



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

TENDER DOCUMENT (PART-B)

(PART II: - TECHNO-COMMERCIAL BID + PART III: BLANK PRICE BID)

Establishment of Fire Fighting Network in Factory Area at HERP



**MAINTENANCE DEPARTMENT
HEAVY EQUIPMENT REPAIR PLANT
BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
VARANASI – 221 003 (U.P)**

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

NOTICE INVITING TENDER

Tender Notice No-HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

- Sealed tenders are invited (in three part bid system) for the following works:-

Short Description of Work	Time of Completion	Earnest Money Deposit (In Rs.)	Tender Submission Date	Tender Opening Date & Time
Establishment of Fire Fighting network in Factory Area at HERP	5 Months	Rs. 1.50 Lacs (DD Only) In separate envelope super scribed as "EARNEST MONEY"	11/07/2014 to 02/08/2014 (Till 16:00 Hrs)	04/08/2014 (At 14:00 Hrs)

- Cost of Tender Document:- **Rs.1000/-** (In cash/DD if purchased from office and in DD only if downloaded from website)
- Address for purchase, submission & opening of Tender:-
 - a. Purchase of Tender: - Office of the DGM (Maint.)
BHEL-HERP,
Tarna, Shivpur
Varanasi – 221003
 - b. Submission of Tender:- Tender Box located in MM Department at Admin Building, of BHEL HERP, Tarna, Shivpur
Varanasi – 221003

Or (if sent through Courier/Post)

DGM (Maint.)
BHEL-HERP,
Tarna, Shivpur
Varanasi – 221003

- Note:** - 1. DD should be in favor of "**BHARAT HEAVY ELECTRICALS LIMITED**" payable at Varanasi.
2. For any information/clarification, please contact at Ph No: - 0542-6545323/24,
Fax: - 0542-2282239/41, Email: - lalit@bhel.in, ashuani@bhel.in

Sign, Date & Seal of contractor



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MAINTENANCE DEPARTMENT**

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TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

- Tender documents can be purchased from the office of DGM (maint) at BHEL-HERP, Varanasi after payment of requisite tender cost in cash/DD (in favor of "BHARAT HEAVY ELECTRICALS LIMITED") till 02/08/2014 up to 12:00 Hrs.
- Bidders may also download the tender documents from the web page of BHEL (<http://www.bhel.com/tender>) or HERP-Varanasi (<http://bhelherp.com>) and use the documents for submission of tender. In such cases, the cost of tender documents shall have to be paid at the time of or before submission of offer. Payment to be made through DD favoring "Bharat Heavy Electricals Ltd" payable at Varanasi, to be sent along with the offer in a separate envelope super scribed as "Tender Cost & Earnest Money".

Offer is to be submitted in three parts in three separate properly sealed envelopes super scribed as "Part-I-Registration Documents", "PART-II-Techno-Commercial Bid", and "PART-III-Price Bid". Fourth envelope (separate & sealed) should contain tender cost/earnest money (in form of applicable DD only) and super scribed as "Tender Cost & Earnest Money" if downloaded from website and "Earnest Money" if purchased from office.

All aforesaid four envelopes to be put in fifth sealed envelope super scribing:-

"Tender for Establishment of Fire Fighting Network in Factory Area at HERP"

Tender No: - HERP/CIVIL/CAP/86/14-15, Due Date: - 02/08/2014

Part-I: - Registration Documents and Part-II:-Techno Commercial bid:-

Part I & II of the sealed tenders will be opened by BHEL on the date of opening of this tender in the presence of tenderers who are present at the time & place of opening. A signed blank price-bid copy should be enclosed with this bid. The spaces for prices should be crossed (/).

Part-III: - Price bid:-

The price bid should contain prices only. Price bid will be opened only for the parties who qualify in techno commercial bid.

Note: - BHEL takes no responsibility for any delay / loss of documents or correspondence sent by courier or post. Late tenders shall be rejected out rightly.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

TO BE SIGNED BY THE TENDERER

Certified that all Sections of the Tender have been read / complied & agreed to, and each page of the tender offer has been signed & stamped.

