opening and closing under pressure.

8.3 WATER FOR TESTING

Water for testing shall be obtained by the Contractor from an approved source. It shall be free from bacterial contamination, silt, grit, sand etc. After testing, the Contractor shall satisfactorily dispose off all water, or it may be re used providing it is clean and is not contaminated.

8.4 TEST RECORDS

The Contractor shall be responsible for the keeping all records of tests and on completion shall provide records and reports of the tests in triplicate. All test records shall clearly identify the item of the test and must be signed by a witness to the test.

8.5 UNSATISFACTORY WORKS

If the tests reveal unsatisfactory materials, installation or adjustment, the Contractor shall, at his own expense, carry out such alternations or replacements as may be necessary to rectify the defective work. The Contractor shall then repeat the tests as necessary to establish the satisfactory nature of the alterations or replacements.

8.6 TESTING AT WORKS

All plants and equipments shall be tested at maker's works before despatch and the test certificate in duplicate shall be forward to Owner/Architect.

The Contractor shall similarly provide a set of manufacturer's certified test curves for any pump installed under the Contract. All tests shall be in accordance with the appropriate Indian Standards.

8.7 ON SITE TESTING

The Contractor shall provide on site all the necessary instruments, plant, equipment, materials, water, electricity and labour necessary for carrying out the specified tests. All tests shall be carried out as required to meet the construction programme and the contractor shall include for all necessary isolation and other works as may be required for testing the whole or parts of the installation. The Contractor shall also be responsible for re-testing, if necessary, until satisfactory tests are achieved.

9 IDENTIFICATION OF PIPES LINES & EQUIPMENT

All pipeline installation shall be provided with a colour identification system. The system in general shall be as per IS:2379-1983-Specification of Colour Code for the Identification of Pipe Lines. The colour identification system shall comprise of :

- a) Basic Identification Colour over the whole length of pipe
- b) Code indication bands for precise determination of the contents being carried by the pipe

The code indication bands shall be minimum 150mm wide and shall be placed at all junctions, at both sides of valves, service appliances, bulk heads, wall penetrations and at any other place where identification is necessary.

The colour of code indication bands shall be as directed by the Owner/Architect.

The direction of flow shall be clearly marked on the pipe lines.

The equipment shall be identified with identification plates as directed by the Owner/Architect

10 LIST OF APPROVED MAKES/MANUFACTURES OF MATERIALS

NOTE : All Brand Names/Manufacturers are Indian unless specified otherwise.

<i>S.NO.</i>	<i>MATERIAL</i>	<i>BRANDNAME / MANUFACTURER</i>
--------------	-----------------	---------------------------------

A. Pipes & Fittings (ISI Marked or Approved Quality)

- | | | |
|----|--|---|
| 1. | Mild Steel Pipes | a) Tata
b) Jindal (Hissar) |
| 2. | Standard M.S. Fittings | a) VS Engineering
b) True Forge
c) Sant |
| 3. | Ductile Iron Fittings (UL and FM Approved) | a) Jainsons |

B) Valves

- | | | |
|----|---|--|
| 1. | C. I. Sluice Valves & Reflux Type Non-return Valves | a) Kirloskar
b) I. V. C.
c) Viking |
| 2. | OS & Y Type C. I. Sluice Valves | a) Kirloskar
b) Viking |

3. Butterfly Valves
 - a) Danfoss
 - b) Audco
 - c) Viking

4. Butterfly Valves with supervisory switch
 - a) Viking
 - b) Tyco

5. Strainers – Pot/ Bucket/‘Y’- type
 - a) Leader
 - b) Zoloto
 - c) SKS
 - d) Kartar

6. Temper switch
 - a) Potter
 - b) System Sensor, U.S.A.

7. Dual Plate Check Valves
 - a) Advance

8. Wafer Type Check Valves
 - a) Danfoss
 - b) EEE

9. Ball Valves
 - a) Danfoss
 - b) CIM, Italy
 - c) RB, Italy

10. Air Release Valves
 - a) Zoloto
 - b) RBM, Italy
 - c) Viking

<i>S.NO.</i>	<i>MATERIAL</i>	<i>BRANDNAME / MANUFACTURER</i>
--------------	-----------------	---------------------------------

C) Plant & Equipment

- | | | |
|----|----------------|--|
| 1. | Fire Pumps | a) Kirloskar
b) Mather Platt |
| 2. | Electric Motor | a) Kirloskar
b) Grundfoss
c) Crompton Greaves |
| 3. | Diesel Engines | a) Kirloskar
b) Greaves
c) Cummins |
| 4. | MS Vessels | Custom Built as per
the best Engineering
Practices |

D) Fire Fighting Fittings & Accessories

- | | | |
|----|---|--|
| 1. | Stainless Steel Landing Valve, Branch Pipe Nozzle, a)
Fireman Axe, Fire Brigade Connection, Male-Female
Couplings etc. (ISI Marked) | a) Newage, Surender Nagar
b) Superex
c) Guards |
|----|---|--|

E) Hose Pipes & First Aid Hose Reels

- | | |
|---|--|
| 1. Fire Hose Pipe (R.R.L) | a) Newage
b) Superex
c) Eversafe |
| 2. First Aid Hose Reel Drum & Bracket | a) Minimax
b) Newage
c) Superex
d) Eversafe |
| 3. Thermo plastic Hose Reels (Class IS :12585 – Type-2) | a) Mitras
b) Padmini
c) Kesar plast |

F) Sprinkler Heads, Installations Valves & Deluge Valve

- | | |
|---|----------------------|
| 1. Quartzoid Bulb type Sprinkler Heads
(UL Listed and FM Approved) | a) Viking
b) Tyco |
| 2. Rosettes for sprinklers
(UL Listed) | a) Viking
b) Tyco |

<i>S.NO.</i>	<i>MATERIAL</i>	<i>BRANDNAME / MANUFACTURER</i>
3.	Installation Control Valve Assembly with Hydraulic Gong (UL Listed and FM Approved)	a) HD Fire b) Newage c) Viking

F) Fire Extinguishers

- G)** a) Minimax
b) Ceasefire

H) Electric Switch Gear and Starters

1. Electric Switch Gear
 - a) L & T
 - b) ABB
 - c) Schneider
 - d) Legrand

2. PVC Insulated Armoured Power and Control Cables
 - a) Grandley
 - b) Skytone
 - c) Havell's
 - d) Polycab

3. MCCB
 - a) L & T
 - b) Merlin Gerin
 - c) ABB

4. MCB
 - a) L & T - Hager
 - b) Merlin Gerin
 - c) MDS - Lexic

5. Relay, contactor
- a) L & T
 - b) ABB
 - c) Siemens
 - d) Schneider
6. Meters, CT etc.
- a) L & T
 - b) AE
 - c) Kappa
7. Starters, Relays etc.
- a) L & T
 - b) ABB
 - c) Control & Switch Gear
 - d) GE - Power

<i>S.NO.</i>	<i>MATERIAL</i>	<i>BRANDNAME / MANUFACTURER</i>
--------------	-----------------	---------------------------------

8. Push button and indication lights
- a) L & T
 - b) Siemens
 - c) Telemenaque
 - d) Vaishno
 - e) BCH
9. Digital Voltmeter & Ammeter
- a) AE
 - b) Cadel
 - c) Enercon
10. Selector Switches
- a) L & T
 - b) Keycell
 - c) Salzar

- | | | |
|-----|---------------------|---|
| 11. | HRC Control Fuses | a) L & T
b) Siemens |
| 12. | PLCs | a) Allen Bradley
b) ABB
c) Siemens
d) Schneider Electric
– Modicon |
| 13. | Panel Manufacturers | a) Elegant Control System
b) Advance Control Pvt Ltd
c) Advance Panels and
Switchgears Pvt Ltd
d) Neptune
e) DRK |
| 14. | Cable tray | a) Pic
b) Pilko
c) Indiana
d) Slotco |

I) Miscellaneous

- | | | |
|----|--|---|
| 1. | Flow Switches

(UL Listed and FM Approved) | a) System Sensor, U.S.A
b) Viking
c) Spraysafe |
| 2. | Braided Stainless Steel flexible tubing

(UL Listed and FM Approved) | a) Newage industries
b) Easyflex
c) Tyco
d) Victaulic
d) Gunnebo Gilpro |

3. Expansion Bolts a) Hilti

b) Bosch

4. G.I. Hangers for Pipes / Adjustable Hanger a) Chilly

b) GMGR

5. Welding Rods a) Advani

<i>S.NO.</i>	<i>MATERIAL</i>	<i>BRANDNAME / MANUFACTURER</i>
--------------	-----------------	---------------------------------

6. Pressure Gauges a) H Guru

b) Fiebig

c) Wika

7. Underground Pipe Protection Wrapping a) IWL - Pypkote

8. Pressure Switches a) Danfoss

b) Switzer

9. Anti-vibration Pads/Footings a) Polybend (Rathi)

b) Resistoflex

10. Vibrations Eliminators a) Resistoflex

b) Flexcons

c) Arrowflex

d) Kanwal

11. Pump and Motor Couplings

a) Lovejoy(Rathi)

Note :

Contractor may quote as per any make of materials prescribed above but contractor should indicate the preferred make at the time of submission of tender.

10 PREAMBLE TO THE PRICING OF BILL OF QUANTITIES

10.1 GENERAL

1. This section shall be applicable for item rate work and for variations.
2. This preamble covers installation of fire protection works.
3. This preamble shall be read in conjunction with the Specifications, Conditions of Contract and all other documents accompanying the tender papers.
4. For all items of work the rates shall be comprehensive and all inclusive. The rates shall include for all materials and things necessary for satisfactory completion and maintenance of the work in proper working order and to the satisfaction of the Architect/Project Manager, including testing, making samples etc., and all that have been indicated in the Specifications or other Tender Documents either directly or indirectly and cover for all obligations of the Contractor under the Contract. No claim for additional payment shall be allowed for any error or misunderstanding by the Contractor of the work involved.
5. Unless otherwise mentioned in the description of the item, this Schedule shall be applicable for work at any height, position or condition.
6. Unless otherwise stated, method of 'measurement' as described in the latest 'Specifications' of CPWD shall be followed. In case of any dispute in this regard, the Project Manager / Architect decision shall be final, binding and conclusive.
7. The following notations have been used throughout the Schedule of Quantities and Rates:

m/M	Running Metre
Sqm	Square Metre
Cum	Cubic Metre
mm/MM	Millimeter
No.	Number/Numbers
Dia.	Diameter
Kg.	Kilogram/s
T.	Tonne
L.S.	Lump Sum
Pt.	Point
Rs.	Indian Rupees
ND	Nominal internal Diameter of pipe
%	Percent.

10.2 TRADE PREAMBLE - FIRE FIGHTING WORKS

1. Masonry chambers for Valves, Hydrants and other Appurtenances. Masonry and other chambers shall be measured in number. The rates shall include –
- a) excavation in any kinds of soil including quick sand but excluding rock which requires blasting :
 - b) protecting the excavation with all necessary shoring, strutting and keeping the excavation clear of water;
 - c) providing and laying foundation concrete as shown on drawing and as specified;
 - d) providing and constructing brick masonry walls in cement mortar as shown on drawing and as specified. The openings required to be left open for pipes and subsequent grouting shall also be included in the rates;
 - e) providing and casting R.C.C cover as shown in drawing and as specified;
 - f) providing, fitting and fixing hinged Ductile Iron cover (Grade B) with frame as shown in drawing and as specified and or directed at site by the Project Manager's and;
 - g) providing cement plastering to the walls of chamber, internally as well as externally.

2. Pipe Work

M. S. PIPES FOR FIRE FIGHTING
(INTERNAL) .

- a) Pipe work is to be measured in running meters nearest to a cm for the finished work, which shall include M. S. pipe and M. S. fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples, flanges, nuts & bolts etc.
- b) The rate shall be inclusive of cost of materials and labour, including providing and fixing metallic supports and suspension system for pipe work, cutting holes and chasing in walls and floors and making good the same, providing sleeves, applying two coats of anti-corrosive paint on buried and concealed pipework and painting of exposed pipes with two coats of enamel paint over a coat of primer.
- c) The rate shall be inclusive of providing 'Identification and Labeling' of pipes with the colour coded bands.

3. Valves, Hydrants, hose reels, sprinklers and other Appurtenances

Appurtenances like valves, hydrants, hose reels etc. shall be measured in number. Rates shall include –

- a) testing and checking of appurtenances and fittings.
- b) fixing/lowering the same into specified support (including providing the support) jointing,

fitting and fixing true to line and level including repairing of protective coating, if necessary; and

- c) providing all equipment labour and materials necessary to carry out the above works complete in all respect as specified and/or instructed.
- d) Painting and identification of the equipment.

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
ADDRESSABLE FIRE ALARM & PUBLIC ADDRESS SYSTEM**

COMMERCIAL AND ADDITIONAL CONDITIONS

1 General

1.1 This specification covers manufacturing, testing as may be necessary before dispatch, delivery at site, all preparatory work assembly and installation, commissioning putting into operation of AFAS & PA i/c intelligent addressable fire alarm system & final testing & commissioning.

1.2 Locations:

The work shall be executed at **site for construction of Permanent Campus of Indain Institute of Management at Sunaria village, Rohtak**. The contractor is advised to visit the site before submission of their tender and ensure that equipment being offered by them shall be accommodated in spaces available.

1.2.1 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.

1.2.2 The works shall be executed as per CPWD's General specification for Electrical Works, Part-I (Internal-2013); Part-II (External)-1995; Part-V (Wet Riser and Sprinkler System for Fire Fighting Installation)-2006, Part-VI (Fire Alarm System) IE Rules, BIS/IEC, Indian Standards amended up to date and as per direction of Engineer-in-Charge. The additional specifications/ conditions are to be read in these additional conditions shall apply. However nothing extra shall be paid on account of these additional specification and conditions, as the same are to be read along with schedule of quantities for the work and in case of any variations, specifications given along with the tender shall apply.

2 RATES

2.1 The rates quoted by the tenderer, shall be firm and inclusive of all taxes (including GST , labour cess etc.), duties levies, octroi etc. and all charges for packing forwarding, insurance, freight and loading, unloading, delivery, installation, testing, commissioning etc. at site including temporary construction of storage, risks, overhead charges, general liabilities/ obligations and clearance from CEA. However, the fee for the CEA inspections shall be borne by the department.

2.2. The Institute will not issue Octroi exemption certificate.

2.3. The contractor has to carry out maintenance as per manufacturer's standards for a period of 12 months from the date of handing over. Nothing extra shall be paid on this account.

3.0 TERMS OF PAYMENT:

The following percentage of contract rates shall be payable against the stages of work shown herein:

- After initial inspection & delivery at site in good condition on pro-rata basis - 70%
- On completion of pro-rata installation – 10%
- On successful testing and commissioning - 20%.

The deductions of Security Deposit, Labour Cess etc. shall be done after calculation of the above due payments as per clauses and net payment shall be reduced accordingly.

4.0 Completeness of tender, Submission of Execution Programme, Approval of Drawings, and Commencement of Work:

- 4.1 Completeness of the tender - All sundry equipment, fittings, assemblies, accessories, hardware items, bolts, supports, termination lugs for electrical connection, cable glands, junction box and all other sundry items for proper assembly and efficient working of the various equipment and components of the work shall be deemed to have been included in the tender, irrespective of the fact whether such items are specifically mentioned in the tender or not.
- 4.2 Submission of programme - within fifteen days from the date of receipt of the letter of acceptance, the successful tenderer shall submit his programme for submission of drawings, supply of equipment, installation, testing, commissioning and handing over of the installation to the Engineer-in- Charge. This programme shall be framed keeping in view the building progress.
- 4.3 Submission of Drawings - The contractor shall submit the design calculations and drawings to the Engineer-in-Charge for approval before start of work.
- 4.4 Commencement of Work - The contractor shall commence work as soon as the drawings submitted by him are approved.

5.0 Dispatch of Materials to Site and Safe Custody thereof :

- 9.1 The contractor shall dispatch materials to site in consultation with the Engineer-in-Charge.
- 9.2 Suitable lockable storage accommodation shall be made available free of charge temporarily. Watch & ward however, shall be the responsibility of contractor.
- 9.3 Programme of dispatch of material shall be framed keeping in view the building progress.
- 9.4 Safe custody of all machinery and equipment supplied by the contractor shall be the responsibility of the contractor till final taking over by the department.

6.0 Co-ordination with Other Agencies :

- 6.1 The contractor shall co-ordinate with all other agencies involved in the work so that the work of other agencies is not hampered due to delay in his work.
- 6.2 Piping, cabling or any other work, which directly affect the progress of building work, shall be given priority.

7 Quality of Materials and Workmanship :

- 11.1 The components of the installation shall be of such design so as to satisfactorily function under all conditions of operation.
- 11.2 The entire work of manufacture/ fabrication, assembly and installation shall conform to sound engineering practice.
- 11.3 All equipment and materials to be used in work shall be manufactured in factories of good repute having excellent track record of quality manufacturing, performance and

proper after sales service.

5 Care of the Building :

- 12.1 Care shall be taken by the contractor during execution of the work to avoid damage to the building.
- 12.2 They shall also be responsible for repairing all such damages and restoring the same to the original finish at their cost.
- 12.3 They shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.

13.0 STORAGE & CUSTODY OF MATERIALS

The pump room may be used for storage of sundry materials and erection equipments of else the agency has to make his own arrangements. No separate storage accommodation shall be provided by the department. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over of the installation by the department.

14.0 COMPLETION PERIOD

The completion period of **18 months** indicated in the tender documents is for the entire work of planning, designing, supplying, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-Charge.

13.0 GUARANTEE:

- 15.1 All equipment shall be guaranteed for a period of 12 months from the date of acceptance and taking over of the installation by the Department against unsatisfactory performance and/or breakdown due to defective design, material, manufacture, workmanship or installation. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Engineer-in-charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk & cost of the contractor. The decision of Engineer-in-charge in this regard shall be final & binding on the contractor.
- 15.2 The tender shall guarantee among other things, the following:-
 - a) Quality, strength and performance of the materials used as per manufacturers standards.
 - b) Safe mechanical & electrical stress on all parts under all specified conditions of operation.

14.0 POWER SUPPLY

- 16.1 Unless otherwise specified, 3 phase, 415 volts, 50 Hz power supply shall be provided by the department free of charge to the contractor at one point for installation at site. Termination in switchgear however, shall be provided by the contractor. Further extension if required shall be done by the contractor.
- 16.2 The power supply for testing and commissioning of the complete installation shall be made available by the Department free of charge to the contractor. For this purpose, the power supply shall be given at one point through U.G. cable or as specified in

- the contract. The termination of the feeder in the unit shall be the responsibility of the contractor and nothing extra shall be paid on this account.
- 16.3 Unless otherwise specified in the contract, further power distribution to the various equipment shall be done by the contractor.
- 16.4 Where the power supply has to be arranged by the Department at more than one point as per the terms of the contract, the termination of all such power feeders in the incomer of respective control panels (provided by the contractor) shall be the responsibility of the contractor.
- 16.5 The contractor shall not use the power supply for any other purpose than that for which it is intended for. No major fabrication work shall be done at site. Power shall be used only for welding / cutting works. The power supply shall be disconnected in case of such default and the contractor shall then have to arrange the required power supply at his cost.

15.0 WATER SUPPLY:

Water supply shall be made available to the contractor by the Department free of charge at only one point for pressure testing of pipe installation. Further extension if required shall be done by the contractor.

18.0 ACCEPTABLE MAKES OF VARIOUS EQUIPMENTS.

The acceptable makes of various equipments/components/accessories have been indicated in "Acceptable Makes". The tenderer shall work out the post of the offer on this basis. Alternate makes are not acceptable.

19.0 TENDER DRAWINGS, DRAWINGS FOR APPROVAL AND COMPLETION DRAWINGS

- 19.1 **Tender Drawings** -The drawings appended with the tender documents are intended to show the Protected Areas, space allotted for various equipment, tentative routes. The equipment offered shall be suitable for installation in the spaces shown in these drawings.
- 19.2 **Drawings for approval on award of the work** -The contractor shall prepare & submit three sets of following drawings and get them approved from the Engineer-in-charge before the start of the work. The approval of drawings however does not absolve the contractor not to supply the equipment/materials as per agreement, if there is any contradiction between the approved drawings and agreement. The decision of the Engineer-in-Charge shall be final & binding on the contractor.
- a) Lay out drawings of the equipments to be installed in building.
 - b) Drawings showing the details of erection of entire equipments including their foundations.
 - c) Lay out and isometric drawings of the equipment and panel work, detectors, MCP, speakers to be installed in various rooms.
 - d) Drawings including section, showing the details of erection of entire equipment including their supports/ mountings etc.
 - e) Electrical wiring diagrams for all electrical equipment and controls including the sizes and capacities of the various cables and equipment.
 - f) Any other drawings relevant to the work.

19.3 Completion Drawings

Three sets of the following laminated drawings shall be submitted by the contractor while handing over the installation to the Department. Out of this one of the sets shall be laminated on a hard base for display in the Control room. In addition one soft copy will be given on compact disc.

- a) Installation drawings giving complete details of all the equipment, including their mountings/ supports.
- b) Electrical wiring diagrams for all electrical equipment and controls including the sizes and capacities of the various cables and equipments.

20.0 INSPECTION AND TESTING:

20.1 Initial inspection of materials & equipment at manufacturer's works will be done by the Engineer-in-Charge or his representative. For item/equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipment at the manufacturer's works before dispatch. The contractor shall give sufficient advance notice regarding the dates proposed for such tests to the department's representative(s) to facilitate his presence during testing. The Engineer-in-charge at his discretion may witness such testing. Equipment will be inspected at the manufacturer/authorised dealer's premises, before dispatch to the site by the contractor.

- a) The department also reserves the right to inspect the fabrication job at factory and the successful tenderer has to make arrangements for the same.
- b) The materials duly inspected by Engineer-in-Charge or his authorized representative shall be dispatched to site by the contractor.
- c) No additional payment shall be made to the contractor for initial inspection/testing at the manufacturer's works by the representative of the Engineer-in-Charge. However, the department will bear the expenses of its representative deputed for carrying out initial inspection/testing.

20.2 Final Inspection and Testing

Final Inspection and testing will be done by the Engineer-in-Charge of his representative as per details indicated in Specification.

The installation will be offered for inspection by local bodies (Chief Fire Officer). The contractor or his representative shall attend such inspection of the Chief Fire Officer, extend all rest facilities as are considered necessary, recently and comply with all observations of the Chief Fire Officer which are part of the agreement and arrange for obtaining necessary clearance certificate in favour of the department. IN case the contractor fails to attend the inspection and made desired facilities available during inspection, the department reserves the right to provide the same at the risk and cost of the contractor and impose penalty for the same. The installation will be accepted by the department only after receiving clearance from Chief Fire Officer for the work executed by the contractor under the agreement.

21.0 EXTENT OF WORK

21.1 The work shall comprise of entire labour including supervision and all materials necessary to make a complete installation and such tests and adjustments and commissioning, as may be required by the department. The term complete installation shall not only mean major items of the plant and equipments covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender document in connection with this contract as this is a turnkey job.

21.2 In addition to supply, installation, testing and commissioning of wet riser equipments, following works shall be deemed to be included within the scope of work to be executed by the tenderer as this is a turnkey job –

- a) Minor building works necessary for installation of equipments, foundation, making of opening in walls or in floors and restoring them to their original condition/ finish and necessary grouting etc. as required.
- b) All supports for over head pipes, cables, valves, sprinkler and channels etc. as required.
- c) Getting Delhi Fire Service Inspection done (NOC) and obtaining approval. However, necessary fees for inspection shall be borne by the department.

22.0 INDEMNITY:

The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the contractor shall be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipments and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer on account of the above.

25.0 WORKS TO BE DONE BY THE CONTRACTOR:

Unless 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- whether specifically indicated in the schedule of work or not.

- i) Foundations for equipments including foundation bolts and vibration isolation spring/pads
- ii) Suspenders, brackets and floor/ wall supports for suspending/supporting pipes.
- iii) Suspenders and/or cable trays for laying the cables.
- iv) Excavation and refilling of trenches in soil wherever the pipes are to be laid directly in ground, including necessary base treatment and supports.
- v) Sealing of all floor slab/ wall openings provided by the Department or contractor for pipes and cables, from fire safety point of view, after laying of the same.
- vi) Painting of all exposed metal surfaces of equipment and components with appropriate

- colour.
- vii) Making openings in the walls/ floors/ slabs or modification in the existing openings wherever provided for carrying pipe line, cables etc.
 - viii) All electrical works including cable/wires earthing etc. beyond power supply made available by the department.
 - ix) Making good all damages caused to the structure during installation and restoring the same to their original finish.
 - x) Approval from local fire authority/NOC from Delhi Fire Service as may be required as per local bye-laws.

26.0 MOBILIZATION ADVANCE:

No mobilization advance shall be paid for this work.

27.0 INSURANCE AND STORAGE:

All consignments are to be duly insured upto the destination from warehouse at the cost of the contractor. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.

28.0 VERIFICATION OF CORRECTNESS OF EQUIPMENT AT DESTINATION:

The contractor shall have to produce all the relevant records to certify that the genuine equipments from the manufacturers

29.0 MACHINERY FOR INSTALLATION:

All tools and tackles required for unloading/ handling of equipment and materials at site, their assembly, erection, testing and commissioning shall be the responsibility of the contractor.

30.0 SAFETY MEASURES:

All equipment shall incorporate suitable safety provisions to ensure safety of the operating personnel at all times. The initial and final inspection reports shall bring out explicitly the safety provisions incorporated for all equipment.

31.0 After Sales Service:

The contractor shall ensure adequate and prompt after sales service in the form of maintenance, spares and personnel as and when required and shall minimize the breakdown period. In case of equipment supplied by other manufacturers the firm shall furnish a guarantee from the manufacturer for the same before the installation is taken over.

15.0 Documents to be provided on Completion of Work:

Three sets of following documents shall be furnished to the department by the contractor on completion of work.

- a) Completion drawings as per 19.3.
- b) 3sets of manufacturer's technical catalogues of all equipment and accessories.
- c) Operation and maintenance manual of all major equipment, detailing all adjustments, operation and maintenance procedure has been supplied and erected.

<u>FIRE ALARM SYSTEM</u>		
S.NO.	EQUIPMENT DETAIL	MAKES & MODELS
1	Main fire Alarm Control Panel	NOTIFIRE MODEL NO.NFS2-3030D IN NETWORK HONEYWELL MODEL NO.XLS-140 IN NETWORK ASUL MODEL NO.IQ-636 IN NETWORK GE EDWARD EST3 SERIES SIEMENS:FIRE FINDER SERIES XLVS BOSCH FPD7024 10 Loop In Network
2	GUI SOFTWARE	NOTIFIRE MODEL NO.ONYX WORK HONEYWELL MODEL NO.EBI ASUL MODEL NO.OW ANSUL GE EDWARD EST3 SERIES GAMEWELL FCI USA MODEL NO. FOCAL POINT SIEMENS:FIRE FINDER SERIES XLVS Bosch Model No GUI Software
3	MULTI CRITERIA DETECTOR	NOTIFIRE MODEL NO.FAPT-851 HONEYWELL MODEL NO.TC840M1021 ASUL MODEL NO.IQ-FAPT GE EDWARD EST3 SERIES SIEMENS:FIRE FINDER SERIES XLVS Bosch Model No FAP-440
4	INTELLIGENT DUCT DETECTOR	NOTIFIRE MODEL NO.FSD-751 HONEYWELL MODEL NO.TC806B1076 ASUL MODEL NO.IQ-FSP-851+HOUSING GE EDWARD EST3 SERIES SIEMENS:FIRE FINDER SERIES XLVS Bosch Model No D7050DH
5	FAULT ISOLATOR	NOTIFIRE MODEL NO.ISO-X HONEYWELL MODEL NO.TC811A1006 ASUL MODEL NO.IQ-ISO GE EDWARD EST3 SERIES SIEMENS:FIRE FINDER SERIES XLVS Bosch Model No D333A
6	INTELLIGENT HEAT DETCTOR	NOTIFIRE MODEL NO.FST-851R HONEYWELL MODEL NO.TC844A1015 ASUL MODEL NO.IQ-FST GE EDWARD EST3 SERIES SIEMENS:FIRE FINDER SERIES XLVS Bosch Model No.526A
7	ADDRESSABLE BEAM DETECTOR	NOTIFIRE MODEL NO.BEAM1224 HONEYWELL MODEL NO.TC847A1004

		ASUL MODEL NO.1224+IQFMM
		GE EDWARD EST3 SERIES
		SIEMENS:FIRE FINDER SERIES XLVS
		Bosch Model No FRAY5000
8	ADDRESSABLE CONTROL MODULE/MONITOR MODULE/MANUAL CALL POINTS.	NOTIFIRE MODEL NO.FCM/FMM/M500
		HONEYWELL MODEL NO.XLS-CM-N/XLS-MM-B
		ASUL MODEL NO.IQ-FCM-1
		GE EDWARD EST3 SERIES
		SIEMENS:FIRE FINDER SERIES XLVS
		Bosch Model No D-7053 /DS7065i/FMM-462-D
9	SPEAKERS	NOTIFIRE MODEL NO.NF-SP100C
		HONEYWELL MODEL NO.SPC
		ASUL MODEL NO.SP200
		GE EDWARD EST3 SERIES
		SIEMENS:FIRE FINDER SERIES XLVS
		Bosch Model No E70Series
10	Digital Voice Equacuation System	Notifier MODEL NO.DVC-EM with Digital Amplifier
		Honeywell Model No XLS-DVS with Digital Amplifiers
		ASUL MODEL NO. Ansul-DVC with Digital Amplifiers
		GAMEWELL FCI Gamewell-DVC with Digital Amplifiers
		SIEMENS:FIRE FINDER SERIES XLVS
		Bosch (Praesideo) with Digital Amplifiers
11	FIRE FIGTER JACK & FIRE FIGHTER HANDSET	NOTIFIRE MODEL NO.FPJ
		HONEYWELL MODEL NO.XLS-FFJ
		ASUL MODEL NO.IQ-FPJ
		GAMEWELL FCI USA MODEL NO.TEL-F
		SIEMENS:FIRE FINDER SERIES XLVS
		GE EDWARD EST3 SERIES
		Bosch Model No MB-FJ / MB-FH
12	INTERACTIVE FIRE FIGHTER DISPLAY	NOTIFIRE(ONYX SERIES)
		HONEYWELL
		ASUL
		Bosch Model No MB-FJ / MB-FH
		SIEMENS:FIRE FINDER SERIES XLVS
		GE EDWARD EST3 SERIES
13	PVC INS. COPPER CONDUCTOR WIRE	BATRA HENLEY

		HAVELLS
		L&T
		RR KABELS
		BONTON
14	MS CONDUIT	AKG/BKG/BEC/POLYPACK

PART-E
ELECTRICAL & MECHANICAL
(EXTERNAL WORKS)

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
FEEDER PILLAR**

FEEDER PILLARS

A. FEEDER PILLARS - CONSTRUCTION

1. Enclosure

The type of enclosure shall be able to provide the protection for the following:-

- a. Protection of personnel against contact with live and moving parts inside the enclosure and protection of equipment against ingress of solid foreign bodies.
- b. Protection of equipment against ingress of liquids.
- c. Protection of equipment against mechanical damage.

The degree of protection shall be IP-55 in accordance with IS: 2147-1072.

It shall be in all respect suitable for outdoor installations. It shall be made from a suitable material to withstand rough usage and weather. It shall be of M.S sheets, the thickness of the sheet shall be at least 2.0 mm. in accordance with IS: 1730-1961. Detachable gland plate (min 3MM thickness) shall be provided at bottom of Feeder Pillar.

2. Painting

Feeder Pillar shall be powder coated of shade RAL 7032 (Siemens grey).

3. Canopy

The top of the pillar shall be fitted with a sloping canopy, the design of which shall be such that rain water shall not accumulate on the top.

4. Doors

Distribution pillars shall have a set of double hinged doors at the front. Similar doors shall be provided at the back also. The doors shall be so fitted as to provide the interior with maximum protection from atmospheric conditions. The hinges shall be of such construction that the doors can be swung open by not less than 150°. In addition the hinged design shall permit doors being completely removed when necessary. The base horizontal member shall be completely removable to facilitate cable jointing. Neoprene gaskets shall be provided for doors.

5. Stand

Feeder pillar stand shall be made out of 50 mm x 50 mm x 6 mm thick MS Channel.

6. Locking

The doors shall be provided with pad locking arrangement.

7. Corrosion Protection

The pillar shall be suitably protected against corrosion.

8. Ventilation

Adequate ventilation shall be provided in the Panel for inlet and exhaust air.

9. Pillar Lighting

A bayonet lamp holder complying with IS : 1258, with a tumbler switch, complying with IS:3854-1966, a three pin plug and socket complying with IS: 1293-1958, with necessary MCB and wiring shall be provided inside the pillar on the front-bottom portion of the shell near the neutral bus bar. Anti condensation heaters of appropriate rating with DP MCB and settable thermostat shall also be provided.

10. Cable Connections

The bottom gland plate shall be in two halves and removable for the sake of easy cable termination and easy working.

11. Incoming and Outgoing Terminals

- a) The terminal shall be of substantial mechanical constructions and shall provide adequate electrical contact for the appropriate size of cable used. The use of aluminium conductors should be taken into account and terminals should be capable of receiving the appropriate size of aluminium conductors.
- b) Terminals connections shall be such that the conductors may be connected by means of screws or other equivalent means so as to ensure that the necessary contact pressure is maintained permanently.
- c) Terminals shall be such that they may not turn or be displaced when the connecting screws are tightened and such, that the conductor may not become displaced.
- d) Terminals shall be so mounted that the appropriate cable may be connected without impairing the normal performance of the unit.
- e) No contact pressure shall be transmitted through insulating material and the gripping of the conductor shall take place between metal faces.
- f) The incoming cables shall be connected to the MCCB terminals.
- g) It shall be possible to safely connect or disconnect the terminals on live circuits.
- h) As principle, 20 percent spare capacity of terminals shall be provided.

12. Bus Bar and Bus Bar Chambers

The bus bar shall be of high conductivity aluminium alloy of E-91 grade and of adequate section. Current density shall be 1.3 sq. mm/Amp. The horizontal bus

system shall run suitably in accordance with IS: 375-1963. All connections to individual circuits from the bus bar shall be with solid connections. Bus bars shall be suitably sleeved with PVC sleeves or suitably insulated in an approved manner. The bus bar temperature should not exceed 85°C i.e. 35°C temperature rise over 50°C ambient .

13. Bus Bar Supports and Attachments

Bus bar shall be firmly fixed on supports constructed from SMC glass fibre reinforced thermosetting plastic. The supports shall be sufficiently robust to effectively withstand electro-mechanical stresses produced in the event of short circuit.

14. Connection to Bus Bars

Connections to bus bars ratings more than 200 amp shall be made with clamping arrangement with bolts and nuts and for bus bars of smaller ratings, use of holes drilled into the bus bars may be made.

For interconnection, multistrand copper conductor single core cable with tinned copper lugs shall be used, Bimetallic washers shall be used at bolted joints to avoid heating due to dissimilar metal contact, wherever required.

Further for tapping off connections from bus bars, PVC insulated wire may be used for current capacities upto 100 amps and for higher current capacities solid conductors/strips suitably insulated with PVC sleeves/tape shall be used.

15. Clearances

The minimum clearances to be maintained for open and closed indoor air insulated bus bars/electrically non-exposed and working at system voltages upto 600 volts shall be as follows:

Between	Main Clearances
Phase to Earth	26 mm
Phase to Phase	32 mm

16. Bus Bar Markings

The colours and letters (or symbols) for bus bars :

Bus bar connections shall conform to relevant Indian Standard. A brief from I.S. 375 (revised) is given below:

For AC bus bars and Main Connections.

S.No.	Bus Bar & Main Connection	Colour	Letter/Symbol
1.	Three Phase	Red, Yellow, blue	R, Y, B.
2.	Two Phase	Red, Blue	R, B

3.	Single Phase	Red	R
4.	Neutral Connection	Black	N
5.	Connection to earth	Green	E
6.	Phase variable (Such as connections to reversible motors)	Grey	Gy

17. Phase Sequence and Polarity

Bus bars and main connections, when marked shall be marked in accordance with the following table to indicate the order in which the voltages in phases reach their maximum values.

System	As indicated by Colours or letters	Phase sequence as indicated Vectorially
Three Phase	Red, Yellow, Blue	R, Y, B.
Two Phase	Red, Blue	R, B.

18. Arrangement of Bus bars & Main Connections :

Bus bars and main connections which are substantially in one plane shall be arranged in order given as follows :

a) A.C. System

- The order of phase connections shall be Red, Yellow and Blue.
- When the run of the conductors is horizontal, the red shall be on the extreme left or on the left or farthest away from the centre line as viewed from the front.
- When the system has a neutral connection in the same plane as the phase connections, the neutral shall occupy an outer position.
- Unless the neutral connections can be readily distinguished from the phase connections, the order shall be red, yellow, blue and black.

b. Terminations

Incoming and Outgoing terminals shall be suitable for receiving underground cables.

19. Earthing

- a) The metal casing of the distribution pillar shall be provided with two separate earthing terminals and the framework shall be metallically connected with the casing. These terminals shall be provided over and above all other means provided for securing metallic enclosures (armour or other metallic coverings of current carrying cables).

- b) The earthing terminal shall be readily accessible and so placed that the earth connection of the distribution pillar is maintained when the cover or any other movable part is removed.
- c) The earthing terminals shall be of adequate size, be protected against corrosion and shall be metallically clean. Under no circumstances shall a movable metal part of the enclosure be insulated from the part carrying the earthing terminals when the movable part is in place.

20. Temperature-Rise

- a) Feeder pillars shall be so designed as to ensure that temperature attained by the fuse/link and cable terminals does not exceed the values given in relevant fuse components specifications when tested.
- b) The temperature shall be measured when one outgoing circuit of the distribution pillar is carrying its rated current, and all the remaining outgoing circuits are each loaded to two-third of their rated current.

21. Marking

The following information shall be clearly and indelibly marked on all distribution pillars or on a label permanently attached to it:

- a. Rated voltage.
- b. Total number of outgoing circuit
- c. Total number of incoming circuit.
- d. Rated current of incoming circuit.
- e. Rated current of outgoing circuit.
- f. Whether for use with AC, DC or both.
- g. Manufacturer's name or trade-mark with year of manufacture and Serial No.

Provision shall be made in every distribution pillar to indicate by suitable means, such as labels, the position, the name, and the current rating of each outgoing and incoming circuits. If a label is used it shall be capable of being permanently and securely fixed, preferably inside the case; if it is inside the case the label may be a printed paper label. Where a numbering label is not mounted below the relevant circuit the circuit numbering shall indicate by symbol and/or diagram the relation to the circuit.

Suitable lifting arrangement shall be provided for Pillars.

B. MOULDED CASE CIRCUIT BREAKERS

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS 13947 – Part 2/IES 60947-2 and should have test certificates for breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick make – break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, frame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses.

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (ICU). MCCB's for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2. 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

a. Current Limiting * Coordination

- The MCCB shall employ maintenance free minimum let-through energies and capable of achieving discrimination upto the full short circuit capacity of the downstream MCCB. The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

b. Testing

- Original test certificate of the MCCB as per IEC 60947-1 & 2 or IS13947 shall be furnished.
- Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- i. Handle interlock to prevent unnecessary manipulations of the breaker.
- ii. Door interlock to prevent the door being opened when the breaker is in ON position.
- iii. Defeat-interlocking device to open even if the breaker is in ON position.
 - The MCCB shall be current limiting type and comprise of quick make-Break switching mechanism. MCCB's shall be capable of defined variable overload adjustment. All MCCB's rated 100Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.
 - All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.
 - The trip command shall override all other commands.

MCCB's upto 250 amps shall be with thermal magnetic and above 250 amps electronic release shall be provided.

C. MINIATURE CIRCUIT BREAKERS

Miniature Circuit Breakers shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCB's shall be classified (B,C,D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
HT & LT CABLE**

H.T. & L.T. CABLES

A H.T CABLES

The cable shall be 11 KV Grade high conductivity stranded compacted circular aluminum conductor 3 core. XLPE Dry Cured (Nitrogen gas) insulated, extruded inner PVC sheathed, galvanized steel strip armored with overall separate extruded PVC outer sheath conforming generally to IS: 7098 (Part-II) -1985 and amendment there of suitable for 11 KV, 3 Phase, 50 Hz earthed system.