(Signature of Authorized person(s))
Name and designation of Authorized Person(s)
Signing the tender on behalf of the tenderer

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

Brief Description of Project

The scheme is conceived to **design and establish Fire fighting network** for entire HERP's factory premises. The scope of work consists of:-

1. Supply, fabrication and installation of MS pipe of various diameter to lay network to cover whole factory.
2. Supply, installation, testing and commissioning of various pumps viz: Electrical Motor Driven Fire Pump, Diesel Pump, Jockey Pump, Terrace Pump for pressurization pumping and maintaining sufficient pressure in the pipeline network along with supply & installation of Electrical Control Panels for operation of fire fighting system.
3. Supply and installation of other fire accessories viz. Hose Reel, Hydrant, Automatic sprinkler system, Automatic alarm system along with requisite pipe line, Fire Extinguishers etc.
4. Various civil works viz. Construction of underground water tank (Minimum Capacity: - 100000 Litre), Pump House (Tentative Size:- 9m x 6m x 3m) along with pump/motor foundation, Support system (Pedestal/Blocks) for pipe line & Supply/Installation of Terrace Tank (10000 Litre) etc.

All necessary testing of fire fighting system (Pump/Motor/Pipeline/Accessories etc) installed against this tender shall be in the scope of the contractor.

Preparation & submission of detailed drawings shall be in the scope of contractor which shall be approved by BHEL. Contractor shall execute work on the basis of approved drawing only.

Necessary approvals and issuance of NOC from Local fire authority shall also be in the scope of this contract and BHEL shall not pay any EXTRA amount on account of such expenditure incurred by the contractor.

The Schedule of quantities attached along-with this tender is tentative and may change during execution as per site condition. Payment shall be restricted to actual execution of work and for those items only which is executed at site.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

QUALIFYING CRITERIA

The work is specialized in nature which requires skilful workmanship & timely completion. All the following criteria will have to be met:-

- (1) The Bidder should have an Average Annual financial turn over during the last 3 years, ending 31 March 2014 not less than Rs. **26.30 Lacs**.
- (2) The bidder should have the experience of successfully completing similar works during the last seven years ending 30/06/2014 amounting to values mentioned as under in a completed contract.
 - a) **Three** similar completed works each costing not less than the amount equal to **Rs. 35.07 Lacs**

Or

- b) **Two** similar completed works each costing not less than the amount equal to **Rs.43.84 Lacs**

Or

- c) **One** similar completed work costing not less than the amount equal to **Rs.70.14 Lacs**

Definition of similar work(s):- Supply, installation, testing & commissioning of Fire fighting network. Allied civil works for establishment of fire fighting works shall also be considered.

- (3) The Bidder should possess valid PAN No, PAN based Service Tax Registration No., TIN No. etc.

Notes:-

1. The contractor must submit their documentary proof in support of each of the above conditions along with the techno commercial bid Part-II, failing which BHEL reserves the right to cancel the offer.
2. No conditional tender will be accepted.
3. Evaluation of the offer shall be based on landed cost to BHEL on total scope of work.
4. BHEL reserves the right to delete any items of works or reject incomplete offers.
5. No sub contracting is allowed without prior permission of BHEL.
6. **Late tenders will not be accepted.**

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

INSTRUCTIONS TO TENDERERS

1. Offer is to be submitted in three parts in three separate properly sealed envelopes super scribed as "Part-I-Registration Documents", "PART-II-Techno-Commercial Bid", and "PART-III-Price Bid". Fourth envelope (separate & sealed) should contain tender cost/earnest money (in form of applicable DD only) and super scribed as "Tender Cost & Earnest Money" if downloaded from website or "Earnest Money" if purchased from office.