Two distinct sheaths i.e. inner and outer shall be provided. Outer sheathing shall be designed to afford high degree of Technical protection and shall also be heat, oil, chemicals and weather resistant. Common acid, alkali's and saline solutions shall not have adverse effect on the material used for PVC outer sheathing.

The cable should be suitable for laying in covered trenches and/or buried direct underground.

Site Temperature - 50°C

Voltage Variation - +- 10%

Frequency Variation - +-5%

Combined voltage & frequency variation - +-10%

1. Code & Standards

- (i) The design, manufacture and performance of cable shall comply with all currently applicable statutes, regulations and safety codes where cables will be installed, as prescribed in relevant IS codes and to requirement of local Electricity supply authority to which the equipment shall be installed
- (ii) Nothing in this specification shall be construed to relieve the contractor of his responsibility.
- (iii) Unless otherwise specified the cables shall conform to latest applicable standards.

2. Conductor

The conductor shall be made from stranded aluminum to form compact circular conductor having resistance with limits as specified in table-2 of IS: 8130-1984 and any amendment thereof.

3. Conductor Shield

The conductor shall have a semi-conducting screen which will ensure perfectly smooth profile to avoid stress concentration. The conductor screen shall be extruded in the same operation as the insulation.

4. Insulation

The XLPE insulation shall be suitable for specified 11 KV system voltages. The manufacturing process shall ensure that insulation shall be free from voids. The insulation shall withstand mechanical and thermal stresses under steady state

and transient operating conditions. The extrusion method shall give very smooth interface between semi-conducting screen and insulation. The insulation of the cables shall be of high standard quality and conform to Clause 33 to IS: 7098 (Part-II) -1985 or latest amendment thereof.

5. Insulation shield

To confine electrical field to the insulation, insulation screening consisting of two parts, namely metallic (non magnetic) and non metallic (semi conducting) shall be provided. The non-metallic semi conducting shield shall be put over the insulation of each core. The insulation shield shall be extruded in the same operation as the conductor shield and insulation by triple extrusion process.

The insulation shield shall be bonded and strippable on adequate heat treatment. Metallic shield shall be bonded and strippable on adequate heat treatment.

Metallic shield shall be provided over non-metallic portion as per provision of clause 12.4 of IS: 7098 (part-II) -1985 and amendment thereof. The copper screen shall be capable of carrying single line to ground fault.

6. Inner Sheath

The sheath shall be suitable to withstand the operating conditions and the desired temperature rating of the cable. It shall be of adequate thickness, consistent quality and free from all defects. The PVC sheath shall be extruded type The binding tape used over the laid up cores shall not be construed as part of the inner sheath. The inner sheath shall conform to the provisions of IS: 7098 (Part-II) -1985 or latest amendment thereof.

7. Armour

Galvanized steel strip armoring shall be provided. The dimensions of steel strip shall be as per table 4 of IS: 7098 (Part-II) -1985 and its latest amendment and strip shall conform to latest provision of IS: 3975:1988 and amendment thereof.

8. Outer Sheath

Extruded PVC outer sheath of type ST-2 as per IS: 5831 -1984 and its latest amendment shall be applied over armoring with suitable additives to prevent attack by rodent and termites and its thickness shall be in accordance with Clause 17.32 of IS: 7098 (Part-II) -1985 and latest amendment thereof.

9. Construction

The cable shall have suitable PVC fillers laid up with insulated cores to provide substantially circular cross section before the inner sheath is applied. The fillers shall be suitable for operating temperature of the cable and compatible with the insulating material.

All materials used in the manufacture of cable shall be new unused and of finest quality.

All materials shall comply with the applicable provisions of the tests of the specifications. IS, Indian Electricity Rules, Indian Electricity Act and any other applicable statutory provisions rules and regulations.

The PVC material used in the manufacture of cable shall be reputed make. No

recycled PVC is permitted. The purchaser reserves the right to ask for documentary proof of the purchases of various materials to be used for the manufacture of cable and to check that the manufacturer is complying with quality control.

10. Current Rating

The cable will have current rating and derating factors as per relevant Indian Standards.

The current rating shall be based on Maximum conductor temperature of 90°C with ambient site conditions specified for continuous operation at the rated current.

11. Operation

Cable shall be suitable for laying directly buried in ground.

Cables shall have heat and moisture resistant properties. These shall be of type and design with proven record of distribution network service.

12. Lengths

The Cables shall be supplied in standard drum lengths i.e. 500+5% / 250+5% meters. Only the balance cable quantity shall be acceptable in non- standard length.

13. Identification Marking

For the identification of individual cores. Colored strips of red, yellow and blue colors shall be used to identify phase conductors.

The manufacturer shall emboss (i) IIM-R (ii) Name of manufacturer (iii) Year of manufacture (iv) Specification No. (v) Rated Voltage grade (vi) Bundle size (e.g. 3 x 240 sqmm) at the interval of one meter length throughout the length of the cable.

The identification embossing shall be done only on the outer sheath.

14. Packing

The cable shall be supplied on non-returnable wooden drums of heavy standard construction conforming to IS: 10418-1982 and latest amendment thereof and being suitable for transport by goods train or truck and for storage at site. The wood used for construction of the drums shall be properly seasoned and wood preservative shall be applied to the entire drum.

All ferrous parts shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage. Each drum shall have the following information marked on it with indelible ink along with other important information including technical data.

- Consignee & Destination.
- Trade name or trademark, if any.
- Name of the manufacturer.
- Nominal sectional area of the conductor of the cable Drum No.
- Drum no.
- No. of cores

- Type of cable & voltage for which it is suitable.
- Gross weight of the drum (approx.)
- Length of cable in the drum with individual lengths if more than one.
- Net weight of the cable.
- ISI certification mark, if available.

A layer of waterproof paper shall be applied to the surface of the drum and over the outer cable layer. A clear space of at least 40mm. shall be left between the cable and the laggings. The packing shall be adequate to protect the cable from damage in transit and manufacturer shall be responsible for it and make good at his own expenses any and all damages due to improper packing etc.

15. Test Certificate

The tenderer shall furnish an authenticated copy or results of successful type test and short circuit withstand (I second) test as carried out over the cable of same design, size and type to prove that the design has successfully passed through required tests. The tests as carried out in any of the following institutions test houses shall be acceptable;

- National Physical Laboratory, Delhi.
- Indian Institute Of Science, Bangalore.
- Central Power Research Institute, Bangalore, Bhopal, Murad Nagar.
- ERDA, Baroda.
- National Test House, Mipure, Calcutta.
- Indian Institutes of Technology.
- Sri Ram Test House, New Delhi.
- Indian Fuel Research Institute, Dhanbad.

16. Inspections and Testing

If successful type test and short circuit withstand test for one second have been carried out the cable of same design, size type and manufacturing process during last five years (counted from the date of tender opening) repetition of these tests is not required provided the manufactured material conforms to IS: 7098 (Part-II) 1985 with latest thereof in respect of type and short circuit withstand test.

On the other hand, if the offered design is not type tested during last five year sample of the cable marked out of the first lot offered for inspection shall be subjected to short Circuit withstand test for one second and all type tests in accordance with IS: 7098 (Part-II) 1985 and amendment thereof in presence of purchaser's representatives at test houses/institutions mentioned in clause 17. All charges fee/transportation etc. to conduct these tests shall be borne by the manufacturer. Subsequent inspection and regular supply of material shall commence only after successful type testing and short-circuit withstand testing and dispatch authorization of first lot from competent authority.

The Owner reserves the right to get the cable type tested at any stage during the tendency of contract at its own expenses in any reputed test house mentioned in clause 17. The transportation and arrangement of testing of sample to test laboratory shall be responsibility of the manufacturer.

The following routine and acceptance test as laid down in IS: 7098 (Part-II) -1985

with latest amendment thereof shall be carried out on sample selected at random as per relevant ISS.

- a. Tensile test on conductor
- b. Wrapping test on conductor
- c. Conductor resistance test.
- d. Test for thickness of insulation and sheath
- e. Hot set test for insulation
- f. Tensile strength and elongation at break test for insulation and sheath.
- g. Partial discharge test (for screened cables only)
- h. High voltage test for 4 hours [as per Clause 19.7.2 of IS: 7098 (Part-II) – 1985].
- i. Insulation resistance (volume resistivity) test.
- j. Oxygen index test

In addition to above length check on one drum per inspection lot shall also be carried out by the inspecting of officers for which manufacturer shall make all necessary arrangements and provide all necessary facilities at his own cost.

All the acceptance tests shall be carried out by the firm, in the presence of purchaser's representative at their works. The firm shall give at least 15 days' advance notice to the purchaser to enable him to depute the engineer for witnessing the tests. The test certificates for acceptance tests witnessed by inspecting officer/ engineer shall be submitted for approval before dispatch of material.

The purchaser also reserves the right to have tests carried out at his own cost by an independent agency, whenever there is a dispute regarding the quality of supply.

17. Documentation

The contractor shall furnish following, and obtain the approval of Engineer-in-charge, before supply of material at site:

- a. Data Sheet
- b. Sectional view, showing the General constructional feature with conductor/ conductor screen/ insulation/ armoring/ inner and outer sheath etc.
- c. All the required type test reports for offered items tested at any Government recognized Laboratory as stated under Clause No. 15.
- d. Literature, pamphlets for the items.

DATA SHEET (H.T. CABLE)

Sl. No. Description

- 1.0 General
- 1.1 Make
- 1.2 Cable size (no. of core x mm²)
- 1.3 Rated Voltage
- 1.4 Type of cable (earthed/unearthed)
- 1.5 Dielectric strength in kV/mm
- 1.6 Dielectric loss
- 1.7 Heat stability in deg. C
 - a) Under continuous operation
 - b) Under short circuit condition
- 1.8 Current carrying capacity
 - a) In ground
 - b) In duct
 - c) In air
- 1.9 Over load capacity
- 1.10 Short circuit capacity in kA for 1 sec
 - a) Max. overall dia (mm)
 - b) Tolerance on overall dia (mm)
- 1.11 Min. bending radius (cm)
- 1.12 No. of strands / dia of each strand (mm)
- 1.13 Approx. net wt of cable (kg/km)
- 1.14 Safe pulling force when pulled by pulling eye
- 1.15 Oxygen index at 27± 2° C
- 1.16 Max acid gas generation by weight (%)
- 1.17 Voltage developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in A
 - a) Rated current
 - b) SC current
- 1.18 Circulating current developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in A
 - a) Rated current
 - b) SC current
- 1.19 Fire resistance requirement
- 1.2 Applicable standards
- 2 Conductor**
- 2.1 Material

- 2.2 Grade
- 2.3 Shape of conductor
- 2.4 Director of lay of stranded layers
- 2.5 Max. DC resistance of cable in Ω/km
- 2.6 AC resistance of cable in Ω/km
 - a) At 20°C
 - b) At 70°C
 - c) At 90°C
- 2.7 Reactance of cable at 50 Hz in Ω/km per phase
- 2.8 Capacitance per phase in $\mu\text{F}/\text{km}$
- 3 Insulation**
- 3.1 Composition of insulation
- 3.2 Thickness in mm
- 3.3 Tolerance of thickness in mm
- 3.4 Filled or unfilled
- 3.5 Type or curing
- 3.6 Min. Insulation resistance at 20°C ($\text{M}\Omega/\text{km}$)
- 4 Screening**
- 4.1 Conductor screening
 - a) Material & type
 - b) Approx thickness of extruded layer (mm)
- 4.2 Insulation screening
 - a) Material & type
 - b) Approx thickness of extruded layer (mm)
- 4.3 Metallic screen
 - a) Material
 - b) Size of tape/wire (mm)
 - c) No. of tape/wires
 - d) SC Capacity of screen-Min
 - e) Individual core
 - f) All the cores jointed
 - g) Cross sectional area of metallic screen / core (mm^2) - minimum
 - h) Approx. dia below metallic screen (mm)
- 5 Inner Sheath**
- 5.1 Material
- 5.2 Calculated dia over laid up cores (mm)
- 5.3 Minimum thickness of sheath (mm)
- 5.4 Colour of sheath
- 5.5 Tolerance of thickness (mm)
- 5.6 Type of filler material
- 6 Armour**

- 6.1 Material
- 6.2 Strip / wire
- 6.3 Calculated dia of cable over inner sheath (under armour) in mm
- 6.4 Dimension of strip / wire
- 6.5 Approx. no. of armour strips / wires
- 6.6 Cross sectional area (mm²)
- 6.7 AC resistance of armour at 80°C
- 6.8 Director of lay of armour
- 7 Outer Sheath**
- 7.1 Material
- 7.2 Calculated dia over laid up cores (mm)
- 7.3 Minimum thickness of sheath (mm)
- 7.4 Colour of sheath
- 7.5 Tolerance of thickness (mm)
- 7.6 Temperature withstand capability
- 8 Cable Drum**
- 8.1 Type (wood/steel)
- 8.2 Dimensions
- 8.3 Flange diameter (m)
- 8.4 Barrel diameter (m)
- 8.5 Traverse (m)
- 8.6 Approx. Wt of cable drum with cables
- 8.7 Max / standard length per drum (m)
- 9 De-rating Factor (Enclose Table)**
- 9.1 Variation in ambient air temperature
- 9.2 Variation in ground temperature
- 9.3 Depth of laying
- 9.4 Variation in thermal resistivity of soil
- 9.4 Two cables touching
- 9.5 Three cables touching
- 9.6 Group rating factor for single core cables
- 9.7 Cables laid direct in ground in horizontal formation
- 9.8 Cables laid in ducts in trefoil formation
- 9.9 Cables laid on racks/trays in covered trench with having restricted air circulation, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
- 9.1 Cables laid on racks / trays in open air, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
 - a) Group rating factor for multicores cables
 - b) Cables laid direct in ground in horizontal formation
 - c) Cables laid direct ground in trefoil formation

- d) Cables laid on cable trays exposed to air. Cables spaced by one cable diameter and trays are in tiers spaced by 300mm. the clearance between wall and cable is 25 mm.
- e) Cables laid on cable trays inside cable trench with removable covers on cable trays having restricted circulation. Cables spaced by one cable OD and trays are in tiers spaced by 300 mm. clearance between wall and cable is 25 mm.
- f) Cables laid on cable trays exposed to air. Cables are touching and trays are in tiers spaced by 300 mm. the clearance between the wall and the cable is 25 mm

Notes : For each grade and size of cable, separate datasheet should be furnished.

B. LT POWER AND CONTROL CABLES

1. Scope

This specification covers the supply of power and control cables.

Cables shall be tested at works and supplied in accordance with drawings, specifications, relevant Indian Standard Specifications and cable manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

2. Material

- a. The LT power cables shall be **XLPE** insulated PVC sheathed, Aluminium conductor armoured cable conforming to IS: 7098 (part - II). The Aluminium conductor shall be stranded, grade H4 class 2 as per IS:8130 and IS 3975 for Armairiry.
- b. Cable shall be rated for continuous operation at maximum conductor temperature of 90°C and for a maximum SC Temperature of 250 °C. Sequential marking in cable in meters shall be provided on outer sheath of cable.

Site Temperature - 50°C

Voltage Variation - +- 10%

Frequency Variation - +-5%

Combined voltage & frequency variation - +-10%

- c. The LT control cable shall be PVC insulated copper conducted armoured stranded cable.

3. Tests

i. Shop Tests:

The cables shall be subjected to shop tests in accordance with relevant standards to prove the design and general qualities of the cables as below (as per IS 10810):

- a. Routine tests on each drum of cables.
- b. Acceptance tests on drums chosen at random for acceptance of the lot.
- c. Type tests on each type of cable, inclusive of measurement of armour DC resistance of power cables.

ii. Test certificates

Test certificates of all the test carried out at the works shall be furnished for approval of the Engineer-in-charge before the cables are despatched from the manufacturer's works to the site.

Test reports shall be complete with all details and shall also contain IS specified limit values wherever applicable to facilitate review.

4. Drawings, Data and Manuals

Drawings, data and manuals shall be submitted for approval of Engineer-in-charge, for the following:-

- a. Manufacturer's catalogues giving cable construction details and characteristics.
- b. Cable current ratings for different types of installation inclusive of derating factors for ambient temperatures, grouping etc.
- c. Write up on manufacturer's recommended method of splicing, jointing, termination etc of the cables.

5. Design Criteria

- 5.1 The cables will be used for connection of power circuits of the electrical system.
- 5.2 Cables will be generally laid in soft soil and in RCC/Hume/GI pipes.
- 5.3 For continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard and (or this specification).
- 5.4 The insulation and sheath materials shall be tough enough to withstand mechanical stresses during handling.
- 5.5 Armouring shall be single round/flat wire of galvanised steel.
- 5.6 Core identification for multi core cable shall be provided by colour coding.

6. Specific Requirements

- 6.1 Drum length & tolerance: the cables shall be supplied in wooden drums, each containing minimum 500 metres length of cable. Allowable tolerance on individual drum length is $\pm 5\%$.

6.2 Cable identification: cable identification shall be provided by embossing on the outer sheath the following at regular intervals of 2/3 metres.

- a. Manufacturer's name or brand name or trade mark.
- b. Type of cable and voltage grade.

7. INSPECTION

All cables shall be inspected upon receipt at site and checked by the Engineer-in-charge for any damage during transit.

DATA SHEET (L.T. CABLE)

Sl. No.	Description
1.0	General
1.1	Make
1.2	Cable size (no. of core x mm ²)
1.3	Rated Voltage
1.4	Type of cable
	a) Armoured / Unarmoured
	b) Earthed / Unearthed
1.5	Dielectric strength in kV/mm
1.6	Dielectric loss
1.7	Heat stability in deg. C
	a) Under continuous operation
	b) Under short circuit condition
1.8	Current carrying capacity
	a) In ground
	b) In duct
	c) In air
1.9	Over load capacity
1.1	Short circuit capacity in kA for 1 sec
	a) Max. overall dia (mm)
	b) Tolerance on overall dia (mm)
1.11	Min. bending radius (cm)
1.12	No. of strands / dia of each strand (mm)
1.13	Approx. net wt of cable (kg/km)
1.14	Safe pulling force when pulled by pulling eye
1.15	Oxygen index at 27± 2° C
1.16	Max acid gas generation by weight (%)
1.17	Voltage developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in V
	a) Rated current
	b) SC current
1.18	Circulating current developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in Ampere
	a) Rated current
	b) SC current
1.19	Fire resistance requirement

- 1 Applicable standards
- 2 Conductor**
 - 2.1 Material
 - 2.2 Grade
 - 2.3 Shape of conductor
 - 2.4 Director of lay of stranded layers
 - 2.5 Max. DC resistance of cable in Ω/km
 - 2.6 AC resistance of cable in Ω/km
 - a) At 20°C
 - b) At 70°C
 - c) At 90°C
 - 2.7 Reactance of cable at 50 Hz in Ω/km per phase
 - 2.8 Capacitance per phase in $\mu\text{F}/\text{km}$
- 3 Insulation**
 - 3.1 Composition of insulation
 - 3.2 Thickness in mm
 - 3.3 Tolerance of thickness in mm
 - 3.4 Filled or unfilled
 - 3.5 Type or curing
 - 3.6 Min. Insulation resistance at 20°C ($\text{M}\Omega/\text{km}$)
- 5 Inner Sheath**
 - 5.1 Material
 - 5.2 Calculated dia over laid up cores (mm)
 - 5.3 Minimum thickness of sheath (mm)
 - 5.4 Colour of sheath
 - 5.5 Tolerance of thickness (mm)
 - 5.6 Type of filler material
- 6 Armour (In case of armoured cables)**
 - 6.1 Material
 - 6.2 Strip / wire
 - 6.3 Calculated dia of cable over inner sheath (under armour) in mm
 - 6.4 Dimension of strip / wire
 - 6.5 Approx. no. of armour strips / wires
 - 6.6 Cross sectional area (mm^2)
 - 6.7 AC resistance of armour at 80°C
 - 6.8 Direction of lay of armour
- 7 Outer Sheath**
 - 7.1 Material
 - 7.2 Calculated dia over laid up cores (mm)
 - 7.3 Minimum thickness of sheath (mm)

- 7.4 Colour of sheath
- 7.5 Tolerance of thickness (mm)
- 7.6 Temperature withstand capability
- 8 Cable Drum**
- 8.1 Type (wood/steel)
- 8.2 Dimensions
- 8.3 Flange diameter (m)
- 8.4 Barrel diameter (m)
- 8.5 Traverse (m)
- 8.6 Approx. Wt of cable drum with cables
- 8.7 Max / standard length per drum (m)
- 9 De-rating Factor (Enclose Table)**
- 9.1 Variation in ambient air temperature
- 9.2 Variation in ground temperature
- 9.3 Depth of laying
- 9.4 Variation in thermal resistivity of soil
- 9.4 Two cables touching
- 9.5 Three cables touching
- 9.6 Group rating factor for single core cables
- 9.7 Cables laid direct in ground in horizontal formation
- 9.8 Cables laid in ducts in trefoil formation
- 9.9 Cables laid on racks/trays in covered trench with having restricted air circulation, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
- 9.1 Cables laid on racks / trays in open air, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
 - a) Group rating factor for multi-core cables
 - b) Cables laid direct in ground in horizontal formation
 - c) Cables laid direct ground in trefoil formation
 - d) Cables laid on cable trays exposed to air. Cables spaced by one cable diameter and trays are in tiers spaced by 300mm. the clearance between wall and cable is 25 mm.
 - e) Cables laid on cable trays inside cable trench with removable covers on cable trays having restricted circulation. Cables spaced by one cable OD and trays are in tiers spaced by 300 mm. clearance between wall and cable is 25 mm.
 - f) Cables laid on cable trays exposed to air. Cables are touching and trays are in tiers spaced by 300 mm. the clearance between the wall and the cable is 25 mm

Notes : For each grade and size of cable, separate datasheet should be furnished.

3 LIST OF APPROVED MAKES OF MATERIAL

S. No	Materials / Equipment to be installed	Manufacturer's / Vendor's Name
1	HT 11 KV XLPE Cable	Polycab/Universal/ Ravin / CCI / Havells/Torrent/KEI
2	HT Jointing Kit	CCI/ Raychem/ M-seal (Xicom)
3	LT XLPE Cable (upto 1.1 KV)	Polycab/Universal/ Ravin / CCI / Havells/Torrent/KEI/Gloster
4	LT Jointing Kit / Termination	RaychemSafe Kit
5	Cable Glands Double Compression with earthing links	Baliga Lighting /Comet/Cosmos
6	Bimettalic Cable Lug	Dowell's (Biller India Pvt. Ltd.)/Comet Hax Brass (Copper Alloy India Ltd.)

Any other item not specified here shall be got approved by Engineer-in-charge, before use at work.

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
INSTALLATION**

INSTALLATION SPECIFICATIONS

1. CABLES

A. GENERAL

The cable installation shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, CPWD Specifications and relevant IS Codes shall be followed.

B. ROUTE

- i. Before the cable laying work is undertaken, the route of the cable shall be decided by the Engineer-in-Charge.
- ii. While shortest practicable route shall be preferred, cable runs shall generally follow fixed developments such as roads, foot-paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross country run to shorten the route length is not desirable as it would be set with route identification and maintenance problems, besides posing difficulties during later development of open areas etc.
- iii. While selecting cable routes, corrosive soils, ground surrounding sewage and effluent etc. shall be avoided. Where this is not feasible, special precautions as approved by the Engineer-in-Charge shall be taken.
- iv. As far as possible, the alignment of the cable route shall be decided taking into consideration the present and future requirements of other agencies and utility services affected by it, the existence of any cable in the vicinity as may be indicated by cable markers or cable schedules or drawing maintained for that area, possibilities of widening of roads/lanes, storm water drains etc. Cable routes shall be planned away from the drains and should be within the property.
- v. Whenever cables are laid along well demarcated or established roads, the HT cables shall be laid further from the kerb line than HV cables.

C. WAY LEAVE

1. It may be necessary to obtain way leave for the cable route from the appropriate authorities some of whom are listed below :
 - a) Drainage, Public Health and Water Works.
 - b) Telephones and Telegraphs.
 - c) Gas works.
 - d) Other Undertakings.
 - e) Owners of properties.

Where necessary, joint inspection with representatives of other authorities may be arranged so that mutual interests are safeguarded. In case of private property, Section 12/51 of the Indian Electricity Act shall be complied with.

D. PROXIMITY TO COMMUNICATION CABLES

Power and communication cables shall as far possible cross at right angles. Where power cables are laid in proximity communication cables the horizontal and vertical clearances shall not normally be less than 60 cms.

E LAYING METHODS

1. Cables shall be laid direct in ground in pipes/closed ducts, in open ducts or on surface depending on site conditions.

2. During the preliminary stages of laying the cable, consideration should be given to proper location of the joint position so that when the cable is actually laid the joints are made in the most suitable places. As far as possible water logged locations, carriage ways, payments, proximity to telephone cable, gas or water mains, inaccessible places, ducts, pipes, racks etc. shall be avoided for joint position.

3. Laying in Pipes/Closed ducts :

i. In location such as road crossing, entry to building, on poles, in paved areas etc. cables shall be laid in pipes or closed ducts.

ii. GI or Hume Pipes (spun reinforced concrete pipes) shall be used for such purposes. In the case of new construction, pipes as required shall be laid alongwith the Civil works and jointed according to the instructions of the Engineer-in-Charge as the case may be. The size of pipe shall be as indicated in the electrical drawings. GI pipe shall be laid directly in ground without any special bed. Hume pipe (Spun reinforced concrete pipe) shall be laid over 10 cm. thick cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate of 40mm nominal size) bed, after which it shall be completely embedded in concrete. No sand cushioning or tiles need be used in such situations. Unless otherwise specified, the top surface of pipes shall be at a minimum depth of 1mtr. from the ground level when laid under roads, pavement etc.

iii. Where steel pipes are employed for protection of single core cables feeding AC load, the pipe should be large enough to contain both cables in the case of single phase system and all cables in the case of polyphase system.

iv. The pipes on road crossing shall preferably be on the skew to reduce the angle of bends as the cable enters and leaves the crossings. This is particularly important for high voltage cables.

v. Manholes of adequate size decided by the Engineer-in-Charge shall be provided by the contractor to facilitate feeding/drawing in of cables and to provide working space

for persons. They shall be covered by suitable manhole covers with frame of proper design.

- vi. Pipes shall be continuous and clear of debris or concrete before cable is drawn. Sharp edges at ends shall be smoothed to prevent injury to cable insulation or sheathing.
- vii. Pipes for cable entries to the building shall slope downwards from the building and suitably sealed to prevent entry of water inside the building. Further the mouth of the pipes at the building end shall be suitably sealed to avoid entry of water. This seal in addition to being waterproof shall also be fireproof.
- viii. All chases and passages necessary for laying of service cable connections to buildings shall be cut as required and made good to the original finish and to the satisfaction of the Engineer-in-Charge.
- ix. Cable grips/draw wires and winches etc. may be employed for drawing cables through pipes/closed ducts etc.

4. Termination/Joining

- i. Brass double compression glands shall be provided for LT cables termination. Jointing work shall be carried out only by a licensed/experienced cable joiner.
- ii. At the preliminary stages of laying a cable, a proper jointing position should be selected.
- iii. Sufficient surplus cable shall be left on each side of joints as mentioned in clause 3g(g) above.
- iv. Joints shall be staggered by 2 to 3 m when two or more cables are laid together in the same trench.
- v. A caution board indicating "CAUTION-CABLE JOINTING WORK IN PROGRESS" shall be displayed to warn the public and traffic where necessary.
- vi. Jointing pits shall be of sufficient dimensions as to allow easy and comfortable working. The sides of the pit shall be well protected from loose earth falling into it. It shall also be covered by a tarpaulin to prevent dust and other foreign matter being blown on the exposed joint and jointing materials.
- vii. Sufficient ventilation shall be provided during jointing operation in order to disperse fume given by fluxing.
- viii. Jointing materials and accessories like conductor ferrules, solder, flux, insulating and protective tapes, filling compound, jointing boxes etc. of right quality and correct sizes, conforming to relevant Indian Standards, wherever they exist, shall be used. The design of the joint box and the composition of the filling compound shall be such as to provide an effective sealing against entry of moisture in addition to affording

proper electrical characteristic to joints. Where special type of sizing connector kits or epoxy resin spliced joints are specified, materials approved for such application shall be used and instructions of the manufacturer / supplier of such materials shall be strictly followed.

- ix. Insulation resistance of cables to be jointed shall be measured with 500 V meager upto 1.1 KV grade and with 2,500 / 5,000 V meager for cables of higher voltage. Unless the insulation resistance values are satisfactory, jointing shall not be done.
- x. Before jointing is commenced all safety precaution like isolation, discharging, earthing etc. shall be taken to ensure that the cable would not be inadvertently charged from live supply. Metallic armour and external metallic bonding shall be connected to earth.
- xi. Cores of the cables must be properly identified before jointing.
- xii. Whenever Aluminium conductor is exposed to outside atmosphere, a highly tenacious oxide film is formed which makes the soldering of Aluminium conductor difficult. This oxide film should be removed using appropriate type of flux.
- xiii. The clamps for the armour shall be clean and tight.
- xiv. Where a cable is to be joined with the existing cable, the sequence should be so arranged as to avoid crossing of cores while jointing.

NOTE :

Type test certificate from the cable joint manufacturer shall be furnished to the Engineer-in-Charge before the material is despatched to the site.

xv. Jointing Procedure

- a. The instructions of jointing furnished by the manufacturer and supplier of cables and joint boxes shall be strictly followed.
- b. All outdoor jointing of PVC cables shall be done using best quality of compound and jointing materials obtained from approved manufacturer suppliers. For indoor termination of PVC cables, joints with compression type glands shall be preferred.

xvi. Mixing of Epoxy Compound

Equal quantities of resin and hardener shall be taken and mixed thoroughly until the mixture is free from white patches and has uniform colour. No water, oil, or any other liquid shall be added to the mixture, as this would make it soft, thus affecting the properties of the compound. The mixture shall be used within 30 - 40 minutes of mixing. The surface on which the epoxy compound is to be used shall be dry. No disturbance of the joint shall be made till the epoxy compound has been completely hardened. A smooth surface can be made by rubbing a damp cloth smoothly on the compound before it sets. The joints shall be painted after it has completely hardened.

xvii Testing

- i. All cables before laying shall be tested with 2,500/5,000 V megger. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/armour and insulation resistance between conductors.
- ii. All cables shall be subject to above mentioned tests during laying, before covering the cables by protective covers and back filling and also before the jointing operations.
- iii. After laying and jointing, the cable shall be subjected to a 15 minutes AC/DC pressure test.
- iv. In the absence of facilities for pressure testing it is sufficient to test for one minute with with 2,500/5,000 V meager.

xviii. Completion plan and completion certificate

- a) After completion of the work the Contractor shall draw completion plans to a suitable scale and shall submit to the Engineer-in-Charge. The completion plans shall, inter-alia, give the following details :-
 - i Layout of cable work
 - ii Length, size, type and grade of cables.
 - iii Method of laying i.e. direct in ground, in pipes etc.
 - iv Location of each joint with jointing method followed.
 - v Route marker and joint maker with respect to permanent land marks available at site.
 - vi Wherever the previously laid cable is cut and additional joints are introduced etc., the cable records shall suitably be amended.

2. PANELS AND FEEDER PILLARS

A. GENERAL

The installation shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, CPWD Specifications and relevant IS Codes shall be followed.

B. INSTALLATION

The installation work shall cover assembly of various sections of the panels, lining up, grouting the units etc. In the case of multiple panel switch boards after connecting up the bus bars etc. all joints shall be protected with necessary insulated shroudings. All protections and other small wirings for indication etc. shall be checked before

calibration and commissioning tests are commenced. All relays, meters etc. shall be mounted and connected with appropriate wiring.

C. Testing And Commissioning

Commissioning checks and tests shall include all wiring checks and checking up of connections. Primary/Secondary injection tests for the relay adjustment/setting shall be done before commissioning in addition to routine megger test. Checks and tests shall include the following :

- i) Operation checks and lubrication of all moving parts.
- ii) Interlock function checks.
- iii) Continuity checks of wiring, fuses etc. as required.
- iv) Insulation test : when measured with 500 V meager the insulation resistance shall not be less than 100 mega ohms.
- v) Trip test and protection gear test.

D. Test witness

Tests shall be performed in the presence of the Engineer-in-Charge. The contractor shall give at least seven (7) days advance notice of the date when the tests are proposed to be carried out.

3. EARTHING

A. GENERAL

The installation shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, CPWD Specifications and relevant IS Codes shall be followed.

The non-current carrying metal parts of electrical installation shall be earthed properly. All metallic structure, enclosures, junction boxes, outlet boxes, cabinets, machine frame, portable equipments, metal conduits, trunking, cable armour, switchgear, distribution boards, lighting fittings and all other parts made of metal in close proximity with electrical circuits shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All earthing will be in conformity with the relevant Indian Electricity Rules 1956 and Indian Standard Specification IS : 3043. Every item of equipment served by the electrical system shall be bonded to earthing system.

The resistance to each earthing system shall not exceed 1.0 ohm.

B. CONNECTION OF EARTHING CONDUCTORS

Main earthing conductor shall be taken from the earth connections at the main distribution panel to the main L.T. panel with which the connection is to be made. For distribution boards, earthing conductors shall run from main distribution boards.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution boards or to an earth leakage circuit breaker. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of equipment shall be earthed with 2 no. G.I. strips/wires and non current carrying metallic parts with 1 no. G.I. strips/wires.

Neutral conductor, sprinkler pipes, or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures cables and conductors, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in earthing system. The Electrical resistance of metallic enclosures for cables and conductors measured between earth connections at the main switch boards and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate circuit breakers and shall not exceed 1 OHM.

C. EARTH CONNECTIONS

All metal clad switches and other equipment carrying single phase circuit, shall be connected to earth by a single connection. All metal clad switches carrying 3 phase shall be connected with earth by two separate and distinct connections. The earthing conductor inside the building wherever exposed shall be properly protected from mechanical injury by running the same in GI pipe of adequate size. The earthing conductor shall be painted to protect it against corrosion. Earthing conductor outside the building shall be laid 600 mm below finished ground level. The over lapping in G.I. strips in joints shall be welded. Lugs of adequate capacity and size shall be used for all termination of conductor wires. Lugs shall be bolted to the equipment body to be earthed after the metal is cleaned of paint and other oily substance and properly tinned.

D. PROTECTION FROM CORROSION

Connection between copper and galvanized equipment shall be made on vertical face and protected with paint and grease. Galvanized fixing clamps shall not be used for fixing earth conductors. Only copper fixing clamp shall be used for fixing earth conductors. When there is evidence that the soil is aggressive to copper, buried earthing conductors shall be protected by suitable serving and sheathing.

E. EARTHING STATION

i. PLATE ELECTRODE EARTHING

Earthing electrode shall consist of a **G.I.** plate of dimensions 600 mm x 600 mm x 6.3 mm thick or Copper plate of 600 mm X 600 mm X 3 mm as called for in the Bill of Quantity. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case not less than 3 meters below ground level. Wherever possible, earth electrode shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrode shall be kept clear of the building foundations and in no case shall it be nearer than 2 meters from the outer surface of the wall.

The earth plate shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. A 20 mm dia GI pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through the pipe. The funnel over the GI pipe shall be housed in a masonry chamber approximately 300 mm x 300 mm x 300 mm deep. The masonry chamber shall be provided with a cast iron cover resting over a CI frame. Test facility shall be provided with test links for the earthing station.

ii. ARTIFICIAL TREATMENT OF SOIL

If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, as specified in Clause no. 3/2.8.9 then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, Calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

iii. RESISTANCE TO EARTH

The resistance to each earthing system shall not exceed 1.0 ohm.

4.0 SITE TESTING AND COMMISSIONING

A. General

All tests shall be carried out by the contractor using his own instruments, testing equipment as well as qualified testing personnel.

The results of all tests shall conform to the specification requirements as well as any specific performance data guaranteed during finalisation of the contract.

At site all equipment shall be energised only after certification by the personnel performing the test that the equipment is ready for energising and with concurrence of the purchaser.

All electrical equipment shall be installed, tested and commissioned in accordance with the latest relevant standards and codes of practices published by Indian Standards Institution wherever available and stipulations made in relevant general specifications.

In case where Indian Standards are not available these shall be carried out in accordance with the latest standards and codes of Practice published by any other recognised National Standards Institution or latest publications of International Electro Technical Commission (IEC).

The testing of all electrical equipment as well as the system as a whole shall be carried out to ensure that the equipment and its components are in satisfactory condition and will successfully perform its functional operation. The inspection of the equipment shall be carried out to ensure that all materials, workmanship and installation conform to the accepted design, engineering and construction standards as well as accepted codes of practice and stipulations made in the relevant general specifications

B. Preparation of The Sub-Station for Commissioning

After completion of the installation at site and for the preparation of sub-station commissioning, the contractor shall carry out checking and testing of all equipment and installation in accordance with the agreed standards, codes of practice of Indian Standards Institution and Specific instructions furnished by the particular equipment suppliers as well as Engineer-in-Charge.

Checking required to be made on all equipment and installations at site shall comprise but not be limited to the following.

- a) Physical inspection for removal of any foreign bodies, external defects, such as damaged insulators, loose connecting bolts, loose foundation bolts etc.
- b) Check for the free movement of mechanism for the circuit- breakers, rotating parts of the rotating machines and devices.
- c) Check for tightness of all cable, busbars as well as earth connections in the main earthing network.
- d) Check for clearance of live busbars and conductors from the metal enclosure.
- e) Continuity check in case of power and control cables.
- f) Checking of all mechanical and electrical interlocks including tripping of breakers using manual operation of relay.
- g) Check and calibrate devices requiring field adjustment/calibration like adjustment of relay settings etc.
- h) Check for proper connection to earth network of all non- current carrying parts of the equipment and installation.
- i) Check for grease, insulating/lubricate oil leakage & proper charge.
- j) Check for alignment of all drawout devices like drawout type circuit breakers, MCC cubicles etc.
- k) Checking of alarm and annunciation circuits by manual actuation of relevant relays.

5. INSTALLATION OF EQUIPMENT

1. General

The contractor will be required to carry out at site the complete erection of equipment supplied by him (as well as those that may be procured from/fabricated by others based on his drawings, specifications and bill of quantities) as well as start-up and commissioning including performance tests of the same.

The contractor shall be completely responsible for the satisfactory erection, testing, commissioning, start-up and performance test of the equipment notwithstanding that he may be assisted by the Engineer-in-Charge.

For complete erection and commissioning, the contractor shall be responsible for providing at his cost all necessary tools, tackles and instruments as required.

The installation of all electrical equipment shall be carried out by only an electrical contractor (holding a valid licence issued by the State Government) for carrying out installation work of the voltage classes involved under the direct supervision of and by persons holding valid certificates of competency for the same voltage classes, issued or recognised by the State Government. The contractor shall furnish the particulars of the licence held by him/the electrical contractor he proposes to engage for carrying out the installation work against this specification. The contractor shall furnish to the purchaser the names and particulars of certificates of competency of the supervisors and workman to be engaged for carrying out the installation work against this specification.

The work shall be executed in a workman like manner in accordance with the requirements specified in the specification for Installation, testing and commissioning. The work shall also comply with standard norms (and practices adopted by the State Electricity Board). Requisite factory and site test reports shall be supplied by the contractor.

Any modification in the equipment or installation that may be demanded by the Inspector shall have to be carried out by the contractor at no extra cost to the purchaser. The contractor shall take all necessary steps to enable the purchaser to get the installation approved by the Chief Electrical Inspector of the State Government and shall render all necessary assistance to the purchaser in the matter.

All equipment including individual components, fittings and accessories shall be properly stored at site so as to obviate any deterioration of electrical properties and mechanical damages.

All equipment shall be thoroughly cleaned of packing materials, scales, rust, oil, grease etc prior to commencement of the installation work.

All equipment shall also be checked physically for the completeness of all components and devices before taking up installation.

The supplier shall repair all minor defects in the equipment, if required, prior to installation in consultation with equipment manufacturer so that manufacturer's guarantee is not affected in any way. In case of any major damage to the equipment, the same shall be rectified or replaced only by the manufacturer's representative with the approval of the Purchaser.