All aforesaid four envelopes to be put in fifth sealed envelope super scribing:-

"Tender for Establishment of Fire Fighting Network in Factory Area at HERP"

Tender No: - HERP/CIVIL/CAP/86/14-15, Due Date: - 02/08/2014

Part-I: - Registration Documents and Part-II:-Techno Commercial bid:-

Part I & II of the sealed tenders will be opened by BHEL on the date of opening of this tender in the presence of tenderers who are present at the time & place of opening. A signed blank price-bid copy should be enclosed with this bid. The spaces for prices should be crossed (/).

Part-III: - Price bid:-

The price bid should contain prices only. Price bid will be opened only for the parties who qualify in techno commercial bid.

The tender shall be addressed to:-

DGM (Maintenance)
BHEL HERP
Tarna, Shivpur,
Varanasi – 221003
Email ashuani@bhel.in

Sealed Tenders can be submitted to: - (If submitted personally)

Tender Box located in MM Department at
Admin Building, of BHEL HERP, Tarna, Shivpur
Varanasi – 221003

Or (if sent through Courier/Post)

DGM (Maint.)
BHEL-HERP,
Tarna, Shivpur
Varanasi – 221003

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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2. Tenders should be sent/posted with due allowance for any transit/postal delay. The tenders received after due date and time of opening are liable to be rejected.
3. Tenders shall be opened by authorized officer of BHEL at his office at the time and date as specified in the tender notice in the presence of such of those tenderers or their authorized representative who may be present.
4. The tenderers shall closely peruse all the clauses, specifications and drawings indicated in the Tender Documents before quoting. If the tenderer have any doubt about the meaning of any portion of the Tender Specifications or find discrepancies/ omissions in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect scope of work etc., he shall at once contact the authority inviting the tender for clarification before the submission of the tender.
5. Before tendering, the tenderers are advised to inspect the site of work and the environments and be acquainted with the actual working and other prevalent conditions, facilities available, position of material and labor. No claim will be entertained later on grounds of lack of knowledge after submission of the tender.
6. Tenderer must furnish all the required information as per the instructions given in various sections of the tender document and specification. Each and every page of the Tender Specification must be SIGNED, STAMPED AND SUBMITTED ALONG WITH THE OFFER by the tenderer in token of complete acceptance thereof. The information furnished shall be complete by itself.
7. The tenderer shall quote the rates after visiting the site to know the site conditions. The tenderer shall quote the rates in English Language using international numerals. These rates shall be entered in figures as well as in words. In case of difference in rates between words and figures, the rate quoted in WORDS shall be treated as final rates. For the purpose of the tender, the metric system of units shall be used.
8. All entries in the tender shall either be typed or be written in ink. Erasures and overwriting are not permitted and may render such tenders liable to summary rejection. The tenderer shall duly attest all cancellations and insertions prior to submission of tender.
9. **DATA TO BE ENCLOSED.**
Full information shall be given by the tenderer in respect of the following. Non submission of these information may lead to rejection of the offer.
- 9.1 **FINANCIAL STATUS.**
Financial viability as per Proforma enclosed at ANNEXURE 'A' including Permanent Account Number issued by Income Tax Department.
- 9.2 **BLANK & SIGNED PRICE-BID**
A copy of blank & signed price-bid should be enclosed with the techno-commercial bid. The space for prices may be crossed (/).

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

9.3 PREVIOUS EXPERIENCE:

A statement giving particulars (duly supported by documentary evidence) of the various services rendered/ in progress for each similar works by the tenderer indicating the particulars and value of each work, the site location, the duration, date of completion etc. as per Performa – ANNEXURE-`B`.

9.4 ORGANISATION CHART:

9.4.1. The organization pattern indicating name, qualification and experience of engineer present at senior level in the roll of the company as on 30.06.2014.

9.4.2. Details of equipments in support of their capability and satisfactory completion of the project.

9.5 An attested copy of the Power of Attorney, in case the tender is signed by an Individual other than the sole Proprietor shall also be attached.

9.6 IN CASE OF AN INDIVIDUAL: His full name, experience, address and nature of business.

OR

IN CASE OF PARTNERSHIP FIRMS: The names of all the partners with addresses and their experience. A copy of the partnership deed/Instrument of Partnership duly certified by a Notary Public shall be enclosed.