All equipment and accessories shall be installed strictly in accordance with the manufacturer's instructions/drawings. Equipment supplied in sections or in

dismantled condition shall be reassembled at site with all associated accessories as per the manufacturer's instructions.

All electrical installation work shall be planned well in advance so that all openings, sleeves, inserts, mounting channels, foundation bolts, holes etc required for the installation can be incorporated during the execution of civil engineering work. In case additional openings, chases, sleeves etc are required after completion of civil engineering work, the supplier shall make necessary arrangement for the same by drilling/cutting chases, holes etc and shall make good all damaged portions of the work.

2. Switchboard, Motor Control Centres and Control Panels

11kV/415V switchboard for load-centre shall be located inside ventilated switch/control rooms having cable basement/tunnel or concrete trenches/above the ground cable tray depending on the requirement of outgoing feeders.

The motor control centres (MCC) shall be generally located inside ventilated switch/control rooms. In the plant, where number of MCCs are few and where plant area is free from dirt, the MCCs may be located in the plant bays. Power distribution boards (PDBs) shall generally be located in the plant bays except in those areas of the plant which are heavily polluted with dirt.

The control panels shall generally be located inside ventilated switch/control rooms/plant room.

Individually located control switches, push-button stations, combination starter units, local isolators etc shall be of wall mounting type or mounted on rigid supporting brackets made of steel sections or heavy gauge pipes as required.

All relays, instruments etc supplied loose shall be checked and calibrated prior to be mounted and connected at site.

Switchboards, MCCs and control panels shall be mounted on steel sections embedded in the floor and fixed either by bolting or tack welding after proper aligning and levelling.

During installation, special care shall be taken to check and clean all contacts of breakers, contactors, relays etc. Also all operating mechanisms shall be checked for smooth operation and linkages in the mechanism shall be properly lubricated.

3. Testing and Commissioning of Electrical Equipment

A. General

The testing and commissioning for all electrical equipment at site shall be according to the procedure laid down below.

All electrical equipment shall be tested, installed and commissioned in accordance with the latest relevant standards and codes of practices published by Indian Standards Institution wherever available and stipulations and in relevant general specifications.

In case where Indian Standards are not available these shall be carried out in accordance with the latest standards and codes of practice published by any other recognised National Standards Institution or latest publications of International Electro Technical Commission (IEC).

The testing of all electrical equipment as well as the system as a whole shall be carried out to ensure that the equipment and its components are in satisfactory condition and will successfully perform its functional operation. The inspection of the equipment shall be carried out to ensure that all materials, workmanship and installation conform to the accepted design, engineering and construction standards as well as accepted codes of practice and stipulations.

Inspection and testing shall be done in accordance with the IEE Wiring Regulations, the requirements of this Section and as indicated.

Inspection shall include a physical check that all equipment has been securely fixed and that all electrical connections are mechanically sound.

In addition to the test at the completion of each installation, certain tests shall be done during the progress of the Works as required by relevant clauses of these specifications.

B. Information:

For equipment supplied under the contract, the Contractor shall obtain from manufacturers the time/current characteristics of all protective devices for automatic disconnection of supply and provide copies to the Engineer-in-Charge and to the person or persons carrying out the inspection and testing, in addition to meeting the requirements of clause.

C. Testing Methods:

D. The Engineer-in-Charge shall be notified of the method to be used for each type of test and the notification shall be given not less than 28 days before the final tests are to be made. The tests shall be carried out in accordance with the methods set out in the IEE Wiring Regulations, subject to the requirements of following clauses.

E. For testing, continuity of protective conductors and equip-potential bonding AC source shall be used unless the Engineer-in-Charge agrees otherwise.

F. The method used to verify the effectiveness of the protection afforded by a residual current-operated device shall give the operating time and the current used shall not exceed 100% of the nominal setting of the device. For a fault voltage operated device, the test voltage between the exposed conductive part and earth shall not exceed 50 volts. In addition to the tests simulating an appropriate fault condition, any test facility incorporated in the device shall be operated to test its effectiveness.

- G.** High Voltage tests on LV cables and factor assemblies shall comply with the requirements for site testing in the appropriate British Standards.
- H.** Alternative methods to those set out in the IEE Wiring Regulations may be proposed for the approval of the Engineer-in-Charge, but they shall be not less effective than those in the Regulations.
- I.** Where necessary to prevent damage to components of equipment, the equipment shall be disconnected for the duration of the relevant tests.
- J. HT/LT Switchgear**
1. After installation at site, the equipment shall be subjected but not limited to the following tests.
- i) Insulation resistance test with 1000 V megger for main circuits. The minimum value of insulation resistance shall be 1 megohm.
 - ii) Insulation resistance test with 500 V megger for control, metering and relaying circuits. The minimum value of insulation resistance shall be 1 megohm.
 - iii) Relay operation test by secondary injection method.
 - iv) Electrical control, inter lock, sequential operation and Functional test of the control circuits.
 - v) Checking of settings & characteristic test of all relays/releases as per drawings.
 - vi) ON/OFF operation of breakers both manually and electrically in "Test" as well as "Service" positions and for switch fuse units.
 - vii) Earth continuity test between various non-current carrying parts of equipment, steel work, etc. and earth bus provided in panel.
 - viii) Continuity test between incoming and outgoing for all feeders.
 - ix) AC high voltage test on switchgear rated above 1000V AC.
 - x) Construction inspection tests.
 - xi) Calibration test for meters.
- K. Cables/Bus Duct**
1. Tests
- (1) Insulation resistance test with 2500 V megger for high voltage power cables rated above 1.1 kV grade and 1,000V megger for cables/bus duct rated upto 1.1 kV grade.
 - (2) AC high voltage test shall be carried out on all power cables rated above 1.1 kV grade in accordance with IS:7098 (Part II), clause 10.16.
 - (3) Continuity test for all cores and armoure.
 - (4) The cables shall be tested in accordance with the latest applicable standard as specified against each group of cables.
 - (5) The tests shall include all type tests, routine tests and acceptance tests specified in the applicable standards.
 - (6) Tests shall be made immediately on completion of the installation of power cables to demonstrate that the phase sequence is correct at all end connections.
- The over sheaths of cables laid under ground shall be given a voltage withstand test after backfilling of the trenches is complete but before termination.

L. Control And Communication Cables:

- i) Cables shall be tested as soon as their installation is complete to ensure that the cores are continuous and they have not been crossed and the insulation resistance is satisfactory. Insulation tests shall cover all permutations between each conductor, screen, metallic sheath, armour and earth.
 - ii) For polyethylene and dry paper-insulated communications cables, the insulation resistance for each conductor shall be not less than $1500 L$ mega ohms, where L is the cable length in Kilometres. The measured resistance of each conductor shall not exceed the calculated resistance by more than 5%; the calculated value will be made available by the Engineer-in-Charge.
1. Test Reports
 - a) Routine test shall be carried out in presence of Engineer-in-Charge and certificates for each drum of cable employed shall be forwarded to Engineer-in-Charge well in advance before delivery to site. Only those cable drums whose test certificates are cleared by Engineer-in-Charge will be despatched to site. Engineer-in-Charge will not be responsible for any delay on account of non-submission of test reports and rejected items.
 - b) Type test/special test shall be carried out in presence of Engineer-in-Charge and certificates shall be furnished for one drum out of every 10 drums or less for various cable sizes to the Engineer-in-Charge for approval. Engineer-in-Charge will call for type test certificates for any other item at his discretion depending on the manufacturer of various types of cables.

M. Earth Electrode Resistance Test

The earth resistance of the earth electrode is to be measured by an earth testing "Megger" provided with a direct reading ohmmeter. Readings obtained in ohms shall not be more than 1 ohms. If necessary, with the approval of Engineer-in-Charge additional electrode shall be provided away from the resistance are and linked to the electrodes system. Payment for such additional electrode and interconnecting tape/wire will be paid on unit or linear basis.

The measured earth fault loop impedance for each circuit shall be checked against the maximum value as indicated.

Where the maximum value is exceeded the Engineer-in-Charge shall be informed.

1. Insulation Resistance Test

The insulation resistance shall be measured by applying between earth and the whole system of conductors or any sections thereof with all fuses in place and all switches closed, and except in earthed concentric wiring all lamps in position or both poles or the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it need not exceed 500 V for medium voltage circuits. Where the supply is derived from the three wire DC or poly phase AC system, the neutral pole of which is connected to earth direct or through added

resistance, the working pressure shall be deemed to be that which is maintained between the phase conductor and the neutral.

The insulation resistance shall be measured between all conductors connected to one pole or phase conductor of the supply and all the conductors connected to the neutral or to the other pole or phase conductors of the supply with all lamps in position and switches in 'OFF' position. The insulation resistance in Mega ohm measured as above shall not be less than 50 Mega ohm divided by the number of outlets or when PVC insulated cables are used for wiring 12.5 megaohm divided by number of outlets.

2. Testing of Earth Continuity Path

The earth continuity conductor including metal conduits and metallic envelopes of cables in all cases shall be tested to electric continuity and electrical resistance of the earthing lead but excluding any added resistance or earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

All tested and calibrated instruments for testing, labour, materials and incidentals necessary for conducting the tests shall be arranged by the contractor at his own cost. All test results shall be submitted to the Engineer in the prescribed proforma for approval.

N. Earth Electrodes:

1. The resistance of each earth electrode, whether for earthing of protective conductors, lightning protection or an electrical system, shall be checked immediately after installation of the electrodes and the results submitted to the Engineer-in-Charge.

2. Earth Fault loop impedances:

i) The measured earth fault loop impedance for each circuit shall be checked against the maximum value as indicated.

ii) Where the maximum value is exceeded the Engineer-in-Charge shall be informed.

3. Records And Certificates:

i) Inspection and test results shall be recorded on the forms provided by the Authority. Two copies shall be submitted to the Engineer-in-Charge within 7 days of each test.

ii) When all inspections and tests results are satisfactory, a Completion Certificate and an Inspection certificate shall be given to the Engineer-in-Charge not later than the date of completion of the works. The certificates shall be given in the form laid down in the IEE Wiring Regulations for electrical installations and BS 5266 for emergency lighting systems.

iii) The values of prospective short-circuit current and earth fault loop impedance at the origin of the installation shall be recorded on the Inspection certificates.

PREAMBLE TO BILL OF QUANTITIES

1. The Bill of Quantities should be read with all the other sections of this Tender. All the items of work mentioned in the Bill of quantities covered by this contract shall be carried out as per the drawings, specifications and directions of the Owners and shall include the cost of all labour, materials, tools and plants, materials, testing if any with sub-Contractor's testing appliance, all octroi, royalties, taxes and Contractor's profit and overheads etc.
2. The Tenderer shall be deemed to have studied the drawings, specifications and details of work to be done within the time schedule and to have acquainted himself of the conditions prevailing at site. The Quoted Rates shall be applicable for all works in any section/size/shape and Design etc.
3. In case where the specifications given in the Description of the item of work given in Bill of Quantities are found wanting, CPWD General Specification for Electrical Works Part – I (external), 2005 (with upto date corrections slips) shall be followed: where not specified the latest edition of relevant I.S. Specifications shall be applicable. In case of any ambiguity in interpretations the Owners decision shall be final and binding.
4. The rate(s) shall include the cost of providing / executing all ancillary – jobs / activities e.g. necessary Installation of Equipment, Excavation, cable laying, installation and back filling. Primer and painting to all MS/GI works, welding, locking devices to Panel Boards, Testing and Commissioning etc. in any items for the scope of works contained in the tender documents, whether mentioned in description of item of work or not; and the contractor shall make the job complete as per drawings and direction of Engineer-in-charge, and nothing extra shall be payable on all such activities / jobs.
5. The rates quoted for items of work shall include working in all conditions with safety at all heights/depths etc. and shall also include shifting and stacking of equipments and cables as per manufacturer recommendations to the safer place allotted at any time, till the completion of work including all suspension period and delays whatsoever.
6. The Quantities in this schedule are provisional. The Contractor will be paid for the actual quantity of work executed at site at the rates quoted in his tender. The Owner reserves the right to increase or decrease any of the quantities or to totally omit any item of work and no claims by the Contractor on these accounts shall be entertained.
7. All the items of work given in this schedule of quantities shall be executed strictly in accordance with Indian Electricity Rules and requirements of the Electric Supply Authority and British Standards Read in conjunction with the relevant drawings, specifications and the appropriate Indian Standards.
8. The contractor shall visit the site and shall satisfy himself as to conditions under which the wok is to be performed. No extra claim consequence of ignorance or on grounds of insufficient description will be allowed at a later date.

9. No Alteration whatsoever is to be made to the text or quantities of this Bill of quantities unless alteration is authorised in writing by the Owner. Any such alterations, notes or additions shall, unless authorised in writing be disregarded when tender documents are considered.
10. In the event of error occurring to the amount column of the Bill of quantities, as a result of wrong extension unit rate and quantity, the unit rate quoted by the Tenderer shall be regarded as firm and the extension shall be amended on the basis of the rates.
11. All error in totaling in the amount column and in carrying forward totals shall be corrected by owner. Any error in description or in quantity or omission of items from the contract Bill of quantities shall not viiate this contract but shall be corrected and deemed to be a variation required by the owner.
12. Approved make of materials shall be adopted.
13. Any approvals and load sanction required from local authorities shall become part of the contractual obligations of the CONTRACTOR and nothing extra shall be payable to him.

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
STREET LIGHTING WORKS**

STREET LIGHTING : TECHNICAL SPECIFICATIONS

GENERAL

The work shall be carried out in accordance with the specifications given herein. For details not covered in these specifications, CPWD Specifications and relevant IS Codes shall be followed.

A. STREET LIGHT FIXTURES AND POLES

1. STREET LIGHT POLE (3/4 M)

- a. Height : 3 /4 M.
- b. Pole dia : 90 mm (OD) x 3.65 mm thick.
- c. Base plate : 250 x 250 x 12 mm thick 4 nos. 20 holes at 250 PCD M16x 600 bolts.
- d. Support : Rib support for stability.
- e. Junction box : Integral with pole complete with hinged cover openable with Allen Key. JB shall be fitted with MCB connector block for loop in loop out arrangement.
- f. Bracket : 1000 mm long, 48.3 mm OD for fixing light fixtures and 350mm long, 4mm thick, 139.7 OD cap for fixing the bracket to the pole.
- g. Painting : Pu automotive paint for life time performance.
- h. Finish : Glossy.
- i. Paint shade : As approved

2. STREET LIGHT POLE (6 M)

- a. Height : 6 M.
- b. Pole dia : 114.3 mm (OD) x 4.85 mm thick.

- c. Base plate : 250 x 250 x 12mm thick 4 nos. 20 holes at 250 PCD M16x 600 bolts.
- d. Support : Rib support for stability.
- e. Junction box : Integral with pole complete with hinged cover openable with Allen Key. JB shall be fitted with MCB connector block for loop in loop out arrangement.
- f. Bracket : 1000 mm long, 48.3 mm OD for fixing light fixtures and 350mm long, 4mm thick, 139.7 OD cap for fixing the bracket to the pole.
- g. Painting : Pu automotive paint for life time performance.
- h. Finish : Glossy.
- i. Paint shade : As approved.

3. STREET LIGHT POLE (8 M)

- a. Height : 8 M.
- b. Pole dia : 114.3 mm (OD) x 4.85 mm thick.
- c. Base plate : 250 x 250 x 15 mm thick 4 nos. 20 holes at 250 PCD M16x 600 bolts.
- d. Support : Rib support for stability.
- e. Junction box : Integral with pole complete with hinged cover openable with Allen Key. JB shall be fitted with MCB connector block for loop in loop out arrangement.
- f. Bracket : 600 mm long, channel (100mm x 50mm) with holes for fixing flood light fixture (S).
- g. Painting : Pu automotive paint for life time performance.
- h. Finish : Glossy.
- i. Paint shade : As approved.

4. STREET LIGHT POLE (12 M)

- a. Height : 12 M (in two sections of 6 meter each)
- b. Pole dia : 219.1 mm (OD) x 5.5 mm thick (6 meter) and 193.7 mm, 4.85 mm (6 meter)
- c. Base plate : 609 mm dia x 20 mm thick, 4 Nos. 20 dia M16 x 600 mm long bolts.
- d. Support : Rib support for stability.
- e. Junction box : Integral with pole complete with hinged cover openable with Allen Key. JB shall be fitted with MCB connector block for loop in loop out arrangement.
- f. Bracket : 600 mm long, channel (100mm x 50mm) with holes for fixing flood light fixture (S).
- g. Painting : Pu automotive paint for life time performance.
- h. Finish : Glossy.
- i. Paint shade : As approved

B. FEEDER PILLARS

A. FEEDER PILLARS - CONSTRUCTION

1. Enclosure

The type of enclosure shall be able to provide the protection for the following:-

- a. Protection of personnel against contact with live and moving parts inside the enclosure and protection of equipment against ingress of solid foreign bodies.
- b. Protection of equipment against ingress of liquids.
- c. Protection of equipment against mechanical damage.

The degree of protection shall be IP-55 in accordance with IS: 2147-1072.

It shall be in all respect suitable for outdoor installations. It shall be made from a suitable material to withstand rough usage and weather. It shall be of M.S sheets, the thickness of the sheet shall be at least 2.0 mm. in accordance with IS: 1730-1961.

Detachable gland plate (min 3MM thickness) shall be provided at bottom of Feeder Pillar.

2. Painting

Feeder Pillar shall be powder coated of shade RAL 7032 (Siemens grey).

3. Canopy

The top of the pillar shall be fitted with a sloping canopy, the design of which shall be such that rain water shall not accumulate on the top.

4. Doors

Distribution pillars shall have a set of double hinged doors at the front. Similar doors shall be provided at the back also. The doors shall be so fitted as to provide the interior with maximum protection from atmospheric conditions. The hinges shall be of such construction that the doors can be swung open by not less than 150°. In addition the hinged design shall permit doors being completely removed when necessary. The base horizontal member shall be completely removable to facilitate cable jointing. Neoprene gaskets shall be provided for doors.

5. Stand

Feeder pillar stand shall be made out of 50 mm x 50 mm x 6 mm thick MS Channel.

6. Locking

The doors shall be provided with pad locking arrangement.

7. Corrosion Protection

The pillar shall be suitably protected against corrosion.

8. Ventilation

Adequate ventilation shall be provided in the Panel for inlet and exhaust air.

9. Pillar Lighting

A bayonet lamp holder complying with IS : 1258, with a tumbler switch, complying with IS:3854-1966, a three pin plug and socket complying with IS: 1293-1958, with necessary MCB and wiring shall be provided inside the pillar on the front-bottom portion of the shell near the neutral bus bar. Anti condensation heaters of appropriate rating with DP MCB and settable thermostat shall also be provided.

10. Cable Connections

The bottom gland plate shall be in two halves and removable for the sake of easy cable termination and easy working.

11. Incoming and Outgoing Terminals

- a) The terminal shall be of substantial mechanical constructions and shall provide adequate electrical contact for the appropriate size of cable used. The use of aluminium conductors should be taken into account and terminals should be capable of receiving the appropriate size of aluminium conductors.

- b) Terminals connections shall be such that the conductors may be connected by means of screws or other equivalent means so as to ensure that the necessary contact pressure is maintained permanently.
- c) Terminals shall be such that they may not turn or be displaced when the connecting screws are tightened and such, that the conductor may not become displaced.
- d) Terminals shall be so mounted that the appropriate cable may be connected without impairing the normal performance of the unit.
- e) No contact pressure shall be transmitted through insulating material and the gripping of the conductor shall take place between metal faces.
- f) The incoming cables shall be connected to the MCCB terminals.
- g) It shall be possible to safely connect or disconnect the terminals on live circuits.
- h) As principle, 20 percent spare capacity of terminals shall be provided.

12. Bus Bar and Bus Bar Chambers

The bus bar shall be of high conductivity aluminium alloy of E-91 grade and of adequate section. Current density shall be 1.3 sq. mm/Amp. The horizontal bus system shall run suitably in accordance with IS: 375-1963. All connections to individual circuits from the bus bar shall be with solid connections. Bus bars shall be suitably sleeved with PVC sleeves or suitably insulated in an approved manner. The bus bar temperature should not exceed 85°C i.e. 35°C temperature rise over 50°C ambient .

13. Bus Bar Supports and Attachments

Bus bar shall be firmly fixed on supports constructed from SMC glass fibre reinforced thermosetting plastic. The supports shall be sufficiently robust to effectively withstand electro-mechanical stresses produced in the event of short circuit.

14. Connection to Bus Bars

Connections to bus bars ratings more than 200 amp shall be made with clamping arrangement with bolts and nuts and for bus bars of smaller ratings, use of holes drilled into the bus bars may be made.

For interconnection, multistrand copper conductor single core cable with tinned copper lugs shall be used, Bimetallic washers shall be used at bolted joints to avoid heating due to dissimilar metal contact, wherever required.

Further for tapping off connections from bus bars, PVC insulated wire may be used for current capacities upto 100 amps and for higher current capacities solid conductors/strips suitably insulated with PVC sleeves/tape shall be used.

15. Clearances

The minimum clearances to be maintained for open and closed indoor air insulated bus bars/electrically non-exposed and working at system voltages upto 600 volts shall be as follows:

Between	Main Clearances
Phase to Earth	26 mm
Phase to Phase	32 mm

16. Bus Bar Markings

The colours and letters (or symbols) for bus bars :

Bus bar connections shall conform to relevant Indian Standard. A brief from I.S. 375 (revised) is given below:

For AC bus bars and Main Connections.

S.No.	Bus Bar & Main Connection	Colour	Letter/Symbol
1.	Three Phase	Red, Yellow, blue	R, Y, B.
2.	Two Phase	Red, Blue	R, B
3.	Single Phase	Red	R
4.	Neutral Connection	Black	N
5.	Connection to earth	Green	E
6.	Phase variable (Such as connections to reversible motors)	Grey	Gy

17. Phase Sequence and Polarity

Bus bars and main connections, when marked shall be marked in accordance with the following table to indicate the order in which the voltages in phases reach their maximum values.

System	As indicated by Colours or letters	Phase sequence as indicated Vectorially
Three Phase	Red, Yellow, Blue	R, Y, B.
Two Phase	Red, Blue	R, B.

18. Arrangement of Bus bars & Main Connections :

Bus bars and main connections which are substantially in one plane shall be arranged in order given as follows :

a) A.C. System

- The order of phase connections shall be Red, Yellow and Blue.
- When the run of the conductors is horizontal, the red shall be on the extreme left or on the left or farthest away from the centre line as viewed from the front.
- When the system has a neutral connection in the same plane as the phase connections, the neutral shall occupy an outer position.
- Unless the neutral connections can be readily distinguished from the phase connections, the order shall be red, yellow, blue and black.

b. Terminations

Incoming and Outgoing terminals shall be suitable for receiving underground cables.

19. Earthing

- a) The metal casing of the distribution pillar shall be provided with two separate earthing terminals and the framework shall be metallically connected with the casing. These terminals shall be provided over and above all other means provided for securing metallic enclosures (armour or other metallic coverings of current carrying cables).
- b) The earthing terminal shall be readily accessible and so placed that the earth connection of the distribution pillar is maintained when the cover or any other movable part is removed.
- c) The earthing terminals shall be of adequate size, be protected against corrosion and shall be metallically clean. Under no circumstances shall a movable metal part of the enclosure be insulated from the part carrying the earthing terminals when the movable part is in place.

20. Temperature-Rise

- a) Feeder pillars shall be so designed as to ensure that temperature attained by the fuse/link and cable terminals does not exceed the values given in relevant fuse components specifications when tested.
- b) The temperature shall be measured when one outgoing circuit of the distribution pillar is carrying its rated current, and all the remaining outgoing circuits are each loaded to two-third of their rated current.

21. Marking

The following information shall be clearly and indelibly marked on all distribution pillars or on a label permanently attached to it:

- a. Rated voltage.
- b. Total number of outgoing circuit
- c. Total number of incoming circuit.
- d. Rated current of incoming circuit.
- e. Rated current of outgoing circuit.
- f. Whether for use with AC, DC or both.
- g. Manufacturer's name or trade-mark with year of manufacture and Serial No.

Provision shall be made in every distribution pillar to indicate by suitable means, such as labels, the position, the name, and the current rating of each outgoing and incoming circuits. If a label is used it shall be capable of being permanently and securely fixed, preferably inside the case; if it is inside the case the label may be a printed paper label. Where a numbering label is not mounted below the relevant circuit the circuit numbering shall indicate by symbol and/or diagram the relation to the circuit.

Suitable lifting arrangement shall be provided for Pillars.

B. MOULDED CASE CIRCUIT BREAKERS

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS 13947 – Part 2/IES 60947-2 and should have test certificates for breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick make – break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, frame retardant, insulting moulded case with high withstand capability against thermal and mechanical stresses.

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (ICU). MCCB's for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2. 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

a. Current Limiting * Coordination

- The MCCB shall employ maintenance free minimum let-through energies and capable of achieving discrimination upto the full short circuit capacity of the downstream MCCB. The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

b. Testing

- Original test certificate of the MCCB as per IEC 60947-1 & 2 or IS13947 shall be furnished.
- Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- iv. Handle interlock to prevent unnecessary manipulations of the breaker.
- v. Door interlock to prevent the door being opened when the breaker is in ON position.
- vi. Defeat-interlocking device to open even if the breaker is in ON position.
 - The MCCB shall be current limiting type and comprise of quick make-Break switching mechanism. MCCB's shall be capable of defined variable overload adjustment. All MCCB's rated 100Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.
 - All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.
 - The trip command shall override all other commands.

MCCB's upto 250 amps shall be with thermal magnetic and above 250 amps electronic release shall be provided.

C. MINIATURE CIRCUIT BREAKERS

Miniature Circuit Breakers shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCB's shall be classified (B,C,D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

C. LT POWER AND CONTROL CABLES

8. Scope

This specification covers the supply of power and control cables.

Cables shall be tested at works and supplied in accordance with drawings, specifications, relevant Indian Standard Specifications and cable manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

9. Material

c. The LT power cables shall be **XLPE** insulated PVC sheathed, Aluminium conductor armoured cable conforming to IS: 7098 (part - II). The Aluminium conductor shall be stranded, grade H4 class 2 as per IS:8130 and IS 3975 for Armairiry.

d. Cable shall be rated for continuous operation at maximum conductor temperature of 90°C and for a maximum SC Temperature of 250 °C. Sequential marking in cable in meters shall be provided on outer sheath of cable.

Site Temperature - 50°C

Voltage Variation - +- 10%

Frequency Variation - +-5%

Combined voltage & frequency variation - +-10%

c. The LT control cable shall be PVC insulated copper conducted armoured stranded cable.

10. Tests

i. Shop Tests:

The cables shall be subjected to shop tests in accordance with relevant standards to prove the design and general qualities of the cables as below (as per IS 10810):

a. Routine tests on each drum of cables.

b. Acceptance tests on drums chosen at random for acceptance of the lot.

c. Type tests on each type of cable, inclusive of measurement of armour DC resistance of power cables.

ii. Test certificates

Test certificates of all the test carried out at the works shall be furnished for approval of the Engineer-in-charge before the cables are despatched from the manufacturer's works to the site.

Test reports shall be complete with all details and shall also contain IS specified limit values wherever applicable to facilitate review.

11. Drawings, Data and Manuals

Drawings, data and manuals shall be submitted for approval of Engineer-in-charge, for the following:-

- a. Manufacturer's catalogues giving cable construction details and characteristics.
- b. Cable current ratings for different types of installation inclusive of derating factors for ambient temperatures, grouping etc.
- c. Write up on manufacturer's recommended method of splicing, jointing, termination etc of the cables.

12. Design Criteria

- 12.1 The cables will be used for connection of power circuits of the electrical system.
- 12.2 Cables will be generally laid in soft soil and in RCC/Hume/GI pipes.
- 12.3 For continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard and (or this specification).
- 12.4 The insulation and sheath materials shall be tough enough to withstand mechanical stresses during handling.
- 12.5 Armouring shall be single round/flat wire of galvanised steel.
- 12.6 Core identification for multi core cable shall be provided by colour coding.

13. Specific Requirements

- 13.1 Drum length & tolerance: the cables shall be supplied in wooden drums, each containing minimum 500 metres length of cable. Allowable tolerance on individual drum length is $\pm 5\%$.
- 13.2 Cable identification: cable identification shall be provided by embossing on the outer sheath the following at regular intervals of 2/3 metres.
 - a. Manufacturer's name or brand name or trade mark.
 - b. Type of cable and voltage grade.

14. INSPECTION

All cables shall be inspected upon receipt at site and checked by the Engineer-in-charge for any damage during transit.

DATA SHEET (L.T. CABLE)

Sl. No. Description

- 1.0 General
- 1.1 Make
- 1.2 Cable size (no. of core x mm²)
- 1.3 Rated Voltage
- 1.4 Type of cable
 - a) Armoured / Unarmoured
 - b) Earthed / Unearthed
- 1.5 Dielectric strength in kV/mm
- 1.6 Dielectric loss
- 1.7 Heat stability in deg. C
 - a) Under continuous operation
 - b) Under short circuit condition
- 1.8 Current carrying capacity
 - a) In ground
 - b) In duct
 - c) In air
- 1.9 Over load capacity
- 1.1 Short circuit capacity in kA for 1 sec
 - a) Max. overall dia (mm)
 - b) Tolerance on overall dia (mm)
- 1.11 Min. bending radius (cm)
- 1.12 No. of strands / dia of each strand (mm)
- 1.13 Approx. net wt of cable (kg/km)
- 1.14 Safe pulling force when pulled by pulling eye
- 1.15 Oxygen index at 27± 2° C
- 1.16 Max acid gas generation by weight (%)
- 1.17 Voltage developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in V
 - a) Rated current
 - b) SC current
- 1.18 Circulating current developed in screen / armour per 100m run with screen / armour earthed at one end when cable is carrying (for single core cables only) in Ampere
 - a) Rated current
 - b) SC current
- 1.19 Fire resistance requirement

- 1 Applicable standards
- 2 Conductor**
 - 2.1 Material
 - 2.2 Grade
 - 2.3 Shape of conductor
 - 2.4 Director of lay of stranded layers
 - 2.5 Max. DC resistance of cable in Ω/km
 - 2.6 AC resistance of cable in Ω/km
 - a) At 20°C
 - b) At 70°C
 - c) At 90°C
 - 2.7 Reactance of cable at 50 Hz in Ω/km per phase
 - 2.8 Capacitance per phase in $\mu\text{F}/\text{km}$
- 3 Insulation**
 - 3.1 Composition of insulation
 - 3.2 Thickness in mm
 - 3.3 Tolerance of thickness in mm
 - 3.4 Filled or unfilled
 - 3.5 Type or curing
 - 3.6 Min. Insulation resistance at 20°C ($\text{M}\Omega/\text{km}$)
- 5 Inner Sheath**
 - 5.1 Material
 - 5.2 Calculated dia over laid up cores (mm)
 - 5.3 Minimum thickness of sheath (mm)
 - 5.4 Colour of sheath
 - 5.5 Tolerance of thickness (mm)
 - 5.6 Type of filler material
- 6 Armour (In case of armoured cables)**
 - 6.1 Material
 - 6.2 Strip / wire
 - 6.3 Calculated dia of cable over inner sheath (under armour) in mm
 - 6.4 Dimension of strip / wire
 - 6.5 Approx. no. of armour strips / wires
 - 6.6 Cross sectional area (mm^2)
 - 6.7 AC resistance of armour at 80°C
 - 6.8 Direction of lay of armour
- 7 Outer Sheath**
 - 7.1 Material
 - 7.2 Calculated dia over laid up cores (mm)
 - 7.3 Minimum thickness of sheath (mm)

- 7.4 Colour of sheath
- 7.5 Tolerance of thickness (mm)
- 7.6 Temperature withstand capability
- 8 Cable Drum**
- 8.1 Type (wood/steel)
- 8.2 Dimensions
- 8.3 Flange diameter (m)
- 8.4 Barrel diameter (m)
- 8.5 Traverse (m)
- 8.6 Approx. Wt of cable drum with cables
- 8.7 Max / standard length per drum (m)
- 9 De-rating Factor (Enclose Table)**
- 9.1 Variation in ambient air temperature
- 9.2 Variation in ground temperature
- 9.3 Depth of laying
- 9.4 Variation in thermal resistivity of soil
- 9.4 Two cables touching
- 9.5 Three cables touching
- 9.6 Group rating factor for single core cables
- 9.7 Cables laid direct in ground in horizontal formation
- 9.8 Cables laid in ducts in trefoil formation
- 9.9 Cables laid on racks/trays in covered trench with having restricted air circulation, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
- 9.1 Cables laid on racks / trays in open air, trefoils are separated by two cable diameter horizontally and the trays are in tier having 30 cm distance
 - a) Group rating factor for multi-core cables
 - b) Cables laid direct in ground in horizontal formation
 - c) Cables laid direct ground in trefoil formation
 - d) Cables laid on cable trays exposed to air. Cables spaced by one cable diameter and trays are in tiers spaced by 300mm. the clearance between wall and cable is 25 mm.
 - e) Cables laid on cable trays inside cable trench with removable covers on cable trays having restricted circulation. Cables spaced by one cable OD and trays are in tiers spaced by 300 mm. clearance between wall and cable is 25 mm.
 - f) Cables laid on cable trays exposed to air. Cables are touching and trays are in tiers spaced by 300 mm. the clearance between the wall and the cable is 25 mm

Notes : For each grade and size of cable, separate datasheet should be furnished.

**GENERAL & TECHNICAL SPECIFICATIONS
FOR
PUMPING MACHINERY & ALLIED EQUIPMENTS**

SCOPE OF WORK & TECHNICAL SPECIFICATIONS

A. Scope of Work:

This scope of work includes execution of Pumping System and Allied Equipment on 'Turnkey Basis', which shall include but not limited to the following:

- a) Collecting raw water sample from the available source at site and getting it tested from reputed and recognized water test lab as per IS: 10500 Drinking Water Standard.
- b) Process Design for the Water Treatment System
- c) Preparation of general arrangement drawing with sufficient information for the Structural Engineering Consultant to design the civil structure of various components.
- d) **Selection of all mechanical and electrical equipment:** like Pumps, Filters, Dosers, Ultra Filtration System, Motors, pipes, valves and other appurtenances, switchgear, cables etc.
- e) Preparation of detailed engineering drawings including single line diagram showing power and control circuitry, fabrication drawings of the pump control panels, filter vessels etc.
- f) **Supply, Installation, testing and commissioning of Mechanical & Electrical Equipment** as generally described in Bill of Quantities
- g) **Interconnecting Pipe work:** All pipe work within the plant room.
- h) **Electrical Works:**
Pump control panel, all interconnecting power and control cabling for pumps, dosing pumps from control panel to respective motors and drives, interlocking of dosers, level controllers with cabling etc.

Cabling work between the pump room and the sump pump panels spread all over the basement is not included in the scope of this work.
- i) **Testing and commissioning of the Pumping System and Water Treatment Plant (including the cost of the consumables).**
- j) **Operation of plant for three months from the date of commissioning including the cost of consumables.**
- k) **Training the personnel of the Owner for operation and maintenance of the plant.**

- 1) **Maintenance of the pumping system and water treatment plant for 12 months commencing immediately after the commissioning.**

B. RAW WATER CHARACTERISTICS

The contractor has to make arrangement for collecting the ground water sample and getting it tested from the reputed national water test lab as per IS: 10500 Drinking Water Standard.

C. FILTERED WATER REQUIREMENTS

For Fresh Water

Filtration- Filtration is to be done in two parallel streams of equal capacity. There shall be three filter feed pumps (2W+ 1S) common for both the stream

Filtered water characteristics: Filtered water shall, in general, be safe for human consumption and free from all suspended impurities. All parameters shall be as per IS: 10500. (below limits prescribed for 'cause of rejection'). **See Important Note below.**

For Recycled Water

Recycled water will be treated by Disc Filter followed by Ultra Filtration system to be used for flushing.

UF Block:

Recycled water will be polished by Skid Mounted Ultra Filtration System comprising UF Feed Pumps, UF Membranes, CIP Pump, Backwash Pump, Piping, Power and control wiring, Control Panel etc

The equipment shall be selected and designed to further polish the effluent after basic tertiary treatment and render it completely free from suspended solids and odour. The unit shall be mounted on a separate skid with its own control panel.

Desired Treated Effluent Characteristics after Ultra Filtration (UF)

pH	:	7.0 to 8.5
BOD	:	Less than 5 mg/litre
Suspended Solids	:	Less than 1 mg/litre
COD	:	Less than 20 mg/litre
Oil & Grease	:	Less than 1 mg/litre
Colour and Odour	:	Treated Effluent for flushing shall be aesthetically acceptable and odour free

D. TREATMENT SEQUENCE

- a) **Pressure sand filter Based Water Treatment Plant for domestic water**
- b) **Post chlorination on distribution ring main**

TECHNICAL SPECIFICATIONS

1 GENERAL CONDITIONS

1.1 SITE CONDITIONS

It is assumed that before tendering the Contractor would have visited the site and familiarized himself with all the local conditions and means of transportation and communications. No claim of whatsoever nature would be entertained at a later date on account of the Contractor's ignorance of the local conditions.

1.2 STANDARD AND CODES OF PRACTICE

The work shall be carried out as per the enclosed Specifications of Work and Material and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with CPWD specifications, National Building Code 2005, relevant Codes of Practice and Standards as issued by Bureau of Indian Standards (B.I.S.), all with the latest amendments wherever applicable.

1.3 WORKMANSHIP

All the work shall be carried out in a workmanship like manner and as per the best practices of the trade.

2 DRAWINGS AND DOCUMENTS

2.1 General

- i) The Contract Drawings and such other drawings as may be furnished to the Contractor during the progress of the Works shall be considered as illustrating between the Drawings and the Specification, the Contractor shall execute the work in accordance with the decision of the Owner. If modifications are necessary, the Contractor shall submit modifications to the Owner for approval before such modifications are executed.
- ii) All Drawings and Specification are the property of the Owner.
- iii) The Contractor will be required to give and obtain all necessary site and other particulars and to agree such details with the Owner. The Contractor must also obtain details of any other Contractor's work affected by his work and shall work in close co-operation with all such firms or persons concerned.
- iv) The Contractor shall be responsible for any damage caused to buildings and contents and works by reason of, arising out of, or incidental to, or in connection with the execution of any work in the Contract Documents.
- v) The Contractor shall permit nothing to be done which may injure the stability of the Works, or existing buildings and no cutting through floors or walls will be

allowed other than where required by the Drawings, without the sanction of the Owner.

- vi) The Contractor must prepare the shop drawings and shall submit to the Owner for approval, before the work is commenced. Three copies of all working details and installation drawings shall be submitted.

These drawings must be submitted by the Contractor as soon as possible after the order is placed to give ample time for all parties concerned to study and comment thereon.

- vii) The work described on any working drawings submitted shall be carefully checked by the Contractor for all clearances, field conditions, maintenance of architectural conditions and proper co-ordination with all trades on the job. To this end, the Contractor, during the construction drawing stage, shall ensure that he co-ordinates drawings of all other trades that might interfere with the proper installation of his work. No payment shall be made for any variations or alterations on site due to lack of knowledge of other trades. Any unresolved conflict between trades shall be referred to the Owner.

The equipment layout is to be detailed on the drawings, showing the exact method of installing and clearly illustrating components to be used in making all connections.

- viii) Pipe work drawings must be fully detailed, showing all pipe work in double line and indicating the precise size of fittings, valves and equipment, position of hanger supports with reference numbers must be indicated and a large scale detail must be given, showing the type and method of installation of each type of hanger. A schedule is to be included on each drawing, showing details of the type of hanger fixings and references number for each type.

All general layout drawings shall be drawn 1/50 scale, unless agreed otherwise with the Owner.

- ix) The Contractor shall provide a detailed programme incorporating working drawing production, which can be read in conjunction with the building construction programme.
- x) The Contractor shall prepare schedules and drawings showing precise details of holes in concrete, block works etc., base frames or support required and the like. The schedules shall show in detail the builder's work required to be performed by all other trades for the mechanical and electrical installations. These drawings and schedules, in an approved form, must be submitted to the Owner well in advance and his approval must be obtained before any structural work requiring holes or other modifications is constructed.