OR

IN CASE OF COMPANIES: Date and place of registration including date of commencement certificate in case of public companies and the nature of business carried on by the Company. Certified copies of memorandum and Articles of Association are also to be furnished. Also indicate names, addresses and experience of the Directors.

9.7 Declaration sheet on Rs.10 stamp paper as per Performa enclosed at ANNEXURE`C`.

9.8 Check list and schedule of general particulars duly filled in, signed and stamped as per `ANNEXURE `D`.

9.9 In addition to the above the particulars required elsewhere in tender documents.

9.10 Mention your PF code No. allotted to you by the Regional Provident Fund Commissioner.

9.11 Mention your ESI code no or any other medical policy prevailing in your company.

9.12 Mention your Service Tax Registration No. (PAN based) issued by Central Excise Department.

Note: In terms of clauses 9.1 to 9.12 above, all the data required to be enclosed with the tender need to be furnished neatly typed, signed and stamped in the

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

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given formats only (in the form of separate sheets) failing which the tender may be considered as incomplete and is liable for rejection. Documentary, proofs wherever necessary also need to be enclosed.

10 EARNEST MONEY DEPOSIT:

Every tender must be accompanied by the prescribed amount of Earnest Money Deposit in any one of the following forms.

(Note: Challan, Money Orders or Postal Orders will not be accepted.)

10.1 Demand Draft from any Nationalized Bank in favour of "Bharat Heavy Electricals Limited" payable at "Varanasi".

10.2 Tenders received without Earnest Money in full in the manner prescribed above will not be considered.

10.3 The Earnest Money Deposit of the successful tenderer may be converted & adjusted against security deposit.

10.4 In the case of unsuccessful tenderers, the Earnest Money will be refunded to them after finalization of the tender.

10.5 BHEL reserves the right of forfeiture of Earnest Money in case the tenderer:

10.5.1 Submits false information.

10.5.2 After opening of Tender, revokes/withdraws his tender within the validity period or revises/alters his earlier quoted rates/conditions.

10.5.3 Fails to commence the work within fifteen days from the date of issue of 'letter of intent (LOI)'.

10.5.4 Fails to start the work as may be indicated in the Letter of Intent (LOI).

10.6 EMD to be submitted along with techno commercial bid in a separate envelope only and not in Price bid.

10.7 No adjustment of earlier EMD/Security deposit, if any, shall be permitted.

10.8 EMD shall not carry any interest.

11.0 AUTHORISATION, ATTESTATION & VALIDITY OF OFFER:

Tenders shall be signed by persons duly authorized /empowered to do so. Certified copies of such authority and relevant documents shall be submitted along with the tenders. The offer shall be kept open for acceptance for a minimum period of 3 months from the date of opening of tenders. In case Bharat Heavy Electricals Limited calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer, which shall be binding, on the tenderers

12.0 RATES OFFERED & EVALUATION OF BIDS:

12.1 Rates quoted should be inclusive of all taxes and duties excluding service tax as applicable against documentary proof.

12.2 The quantities mentioned in the BOQ are tentative for all items and liable to change as per site condition.

Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

- 12.3 Payment under this contract shall be released as per General Condition of Contract(GCC) of BHEL, Varanasi as per schedule of activities on satisfactory completion of work, or part thereof, in all respects against the bills supported by necessary documents effecting due deductions.
- 12.4 All necessary deductions, on account of sale tax, income tax, water charge etc shall be made by BHEL before release of payment.

Price bid's Schedule-A:- Fire Fighting Works contains items related to supply, installation & commissioning of fire fighting system, pumps, accessories, appliances etc for which party is required to quote their rates against all items. **Price bid's Schedule-B: - Civil Works** contains items related to various civil works viz. construction of pump house, underground water tank, support system of pipe line etc associated to execution of fire fighting network at HERP. The rates for civil works are based on CPWD's DSR'2013 and party is required to quote their premium (Below/AT Par/Above) only on total value of civil works.