- xi) Signed and approved drawings will not be departed from unless a signed variation or omission certificate is issued in writing by the Owner. Drawings returned to the Contractor for alteration or amendment shall be re-submitted to the Owner for approval.

Amended or altered drawings shall show the nature of the amendment or alteration in a revision block on the drawing, together with the revision number or letter and the date of the revision.

- xii) Should the Contractor prove unable to produce satisfactory "Working Drawings" or be unable to produce drawings to conform to the progress of the work, the Owner reserves the right to take whatever steps are necessary to have drawings undertaken by others and debit the Contractor's account.

Any decision taken by the Owner to have working drawings produced elsewhere will not relieve the Contractor of his contractual obligations and the Contractor must provide to the Owner all necessary details, physical dimensions, descriptive literature, etc., of all equipment to be incorporated on drawings within 10 days of a request from the Owner.

2.2 Manufacturers' Data

- i) Manufacturers' performance data, certified factory drawings of plant and machinery, giving full information as to capacity, dimensions, materials and all information pertinent to the adequacy of the proposed equipment shall be submitted for approval.

Manufacturer names, sizes, catalogue numbers and/or samples of all materials shall be submitted for approval.

Submittals and working drawings should, as far as possible be complementary so that drawings and submittals can be cross checked.

- ii) The copy of the placement of order with the manufacturer of the equipment shall be submitted to the Owner for his approval and must be accompanied by relevant drawings, technical data, catalogues and samples, where data, certified drawings or other required information is not available until after orders have been placed, the Owner will give provisional approval until all requested drawings and information have been supplied to the Owner and approved by him. It is the Contractor's responsibility to ensure that all necessary information is supplied to the Owner in accordance with the progress of the work.

2.3 Operating and Maintenance Manual

- i) The Contractor shall furnish six copies in bound form of an instruction manual containing all information applicable to this section of the Works. This manual is to be similar in design and content to those to be provided under other services.

The manual shall contain a comprehensive written description of the Works, outlining the operation of the systems and maintenance procedures.

2.4 "As Installed " Drawings

- i) The Contractor shall arrange to keep on Site a full set of drawings showing the progress of the Works, which must be kept upto date.

The Contractor shall keep a record as the work proceeds of any work installed not in accordance with the drawings. On completion of the Works the Contractor shall supply three clear coloured prints of each applicable drawing, showing the exact position of all apparatus, pipe lines, services, control valves, switchgear, etc., together with diagrams, schedules, etc. to the Owner's requirements and in addition one complete set of plastic negatives and soft copy on compact disk (CD).

The word "AS INSTALLED DRAWINGS" shall be clearly indicated on all drawings adjacent to the title block.

2.5 DISCREPANCIES IN THE DRAWINGS

Should there be any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Owner and his decision would be final and binding on the Contractor.

2.6 INSTRUMENTS FOR MEASUREMENT AND TESTING

The Contractor shall provide, free of cost, all equipments, instruments, labour and all other allied assistance required by the Owner or their representatives for measurement and testing of the works.

2.7 CO-ORDINATION WITH OTHER TRADES

The Contractor shall be responsible for coordinating this work with works of other trades sufficiently ahead of time to avoid unnecessary hold ups. Hangers, sleeves, recesses etc. shall be left in time as the work proceeds.

2.8 PROTECTION

All work shall be adequately protected, to the satisfaction of the Owner so that the whole work is free from the damage throughout the period of construction upto the time of handing over.

Special care must be taken to prevent damage and scratching of all fittings and fixtures. Tool marks on exposed fixtures shall not be accepted. Protective paper on fixtures shall be removed with hot water only at the final completion of the work.

Before handing over the work, the Contractor shall clean all elements of the complete installation, remove plasters, splashes, stickers, rust stains and all other foreign matter

and leave every part in acceptable condition and ready for use to the satisfaction of the Owner.

3 HORIZONTAL CENTRIFUGAL PUMPS

3.1 DESIGN REQUIREMENTS

- a) The pump shall be capable of developing the required total head at rated capacity for continuous operation. The pumps shall operate satisfactorily at any point on the Head-Discharge (H-Q) characteristic curve over a range of 50% to 130% capacity (for pumps other than fire pumps).
- b) The total head capacity curve shall be continuously rising towards the shut off. The shut off head shall be at least 110% of the total head. The pump should deliver at least 125% of its rated capacity at 75% of the specified total head (for pumps other than fire pumps).
- c) Fire pumps shall be capable of furnishing not less than 150% of rated capacity at a head of not less than 65% of the rated head. The shut off head shall not exceed 120% of rated head.
- d) The required NPSH at duty point shall be at least 1.0M less than the available NPSH.
- e) Pumps shall run smooth without undue noise and vibration. The velocity of vibration shall be within 4.5 mm/sec. The noise level shall be limited to 85 dBA at a distance of 1.8M.
- f) The power rating of the pump motor shall be the larger of the following :
 - i) The maximum power required by the pump in the entire operating range.
 - ii) 115% of the power required at the duty point. Power requirement shall be worked out considering 1% negative tolerance on quoted figure of efficiency.

3.2 FEATURES OF CONSTRUCTION

- a) Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. Components of identical pump shall be interchangeable.
- b) Impeller shall be enclosed type, securely keyed to the shaft. Means shall be provided to prevent loosening during operation including rotation in reverse direction.
- c) Pump shall be provided with renewable type casing ring.
- d) The first critical speed of the pump rotor shall be at least 30 percent above the operating speed.
- e) Replaceable shaft sleeves shall be provided to protect the shaft where it passes through stuffing boxes.
- f) Stuffing boxes shall be of such design that they can be repacked by removing the gland and lantern ring.
- g) Pump shall be furnished complete with flexible coupling.
- h) Coupling guard, bolted to the base plate shall be furnished.

- i) The base plate for pump and motor shall be common. Suitable holes shall be provided for grouting. Foundation bolts shall be complete with nuts and washers.
- j) Suction and discharge connections shall be flanged.
- k) Pump impeller shall be dynamically and statically balanced.
- l) All accessories required for proper and safe operation shall be furnished with the pump.
- m) Wherever, mechanical seal has been asked for in Bill of Quantities, it shall be factory fitted at manufacturer's works.

3.3 MATERIALS OF CONSTRUCTION

Corrosion Resistant in general

- a) Casing : Cast Iron
- b) Impeller : Stainless Steel /Bronze
- c) Shaft : Stainless Steel
- d) Seal : Mechanical Seal
- e) Base Plate : CI/MS fabricated

4 INDUCTION MOTORS

4.1 DESIGN REQUIREMENTS

The Motors shall generally conform to IS:325. In addition, the motors shall also meet the specific requirements as mentioned below.

4.2 PERFORMANCE CHARACTERISTICS

- a) Motors shall be capable of giving rated output, without reduction in the expected life span when operated continuously under the following supply conditions :
Supply Condition
 - i) Variation in Supply Voltage +/- 10%
 - ii) Variation in Supply Frequency +/- 5%
 - iii) Combined Voltage and Frequency Variation +/- 10%
- b) Motors shall be suitable for full voltage direct-on-line starting or star-delta starting or any other method of starting as specified in "Equipment Parameters". When slipring motors are specified, liquid rotor starter shall be as per clause 128.
- c) Motors shall be capable of starting and accelerating the load with the applicable method of starting, without exceeding acceptable winding temperatures, when the supply voltage is 85% of the rated motor voltage.
- d) The locked rotor current of the motor shall not exceed 600% of full load current (subject to tolerance as per the applicable standard) unless otherwise specified.

- e) Motors shall be designed to withstand 120% of rated speed for two minutes without any mechanical damage, in either direction of rotation.
 - f) The guaranteed performance of the motor shall be met with tolerance specified in applicable standard.
- 4.3 INSULATION
- a) Any joints in the motor insulation such as at coil connections or between slot and end winding sections, shall have strength equivalent to that of the slot sections for the coil.
 - b) The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot, humid and tropical climate.
 - c) The motors shall be provided with Class F insulation with temperature rise limited to that of class B insulation.
- 4.4 CONSTRUCTIONAL FEATURES
- a) The motor construction shall be suitable for easy disassembly and reassembly. The enclosure shall be sturdy and shall permit easy removal of any part of the motor for inspection and repairs.
 - b) Motors weighing more than 25 kg. shall be provided with eyebolts, lugs or other means to facilitate safe lifting.
 - c) The rotor bars shall not be insulated in the slot portion between the iron core laminations for squirrel cage motors.
 - d) **Bearing :**
 - i) Greased ball bearings or roller bearings shall be of reputed make.
 - ii) The bearings shall be so constructed that the loss of lubricating fluid is kept to a minimum and greasing shall be possible without any dismantling operation.
 - e) **Terminal Box :**
 - ii) Terminal boxes shall be of weather proof construction designed for outdoor service. To eliminate entry of dust and water, gaskets of neoprene or approved equivalent mentioned shall be provided at cover joints and between box and motor frame.
 - iii) The terminal box shall be suitable for bottom entry of cables.
 - iv) The terminal box shall be capable of being turned through 360 degrees in steps of 90 degrees/180 degrees.
 - v) The terminals shall be of the stud type with necessary plain washers, spring washers and check-nuts. They shall be designed for the current carrying capacity and shall ensure ample phase to phase and phase to ground clearances.
 - vi) Suitable cable glands and cable lugs shall be supplied to match specified cables.
 - f) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection. These earthing points shall be in addition to earthing stud provided in the terminal box.

5 FULL WAY BALL VALVE

The valves shall be of full bore type and of quality approved by the Consultant/Owner.

5.1 MATERIALS OF CONSTRUCTION

- | | | | |
|----|-----------|---|---------------------------------------|
| a) | Body | - | Nickel plated brass/ nonferrous alloy |
| b) | Ball | - | Forged Brass |
| c) | Seat | - | Virgin PTFE |
| d) | Stem Seal | - | Nitrile Rubber |

6 BUTTERFLY VALVES

The valve shall of cast iron conforming to relevant IS:13095. The valve shall be of quality approved by the consultant/Engineer-in-charge.

6.1 MATERIALS OF CONSTRUCTION

- | | | | |
|----|------------|---|------------------------|
| a) | Body | - | Cast Iron |
| b) | Shaft | - | Carbon steel |
| c) | Body Liner | - | EPDM /nitrile rubber |
| d) | Disc | - | Epoxy Coated C.I./D.I. |

7 NON-RETURN VALVES – DUAL PLATE (WAFER TYPE) CHECK VALVE

The valve shall be of quality approved by the consultant/Engineer-in-charge.

7.1 MATERIALS OF CONSTRUCTION

- | | | | |
|----|-------|---|----------------------------|
| a) | Body | - | Cast Iron |
| b) | Shaft | - | Carbon steel |
| d) | Disc | - | Stainless Steel (AISI 316) |

8 PIPES AND FITTINGS

8.1 PIPE WORK

8.1.1 Materials

The pipe work shall be done in black mild steel pipes of 'Heavy' grade conforming to IS:1239 (Part I)-1990 for upto 150 mm dia pipe and IS:3589-1991 for pipes above 150 mm dia.

All fittings shall be of mild steel of suitable grade conforming to relevant Indian Standards All fittings shall have manufacturer's trade mark stamped on it. Fittings in M.S. pipe lines shall include elbows, tees, bends, reducers, nipples, union bushes, G.I. clamps of approved design, M.S. flanges with 3 mm rubber insertion, nuts, bolts, washers etc.

Screwed fittings shall be approved type black malleable hexagonal on all ends of the fitting suitable for screwed joints.

For welded joints forged steel fittings of approved type with "V" groove shall be used.

Fabricated fittings shall not be permitted generally. However, if use of any fabricated fitting is found necessary by the Project Manager, fabrication of such fitting shall be taken up by the Contractor on the written directives of the Project Manager in a workshop following proper welding procedures. For fabricating a 'Tee' connection pipes shall be drilled and reamed and joint only welded. Gas cutting of pipes shall not be permitted. Fabricated 'Tee' out of M.S. plates shall not be used.

All fittings shall be tested at manufacturer's work. The Contractor may be required to produce certificate to this effect from the manufacturers.

8.1.2 Jointing

The pipes and fittings upto 50 mm diameter shall be threaded joints using Teflon Tape on the threads. Joints for pipe and fittings above 50 mm diameter shall be welded joints. Care shall be taken to remove any burr from the end of the pipe after cutting..

8.1.3 Welded Joints

8.1.3.1 General

The welding of pipes in the field should comply with IS:816, 1969. Electrodes used for welding should comply with IS:814, 1991.

Joints between M.S. pipes and fittings shall be made with pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. Butt welded joints shall not be acceptable. Care shall be taken to remove any burr from the end of the pipe after cutting.

All welders must be fully qualified and proof of an operator's qualification shall be either the Contractor's record of suitable tests passed within the previous six months or tests made before the commencement of the work.

The Contractor must submit to the Owner the names of the welders who will be employed on the work, together with documentary evidence of their competency.

Any welder considered by the Owner as not having the skill necessary for the work will at once be barred from further welding on the site or in the Contractor's workshop.

The Owner may instruct the Contractor to cut out typical welded joints for inspection and the Contractor shall include for the removal of such pieces and re-making joints to the satisfaction of the Owner. The Contractor shall include in his Tender for the cost of removing all such pieces for inspection and re-making joints.

Care must be exercised by the Contractor to ensure that the welding flux does not project into the bore of the tube. All welds shall be good, clean metal, free from slag

inclusions and porosity, of even thickness and regular contour, well fused with the parent metal and finished smooth.

Where site welding is carried out in proximity to inflammable materials, the Contractor must take special precautions to protect the materials from risks of fire.

8.1.3.2 Testing of Welded Joints

The welded joints shall be tested in accordance with procedure laid down in IS:3600 (Part I) : 1985. One test specimen taken from at least one field joint out of any 10 shall be subjected to test.

If the results of the tensile test do not conform to the requirements specified, retests of two additional specimen from the same section shall be made, each of which shall conform to the required specifications. In case of failure of one or two, extensive gouging (scooping out) and repairing shall be carried out as directed by the authority.

If internal pressures exceed 1.5 MPa (15 kgf/cm²), special attention should be given to the assembly of the pipe and the first run of weld.

Non-destructive testing of the completed weld may be carried out on pipe-lines by radiographic (see IS:4853 : 1982) or ultrasonic method (see IS:4260, 1986) as agreed upon between the Owner and the Contractor.

8.1.4 Screwed Joints

Joint for black steel pipes and fittings shall be metal to metal threaded joints using Teflon tape on the threads.

8.1.5 Flanged Joint

M. S. Flanges shall be as per IS: 6392 and shall be faced. Rubber or asbestos gasket shall be inserted between the joints.

Flange shall be provided on :

- a) Straight runs not exceeding 12-15 m on pipe lines 80 mm dia and above.
- b) Both ends of any fabricated fittings e.g. bends, tees etc. of 65mm or larger diameter.
- c) For jointing all type of valve, appurtenances, pumps, connection with other type of pipes, to water tanks and other places necessary and required as per good for engineering practice.

8.1.6 Unions

Provide approved type of dismountable unions on pipes lines 65 mm and below in similar places as specified for flanges.

8.1.7 Laying and Fixing

- a) Above Ground :

Exposed pipes on walls and ceilings shall be fixed with standard pattern G.I. holder bat clamps on angle iron frames embedded in walls or suspended from

ceiling. The clamps shall be spaced at regular intervals in straight lengths as per the following table :-

Dia of Pipe (mm)	Horizontal Length (M)	Vertical Length (M)
25	2.4	3.0
32	2.7	3.0
40	3.0	3.6
50	3.0	3.6
65	3.6	4.5
80	3.6	4.5
100	4.0	4.5
150	4.5	5.4

Additional supports are to be provided at every change of directions and branch-offs

b) **Anchor Blocks**

Suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer and high pressure should be provided at all bends, tees and such other locations as directed by the Owner. Exact location, design, size and mix of the concrete block shall be approved by the Architect / Consultant prior to the execution of the work.

9 **SUMP PUMPS**

- a) The pumps shall run smooth without undue noise and vibration.
- b) The power rating of the pump motor shall not be less than the maximum power required from zero discharge to zero head.
- c) Pump shall be vertical, centrifugal, single stage, nonclog type.
- d) It shall be suitable for handling turbid water containing stringy materials.
- e) The pump shaft journal bearings shall preferably be grease lubricated. No external water will be made available for the lubrication of the bearings.
- f) Delivery piping with gun metal stainless steel non-return valve shall be supplied.
- g) Delivery pipe shall be as per IS:1239, heavy class.
- h) The maximum suspension length of pumps shall be 1.5 metre.
- i) Pump shall be operated automatically by providing magnetic float operated level controllers.

9.1 **MATERIALS OF CONSTRUCTION**

Materials of construction in general shall be as follows unless specified otherwise in Bill of Quantities :

- a) Casing : Cast Iron
- b) Impeller : Cast Iron
- c) Shaft : Carbon Steel
- d) Cover Plate : Steel

10 SUPPORT OF PIPEWORK AND VALVES

All necessary supports, saddles, slings, fixing bolts and foundation bolts shall be supplied to support the pipework and its associated equipment. Valves and other devices mounted in the pipe work shall be supported independent of the pipes to which they connect.

11 PUMP CONTROL PANELS

11.1 GENERAL

Pump control Panels are to be suitable for 3 phase 4 wire 415 Volts 50 Hz system with a fault level of 31MVA at 415 volts.

Panels are to be metal clad, cubicle type totally enclosed, floor mounted and air insulated. The total height of the switchboard is to be not more than 2100 mm. Panels are to be extensible on both sides and shall conform to IP - 43 as per IS :2147

11.2 STANDARDS

The equipment shall be designed to conform to the requirements of :

- i) IS : 8623 - Factory built assemblies of switchgear and controlgear.
- ii) IS : 13497 - General requirements for switchgear and controlgear for voltages not exceeding 1000 Volts.
- iii) IS : 2147 - Degrees of protection provided by enclosures for low voltage switchgear and controlgear.
- iv) IS : 375 - Marking and arrangement of busbars.

Individual equipment housed in the power control centre shall conform to the following IS specifications.

- i) Fuse Switch & Switch Fuse Units - IS : 13947
- ii) Air Circuit Breakers - IS : 13947
- iii) Moulded Case Circuit Breaker - IS : 13947
- iv) H.R.C. Fuselinks - IS : 9224
- v) Current Transformers - IS : 2705
- vi) Voltage Transformers - IS : 3156
- vii) Relays - IS : 3231
- viii) Indicating Instruments - IS : 1248
- ix) Integrating Instruments - IS : 722
- x) Control Switches & Push Buttons - IS : 6875
- xi) Auxiliary Contactors - IS : 2959, IS : 6875

11.3 CONSTRUCTION DETAILS

Cubicle shall be mounted on a base folded channel. All doors, sidewalls and interior separations shall be of CRCA MS sheet of 1.5/2MM thickness. CRCA sheets of 2mm thickness for load bearing members and 1.5mm for non-load bearing members. Insulation barriers and protective screens shall be provided wherever required.

Apparatus forming part of the power control centres shall have the following minimum clearances:

- | | | |
|--------------------------------|---|--------|
| i) Between phases | - | 25 mm. |
| ii) Between phases and neutral | - | 25 mm. |
| iii) Between phases and earth | - | 25 mm. |
| iv) Between neutral and earth | - | 19 mm. |

Creepage distances shall comply with those specified in relevant standards.

11.4 MOULDED CASE CIRCUIT BREAKERS

MCCB shall conform to IS - 13947 and be rated for the currents as shown on the single line diagram. They shall have a short circuit rating as specified elsewhere.

All MCCB shall be provided with an adjustable thermal overload trip device together with an adjustable magnetic short circuit release. The MCCB shall have a trip free toggle mechanism, and dolly shall come to midway position and the trip operates.

The operating mechanism shall be quick make and quick break and trip free and contacts shall be single break type with arcing contacts located within arc chutes.

The MCCB shall be suitable for both vertical and horizontal mounting.

11.5 CURRENT TRANSFORMERS

Current transformers shall be of the ring type suitably fixed between insulating pieces and clamped. They shall conform to the requirement of IS : 2705 and shall have current ratio and outputs and accessories as specified.

11.6 INSTRUMENTS

Indicating instruments shall be flush mounting type square of required size and conforming to the requirement of IS : 1248.