- 12.5 The lowest bidder will be evaluated on overall basis taking schedule A & B.
- 12.6 No advance payments will be made.
- 12.7 Rates should be kept valid for 6 months from the date of opening of this tender.

13.0 EXECUTION OF CONTRACT

The successful Tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent (LOI) by Bharat Heavy Electricals Limited. The successful tenderer shall be required to execute a contract in the "prescribed form" as per GCC with BHEL within 15 days from the issue of LOI and in any case before the commencement of work. The expenses for completion and stamping and registration of the agreement with prescribed authority shall be borne by the Contractor.

14.0 SECURITY DEPOSIT

Upon acceptance of tender, the successful tenderer must deposit the required amount of security deposit within the time specified in the letter of intent for satisfactory completion or work.

- 14.1 The total amount of Security Deposit shall be calculated based on value of work order **(Rs. 4.0 Lacs + 5% of amount exceeding Rs. 50 Lacs)**.
- 14.2 The Security Deposit will be deposited within 15 days from the date of issue of LOI but before start of work in any one of the following forms.
- 14.2.1 The total Security Deposit as indicated in the Letter of Intent has to be submitted, before commencement of the work, as per clause 14.2.2 mentioned as under:
- 14.2.2 The rate of Security Deposit will be as below:

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

- (i) Cash (as permissible under the Income Tax Act)
- (ii) Pay Order, Demand Draft in favor of BHEL, Varanasi.
- (iii) Local cheques of scheduled banks, subject to realization.
- (iv) Securities available from Post Offices such as National Saving Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of contractor furnishing the security and duly pledged in favour of BHEL, Varanasi and discharged on the back).
- v) Bank Guarantee from Scheduled Banks/Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL, Varanasi.
- vi) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL Varanasi, duly discharged on the back.
- vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit will be collected before start of work and the balance 50% may be recovered from the running bills.

Note: Acceptance of the Security Deposit against SI No (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favor of BHEL, Varanasi. However BHEL, Varanasi will not be liable or responsible in any manner for the collection or interest or renewal of the documents or in any other matter connected therewith.

- 14.2.3 *The validity of the Bank Guarantee furnished towards Security Deposit under 14.2.2 above shall be up to the period of completion of work as stipulated in the Letter of Intent + Guarantee period + 3 months claim period.*
- 14.3 *If the value of the work done at any time exceeds the accepted agreement value, the Security Deposit shall be correspondingly enhanced and the extra Security Deposit shall be immediately deposited by the Contractor or recovered from payments due to him.*
- 14.4 EMD of the successful tenderer can be converted and adjusted against the security deposit.
- 14.5 The security deposit shall not carry any interest.
- 14.6 **Stamp Duty** - Contractor should deposit stamp duty on security deposit as per Indian Stamp Act 1899 and amendment made there under, applicable UP stamp duty rules and will have to be deposited before commencement of the contract.
- 14.7 BHEL reserves the right to forfeit the Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit, against any claims of any other contracts with BHEL.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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RETURN OF SECURITY DEPOSIT: If the contractor fully performs and completes the works in all respects to the entire satisfaction of BHEL and presents an absolute "No Demand Certificate" in the prescribed form and return properties belonging to BHEL taken, borrowed or hired by him for carrying out the said works, half the amount of Security Deposit will be released to the contractor after deducting all costs, expenses and other amounts that are to be paid to BHEL under this or other contracts entered into with the contractor along with payment of final bill. It may be noted that in no case the Security Deposit shall be refunded / released prior to passing of final bill. Balance half of security deposit will be released only after completion of guarantee period which shall be **one year** from the date of completion of works under this contract. Cash portion of balance half security deposit may also be released after submission of Performance Bank Guarantee for requisite value (equal to half of total security deposit) by the contractor for a period of 12 months + 3 months claim period. No interest shall be payable by BHEL on Earnest Money, Security Deposit or on any money due to the Contractor by BHEL.

15.0 REJECTION OF TENDER AND OTHER CONDITIONS:

The acceptance of Tender will rest with BHEL which does not bind itself to accept the lowest tender or any tender and reserves to itself full rights for the following without assigning any reasons whatsoever.

15.1.1 To reject any or all of the tenders

15.1.2 To modify the time for completion suitably.

15.2 Conditional tenders, tenders containing absurd or unworkable rates and amounts, tenders which are incomplete or otherwise considered defective and tenders not in accordance with the tender conditions, specifications, etc., are liable to be rejected.

16.3 If a tenderer expires after the submission of his tender or after the acceptance of his tender, BHEL may at its discretion, cancel such tender. If a partner of a firm expires after the submission of the tender or after the acceptance of the tender, BHEL may cancel such tender at its discretion unless the firm retains its character.

16.4 BHEL will not be bound by any Power of Attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. BHEL may, however, recognize such Power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.

16.5 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract, if awarded and forfeit the Earnest Money/ Security Deposit/ any other moneys due.

Sign, Date & Seal of contractor



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- 16.6** Should a tenderer or Contractor or in the case of a firm or Company of Contractors/ one or more of its Partners/ Shareholders/ Directors have a relation or relations employed in BHEL, the authority inviting tender shall be informed of the fact along with the offer, failing this BHEL may at its sole discretion reject the tender or cancel the contract and forfeit the Earnest Money/ Security Deposit.
- 16.7** The successful tenderer may sub-contract civil works as detailed in the BOQ of this tender with written permission of BHEL. The tenderer is solely responsible to BHEL for the total work awarded to him including civil works.
- 17.0** The following terms and expression shall have the meaning hereby assigned to them except where the context otherwise requires.
- 17.1** BHEL shall mean Bharat Heavy Electricals Limited, a Company registered under the Indian Companies Act, 1956 with its Registered Office at BHEL House, Siri Fort, New Delhi Pin – 110049 or its authorized Officers or its Engineer or other employees authorized to deal with any matters with which these persons are concerned, on its behalf.
- 17.2** CLIENTS OF BHEL' or 'CUSTOMER' shall mean the project authorities to whom BHEL is supplying the equipment's.
- 17.3** 'CONTRACTOR' shall mean the individual, firm or Company who enters into contract with BHEL and shall include their executors, administrators, successors and permitted assigns.
- 17.4** 'CONTRACT' or 'CONTRACT DOCUMENT' shall mean and include the agreement, the work order, the accepted appendices of rates, schedules of quantities, if any, General Conditions of Contract, Special Conditions contract, of Instructions to Tenderers, the drawings, the technical specifications, the special specifications, if any, the tender documents and the Letter of Intent/Acceptance letter issued by BHEL. Any conditions or terms stipulated by the tenderer in the tender documents or subsequent letters shall not form part of the contract unless specifically accepted in writing by BHEL in the letter of intent and incorporated in the Agreement.
- 17.5** 'TENDER DOCUMENTS' shall also include the 'General Conditions of Contract' (GCC) of BHEL. If there is any duplication or deviation between the GCC and the 'Special terms & conditions of contract' mentioned, the latter shall prevail. Wherever the latter is silent the former shall be referred to.
- 17.6** Letter of Intent shall mean the intimation by a letter/telegram /fax to the tenderer that the tender has been accepted in accordance with provision contained in that letters. The responsibility of the contractor commences from the date of issue of this letter and all the terms and conditions of contract are applicable from this date.
- 17.7** COMPLETION TIME shall mean the period by date specified in the Letter of Intent or date mutually agreed upon for handing over the erected equipment/ plant which

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are found acceptable by the Engineer being or required standard and conforming to the specifications of the contract.

17.8 'TESTS' shall mean and include such test or tests to be carried out by the contractor as are prescribed in the contract or considered necessary by BHEL in order to ascertain the quality, workmanship, performance and efficiency of the contracted work or part thereof.

17.9 'APPROVED', 'DIRECTED' or 'INSTRUCTED' shall mean approved, directed or instructed by BHEL.