11.7 BUS BARS

The bus bar shall be of copper strip (unless specified otherwise in Bill of Quantities) designed for a continuous current of specified rating and fabricated from bars conforming to high purity electrical grade copper. Each bar shall be provided with flexible expansion links as approved.

The bars shall be suitably supported with fibre glass reinforced epoxy supports to withstand the short circuit forces possible.

Bimetallic washers shall be provided for joining of dissimilar metals electrically.

11.8 CONTROL WIRING

- i) All control wiring shall be carried out with 1100V grade single core PVC cable conforming to IS : 694 having stranded copper conductors of minimum 1.5 sq.mm. section potential circuits and 2.5 sq.mm. section for current transformer circuits.
- ii) Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.
- iii) Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type and of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.
- iv) All control circuit fuses shall be mounted in front of the panel and shall be easily accessible.

11.9 LABELS

Labels shall be of anodized aluminium, with white engraving on black background. They shall be properly secured with fasteners.

11.10 TESTS

The design of the Power Control Centres shall have been type-tested in accordance with following sections of Cl.8 : 1:1 of IS : 8623 :

- a) Verification of temperature rises limits.
- b) Verification of dielectric properties.
- c) Verification of short circuit strength.

Routine tests shall be conducted on each Power Control Centre in accordance with Cl. 8 : 1 : 2 of IS : 8623 and shall comprise :

- i) Inspection of the Power Control Centre is including inspection of wiring and electrical operational tests where necessary.
- ii) Dielectric tests.
- iii) Checking of Protective Measures and electrical continuity of the protective circuits.

11.11 METAL TREATMENT AND FINISH

All steelwork used in the construction of the switchboards should have undergone a rigorous metal treatment process as follows :

- i) Effective cleaning by hot alkaline degreasing solution followed by cold water rinsing to remove traces of alkaline solution.

- ii) Pickling in dilute sulphuric acid to remove oxide scales and rust formation, if any, followed by cold water rinsing to remove traces of acidic solution.
- iii) A recognised phosphating process to facilitate durable coating of the paint on the metal surfaces and also to prevent the spread of rusting in the event of the paint film being mechanically damaged. This again, shall be followed by hot water rinsing to remove traces of phosphate solution.
- iv) Passivating in de-oxalite solution to retain and augment the effects of phosphating.
- v) Drying with compressed air in a dust-free atmosphere.
- vi) Powder coated to the specified shade of IS : 5. The total thickness of paint should not be less than 25 microns.

11.12 L.T. SWITCHGEARS

Commissioning checks and tests shall include all wiring checks and checking up of connections. Primary/secondary injection tests for the relay adjustment/setting shall be done before commissioning in addition to routine meggar test. Checks and tests shall include the following.

- a) Operation checks and lubrication of all moving parts.
- b) Interlock function checks, if any
- c) Continuity checks of wiring, fuses etc. as required.
- d) Insulation test: when measured with 500V meggar the insulation resistance shall not be less than 100 mega ohms.
- e) Trip tests and protection gear test.

12 CABLING

12.1 STANDARDS & CODES

This section covers the specifications for supply and laying of Medium Voltage cables.

All equipments, components, materials and entire work shall be carried out in conformity with applicable and relevant Bureau of Indian Standards and Codes of Practice, as amended upto date and as below. In addition, relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended upto date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and /or IEC Standards shall be applicable.

Equipments certified by Bureau of Indian Standards shall be used in this contract in line with government regulations. Test certificates in support of this certification shall be submitted, as required.

It is to be noted that updated and current standards shall be applicable irrespective of dates mentioned along with ISS's in the tender documents.

PVC insulated heavy duty cables	IS 1554 – 1988
Code of practice for installation and maintenance of power cables	IS 1255 – 1983
Conductors for insulated electrical cables	IS 8130 – 1984
Drums for electrical cable	IS 10418 – 1982
Methods of test for cables	IS 10810 – 1988
Recommended current rating	IS 3961 – 1987
Recommended short circuit rating of high voltage PVC cables	IS 5891 – 1970

12.2 DELIVERY, STORAGE AND HANDLING

Cables shall be delivered at site in original drums with manufacturer's name clearly written on the drum. Manufacturers recommendation particularly in respect of sealing shall be strictly followed. Cable drum shall be stored on a well drained, hard surface, preferably of concrete, so that the drums do not sink in ground causing rot and damage to the cable drum. The cable drum shall conform to IS 10418.

During storage, periodical rolling of drums, in the direction of arrow marked on the drum, shall be done once in 3 month through 90° C. Both ends of cables shall be properly sealed to prevent moisture ingress. Drums shall be stored in well ventilated area protected from sun and rain. Drums shall always be rested on the flanges and not on flat sides. Damaged battens of drums etc. shall be replaced.

Movement of drums shall always be in direction of the arrow marked on the drum. For transportation over long distance, the drums shall either be mounted on drum wheels and pulled by ropes or they shall be mounted on trailers etc. drums shall be unloaded preferably by crane otherwise they shall be rolled down carefully on suitable ramps. While transferring cable from 1 drum to another, the barrel of the new drum shall have diameter not less than the original drum. Cables with kinks or similar visible defects like defective armouring etc shall be rejected. Cables shall be supplied at site in cut pieces as per actual requirements.

12.3 CABLES

Medium voltage cables shall be aluminum conductor PVC insulated, PVC sheathed armoured conforming to IS 1554. Cables shall be rated for a 1100 Volts.

The conductor of cables from 16 Sq. mm. to 50 Sq. mm. shall be stranded. Sector shaped stranded conductors shall be used for cables of 50 sq. mm and above. Conductors shall be made of electrical purity aluminium $\frac{3}{4}$ H or H temper.

Conductors shall be insulated with high quality PVC base compound. A common covering (bedding) shall be applied over the laid up cores by extruded sheath of unvulcanised compound. Armouring shall be applied over outer sheath of PVC

sheathing. The outer sheath shall bear the manufacturer's name and trade mark at every meter length. Cores shall be provided with following colour scheme of PVC insulation.

1	Core	:	Red/Black/Yellow/Blue
2	Core	:	Red and Black
3	Core	:	Red, Yellow and Blue
3	½ /4 Core	:	Red, Yellow, Blue and Black

12.4 LAYING OF CABLES

12.4.1 General

Cables shall be so laid that the maximum bending radius is 12 times the overall diameter of the cable for medium voltage cables and 15 times the overall diameter for 11 kV cables. Cables shall be laid in masonry trenches, directly on walls/cable trays, directly buried in ground or in pipes/ducts as elaborated below. Cables of different voltages and also power and control cables shall be laid in different trenches with adequate separation. Wherever available space is restricted such that this requirement can not be met, medium voltage cables shall be laid above HT cables.

12.4.2 In Masonry Trenches

Wherever so specified, cables shall be laid in indoor/outdoor masonry/RCC trenches with chequered plate/RCC covers to be provided by OWNER. Cables shall be laid on painted MS supports of approved design grouted in trench walls at intervals not exceeding 600 mm. If required, cables shall be arranged in tier formation inside the trench. Cables shall be dressed properly so that the clear spacing between the cables shall not be less than the diameter of the cable. Suitable clamps, hooks and saddles shall be used for securing the cables in position. The cost of supplying and fixing cable support work shall be deemed to be included in the rates for laying of cables. Complete details of this support work shall be shown in shop drawings to be prepared by the Contractors and submitted for Owner's/ approval before execution. Works shall be carried out only as per approved shop drawing. Wherever so specified, trenches shall be filled with fine sand.

12.4.3 On Trays/Walls

Wherever so specified, cables shall be laid along walls/ceiling or on cable trays. Cable shall be secured in position and dressed properly by means of suitable clamps, hooks, saddles etc. such that the minimum clear spacing between cables is diameter of the cable. Clamping of cables shall be at minimum intervals as below.

Type of cables	Size	Clamping by	Fixing intervals
MV	Upto and including 25 sq mm	Saddles 1 mm thick	45 cm
MV & HV	35 sq mm to 120 sq mm	Clamps 3 mm thick 25 mm wide	60 cm
MV & HV	150 sq mm and above	Clamps 3 mm thick 40 mm wide	60 cm

Note: The fixing intervals specified apply to straight runs. In the case of bends, additional clamping shall be provided at 30 cm from the center of the bend on both sides.

12.4.4 Cable Trays

Cable trays, of sizes as per schedule of quantities and drawings, shall be of doubled bend channel design unless otherwise stated. Cable trays shall be fabricated from minimum 2 mm thick perforated sheet steel and shall be complete with tees, elbows, risers, and all necessary hardware. Trays shall be galvanized or painted as specified. Cable trays shall be erected in perfect level and plumb and shall comply with the following:

Trays shall not have sharp edges, burrs or projections injurious to cable insulation.

Trays shall include fittings such as bends, risers etc. for changes in direction and elevation.

Trays shall be supported adequately at minimum 1 m distance from the building structure by means of painted/galvanized MS structural members secured to the structure by dash fasteners or by grouting. The entire cable tray system shall be rigid. Cost of support arrangement shall be included in the rates quoted for supply and installation of trays. Complete details of this support arrangement shall be shown in shop drawings to be prepared by the Contractors and submitted for Owner's approval before execution. Works shall be carried out only as per approved shop drawing.

Each run of cable tray shall be completed before laying of cables.

Cable trays shall be exposed and accessible.

12.4.5 Laying in Pipes/Closed Ducts

In locations such as road crossings, entry to buildings/poles in paved areas etc., cables shall be laid in pipes or closed ducts.

Spun reinforced concrete pipes shall be used for such purposes and the pipe shall not be less than 100 mm in diameter for a single cable and not less than 150 mm for more than one cable.

These pipes shall be laid directly in ground without any special bed. Sand cushioning and/or brick tiles need not be used in such installations.

Unless otherwise specified the top surface of pipes shall be at a minimum depth of 1000 mm from the ground level when laid under roads, pavements etc.

The pipes for road crossings shall preferably be on the skew to reduce the angle of bend as the cable enters and leaves the crossing.

Pipes shall be continuous and clear of debris or concrete before cable is drawn. Sharp edges at ends shall be smoothed to prevent injury to cable insulation or sheathing.

No deduction shall be made for sand and bricks not used for cables passing through RCC Hume pipes or for parts of vertical cables at the lighting poles.

12.4.6 Laying of Cables in Floors

Laying of cables directly in floors shall be avoided and GI pipes of adequate size shall be used wherever necessary. However if the cables have to be laid direct in the floor specific written approval of OWNER shall be obtained and the Contractor shall cut chases, lay the cables and make good the chases to original finish.

12.4.7 Cable Entry into Buildings

Cable entry into buildings shall be made through RCC pipes recessed in the floor. RCC Hume pipes shall be provided well in advance for service cable entries. The pipe shall be filled with sand and sealed at both ends with bitumen mastic to avoid entry of water. Suitable size manholes shall be provided wherever required to facilitate drawing of cables as per requirements.

12.4.8 Cable Joints

Cable joints shall be resorted to and permitted only if length of cable run is more than standard cable drum length. Cable joints shall not be permitted in any other circumstances. Wherever unavoidable these joints shall be made with specific approval of OWNER, and shall form a part of cable run.

12.4.9 Measurement of Cable Runs

The cable runs shall be measured upto the outer end of the boxes without any allowances for over lap in joints. The actual run of the cables shall be measured and the rate shall include all the above mentioned material, labour etc for laying as required.

12.4.10 Cable Loops

At the time of the installation approximately 3 meters of surplus cable shall be left as below or as directed by Engineer-in-charge.

- at each end of the cable
- on each side of underground straight through/tee/termination joints.
- at entries to buildings

This cable shall be left in the form of a loop.

Wherever long runs of cable length are installed cable loops shall be left at suitable intervals as specified by the Owner.

12.4.11 Termination/Joining of Cables

Soldered jointing/termination shall be totally avoided. Solderless terminations by using Dowel crimping tools and suitable lugs shall be adopted for all cable

terminations. Double compression brass glands shall be used. Any termination without use of proper crimping tool shall be liable to be rejected.

In the case of aluminium conductors, it is to be ensured that the conductor oxidation is cleaned by means of emery paper and then a thin coat of tin is applied before pinching into any equipment.

12.5 TESTING OF CABLING

Tests at Manufacturer's Works

12.5.1 Type Tests

Cables shall be subjected to type tests and acceptance test at manufacturers work as per IS : 1554 – 1988 carried out in accordance with appropriate parts of IS : 10810 – 1984. Copies of the type test reports shall be furnished if so required

12.5.2 Routine Test

Cables shall be subjected to routine test as per IS : 1554 – 1988, as below.

- a) Conductor resistance test
- b) High voltage test at room temperature.

Copies of routine tests carried out at manufacturers works shall be furnished alongwith the cables

Testing at Site

12.5.3 Before Laying

All cables before laying shall be pressure tested for one minute with 1000 volts megger. Cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/armour and insulation resistance between conductors

12.5.4 After Laying

After laying and jointing, cables shall be subjected to a 1.5 minutes AC/DC pressure test.

13 PLANT AND EQUIPMENT

13.1 GENERAL

All plant and equipment shall be new and of appropriate grade and quality suitable for and adequately protected against the prevailing climatic conditions and in accordance with specifications and shall be of approved manufacture. Any plant which is found to be unsuitable for used under these conditions shall be dismantled and replaced by suitable entirely at the expense of the Contractor.

The complete installation shall be carried out in a neat and orderly manner by competent personnel with adequate experience of respective trade of work.

Materials shall be the best of their type available and shall conform to the appropriate standards. Materials of constructions shall be certified by a recognised testing authority and shall be suitable for use in the stipulated environment. Installation of materials and equipment shall be strictly in accordance with manufacturer's recommendations.

13.2 TESTING AND COMMISSIONING

13.2.1 General

The Contractor shall be responsible for testing and commissioning the entire services installation described in these specifications and will demonstrate the operation of the system of the entire satisfaction of the Owner/Architect.

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section. Contractor shall provide all tools, equipment, metering and testing devices required for the purposes.

The entire pipe work in the plant room shall be tested at minimum 14 kg/cm² pressure. The test pressure shall be maintained for at least 2 hrs.

13.2.2 Water for Testing

Water for testing shall be obtained by the Contractor from an approved source. It shall be free from bacterial contamination, silt, grit, sand etc. After testing, the Contractor shall satisfactorily dispose off all water, or it may be re used providing it is clean and is not contaminated.

13.2.3 Test Records

The Contractor shall be responsible for the keeping all records of tests and on completion shall provide records and reports of the tests in triplicate. All test records shall clearly identify the item of the test and must be signed by a witness to the test.

13.2.4 Unsatisfactory Works

If the tests reveal unsatisfactory materials, installation or adjustment, the Contractor shall, at his own expense, carry out such alternations or replacements as may be necessary to rectify the defective work. The Contractor shall then repeat the tests as necessary to establish the satisfactory nature of the alterations or replacements.

13.2.5 Testing at Works

All plants and equipments shall be tested at maker's works before despatch and the test certificate in duplicate shall be forward to Owner/Architect.

The Contractor shall similarly provide a set of manufacturer's certified test curves for any pump installed under the Contract. All tests shall be in accordance with the appropriate Indian Standards.

13.2.6 On Site Testing

The Contractor shall provide on site all the necessary instruments, plant, equipment, materials, water, electricity and labour necessary for carrying out the specified tests. All tests shall be carried out as required to meet the construction programme and the contractor shall include for all necessary isolation and other works as may be required for testing the whole or parts of the installation. The Contractor shall also be responsible for re-testing, if necessary, until satisfactory tests are achieved.

13.3 IDENTIFICATION OF PIPES LINES & EQUIPMENT

All pipeline installation shall be provided with a colour identification system. The system in general shall be as per IS:2379-1983-Specification of Colour Code for the Identification of Pipe Lines. The colour identification system shall comprise of:

- a) Basic Identification Colour over the whole length of pipe
- b) Code indication bands for precise determination of the contents being carried by the pipe

The code indication bands shall be minimum 150mm wide and shall be placed at all junctions, at both sides of valves, service appliances, bulk heads, wall penetrations and at any other place where identification is necessary.

The colour of code indication bands shall be as directed by the Engineer-in-Charge.

The direction of flow shall be clearly marked on the pipe lines.

The equipment shall be identified with identification plates as directed by the Engineer-in-charge

LIST OF APPROVED MAKES OF MATERIAL

S.No	Materials / Equipment to be installed	Manufacturer's / Vendor's Name
1.	Clear Water Pumps (Horizontal Type)	Crompton / Kirloskar/ Becon
2.	Clear Water Pumps (Vertical Inline Pumps)	Grundfos/ DP/ WILO
3.	Drainage Pumps	Grundfos/ KSB/ DP/ EBARA/ WILO
4.	Disc Filter	AZUD/ AMIAD
5.	U.F. Membranes	Osmonics, USA/ DOW, USA/ Hydranotics, USA/ GE/ Norrit/ Kolon, Korea/ Oltremare
6.	Membrane Housing	Ecoline/ Eventura
7.	FRP Vessels (Filter Shell)	Well-Mate, USA/ Astral, Spain/ Aventura/ Pentair
8.	Metering Pumps	Asia, LMI/ Toshcon Sesco/ Etatron, Italy
9.	Polypropylene (PP) Chemical Grade Chemical Solution Tanks	Sintex/ Jindal
10.	MS Vessels	Custom Built as per the best Engineering practices
11.	PVC Pipes and Fittings	Supreme/ Astral/ Finolex/ Jain Plastics
12.	Mild Steel Pipes/ G.I. Pipes conforming to IS:1239	Jindal/ Tata
13.	Galvanized malleable iron fittings Conforming to IS: 1879	Unik/ Zoloto-m
14.	Butterfly Valves	Audco/ Advance/ KSB/ Zoloto/SKS
15.	Ball Valves	RB, Italy/ Tiemme, Italy/CIM, Italy
16.	Motorized Valve	Danfoss/Belimo, Switzerland
17.	Gunmetal Gate Valves, Non-return Valves	Leader/Zoloto
18.	C.I Non-return Valves	Kirlosker/IVC
19.	Dual Plate NRV	Advance/Kirlosker
20.	Strainers - Pot/Bucket/'Y'-type	Leader/Zoloto/SKS/Kartar/Emerald
21.	Solenoid Valves	Danfoss/Aira-Airmax
22.	PVC Ball Valves	Plastro Plasson
23.	PVC Insulated Armoured Power Cable	Grandlay/Skytone/Havell's/Polycab
24.	PVC Insulated Copper Cable	Skytone/Havell's/Polycab

25.	M.S. Conduit	BEC/AKG
26.	Moulded Case Circuit Breakers	Schneider-Compact NSX/L&T-D Sine/Siemens
27.	Miniature Circuit Breakers	L&T "Hager"/ Schneider-Mult-9/Legrand-Lexic
28.	Starters, Relays etc.	L&T/Schneider
29.	Push button and indication lights	L&T/Siemens/Telemenaque
30.	Digital Voltmeter & Ammeter	L&T / Conzerv
31.	Selector Switches	L&T/Keycell/Salzar
32.	HRC Control Fuses	L&T/GE
33.	Meters, CT etc.	AE, Kappa
34.	PLCs	Allen Bradley/Siemens/Schneider Electric - Modicon
35.	Panel Manufacturers	Elegant Control System/Advance Control Pvt. Ltd./Advance Panels and Switchgear Pvt. Ltd./DRK
36.	Cable tray	Pic/Pilko//Slotco
37.	Water Level Controllers (Magnetic Float Type)	Janus/Elegant Control/Swlitzer/Cirrus
38.	Anti-vibration Pads/Footings	Resistoflex/Kanwal
39.	Vibrations Eliminators	Resistoflex/Arrowflex/Kanwal
40.	Pressure Switches	System Sensor, USA/Danfoss/Swlitzer
41.	Pressure Gauges	H. Guru/Fiebig
42.	Expansion Bolts	Hilti/Bosch
43.	G.I. Hangers for Pipes/Adjustable Hanger	Chilly/GMGR
44.	Welding Rods	Advani
45.	HDPE Tanks	Sintex/Durawell
46.	Digital Water Quality Monitoring Equipment	Fluid Control System, USA/Impell
47.	Water Flow Meter Turbine Type	Kranti/Kent
48.	Pump and Motor Couplings	Lovejoy (Rathi)
49.	Electro Magnetic Flow Meter	Electronet/Rose Mount/IOTA/Rockwin