17.10 'WORK' or 'CONTRACT WORK' shall mean and include supply of all categories of labor, equipments, specified consumables, tools and tackles required for complete and satisfactory site transportation, handling, stacking, storing, erecting, testing and commissioning of the equipment's to the entire satisfaction of BHEL.

18.0 LAW GOVERNING THE CONTRACT AND COURT OF JURISDICTION

The contract shall be governed by the law for the time being in force in the Republic of India. The Civil Court at Varanasi having ordinary Original Civil Jurisdiction shall alone have exclusive jurisdiction in regard to all claims in respect of this Contract.

19.0 COMMENCEMENT & COMPLETION OF WORK (Pl. also refer clauses 12 & 31 of General conditions of contract of BHEL Varanasi)

The contractor shall commence the work within the time indicated in the Letter of intent and shall proceed with the same with due expedition without delay.

19.1.1 If the successful tenderer fails to commence the work within the stipulated time, BHEL, at its sole discretion, will have the right to cancel the contract. His Earnest money and/ or Security Deposit will stand forfeited without any further reference to him without prejudice to any and all of BHEL's other rights and remedies in this regard.

19.1.2 All the works shall be carried out under the direction and to the satisfaction of BHEL.

20.0 MEASUREMENT OF WORK AND MODE OF PAYMENT

20.1 All payments due to the contractor shall be made by 'Electronic Fund Transfer'. For this purpose the contractor has to give his account details in the standard format to be provided by BHEL Varanasi.

20.2 All payments will be made as per "Price Schedule" only after completion of that work the same will be entered in measurement Book as running account (RA bill) & both the party will sign in that.

20.3 All recoveries due from the contractor for the month/period shall be affected in full from corresponding running bills unless specific approval from competent authority is obtained to the contrary. The recoveries could be Income Tax, VAT, Water charges etc.

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- 20.4 The contractor shall bear the expenditure involved if any, in meeting requirements. The contractor shall, provide all the assistance with appliances and other thing necessary for measurement or re-measurement.
- 20.5 Contractor shall be paid on the basis of items actually executed at site.
- 20.6 Passing of bills covered by such measurement does not amount to acceptance by BHEL of the completion of the work measured. Any left out work has to be completed by the Contractor, as directed.
- 20.7 Final measurement bill shall be prepared in the proforma prescribed for the purpose, based on the certificate issued by the Engineer that the entire work as stipulated in the tender specifications has been completed in all respect to the entire satisfaction of BHEL. The Contractor shall give unqualified 'No claim' and 'no demand' certificate. The abstract of final quantities and financial values shall also be entered in the measurement book and signed by both the parties. The final bill shall be paid within a reasonable time after completion of the work. After the payment of final bill, only the guarantee obligation percentage value shall remain unpaid, which will be released as per GCC.

NOTE: Normally it takes approximately 60 days for the payments to be released by BHEL after recording the measurements.

21.0 RIGHTS OF BHEL

BHEL reserves to itself the following rights in respect of this contract without entitling the contractor to any compensation.

- 21.1 To get the work done through another agency at the risk and cost of contractor, in the event of poor progress or the contractor's not starting the work, after once shifting it, poor progress or inability to progress the work for completion as stipulated in the contract, poor quality of work persistent disregard of instructions of BHEL assignment, transfer, subletting of the contracted work without written permission of BHEL, non-fulfillment of any contractual obligations etc. and to claim/recover compensation for such losses from the contractor including BHEL's supervision charges and overheads from Security Deposit / other dues in addition to any other action that may be taken.
- 21.2 To withdraw any portion of work and/or to restrict/alter quantum of work as indicated in the contract during the progress of erection and get it done through another agency and/or by the departmental labour to suit BHEL's commitments to its customer or in case BHEL decides to advance the completion due to other emergent reasons/ BHEL's obligation to its customer.
- 21.3 To terminate the contract after due notice and forfeit the Security Deposit and recover the loss sustained in getting the balance work done through other agencies in addition to liquidated damages in the event of:
- 21.3.1 Contractor's continued poor progress.
- 21.3.2 Withdrawal from or abandonment of the work before completion of the work

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- 21.3.3 Corrupt act of the contractor.
- 21.3.4 Insolvency of the contractor
- 21.3.5 Persistence disregard of the instructions of BHEL Assignment, transfer, subletting of the contract work without BHEL's written permission
- 21.3.6 Non-fulfillment of any contractual obligations or obligations under the law.
- 21.4 To recover any money due from the Contractor from out of any moneys due to the contractor under this or any other contract or from the Security Deposit.
- 21.5 To claim penalty or compensation for losses sustained including BHEL's supervision charges and overheads in case of termination of contract and/or to levy liquidated damages for delay in completion of work (Pl. refer cl. 31 of GCC of BHEL Varanasi).
- 21.6 To restrict or increase the quantity and nature of work to suit site requirements, since the tender specification is based on preliminary documents and quantities furnished therein are indicative and approximate and the rates quoted shall not be subjected to revision.
- 21.7 To deploy BHEL's skilled and semiskilled workmen in case of emergency/ poor progress/ deficiency in skill on the part of the employees of the contractor and to recover the expenditure on account of the same from the money due to the contractor.
- 21.8 While every endeavor will be made by BHEL to this end, BHEL cannot guarantee uninterrupted work due to conditions beyond its control. The contractor will not be entitled to any compensation/extra payment on this account.
- 21.9 In the event of any dispute of technical nature, the decision of BHEL shall be final and binding on the Contractor.
- 22.0 **CONSEQUENCES OF CANCELLATION**
Whenever BHEL exercises its authority to terminate the contract and withdrawal a portion of work under clause 23, the work may be got completed, by any other means at the contractor's risk and cost provided that in the event of the cost of completion (as certified by the Engineer which shall be final and binding on the contractor) being less than the contract value, the advantage shall accrue to BHEL. If the cost of completion exceeds the moneys due to the contractor under the contract, the contractor shall either pay the excess amount demanded by BHEL or the same shall be recovered from the contractor. This will be in addition to the forfeiture of Security Deposit and recovery of liquidated damages as per relevant clauses.
- 22.1 In case BHEL completes the work under the provisions of this clause, the cost of such completion to be taken into account for determining the excess cost to be charged to the contractor shall consist of cost of material purchased and/or labour provided by BHEL with an addition of such percentage to cover supervision and establishment charges as may be decided by BHEL.

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23.0 FORCE MAJEURE

23.1 The following shall amount to force majeure conditions. Acts of God, act of any Government, war, sabotage, riots, civil commotion, police action, revolution, flood, fire, cyclone, earthquake, epidemic and other similar causes over which the contractor has no control.

23.2 If the contractor suffers delay in the due execution of the contract, due to delays caused by force majeure conditions, as defined above, the agreed time for completion of the work covered by this contract shall be extended by a period of time equal to the period of any such contingency provided the contractor immediately reports about the same to BHEL in writing supported by documentary evidence but the Contractor shall not be eligible for any compensation on this account.

24 GUARANTEE

The satisfactory and safe performance of the work done by the contractor shall be guaranteed up to 12 Month (One Year) from the date of the completion of work. During this period of the responsibility of contractor shall be to attend all meetings with BHEL, Varanasi and to attend & reply all the matters relating to the design / contract work as may be required.

25.0 ARBITRATION

All disputes between the parties to the contract arising out of or in relation to the contract, other than those for which the decision of the Engineer or any other person is by the contract expressed to be final and conclusive, shall, after written notice by either party to the contract to the other party, be referred to sole arbitration of the Unit head of BHEL Varanasi or his nominee. The arbitration shall be conducted in accordance with the provisions of the Indian Arbitration Act, 1996.

25.1 The parties to the contract understand and agree that there will be no objection that the Unit head of BHEL Varanasi or the person nominated as arbitrator had earlier in his official capacity to deal directly or indirectly with the matters to which the contract relates or that in the course of his official duties had expressed views on all or any of the matters in dispute or difference. The award of the arbitrator shall be final and binding on the parties to this contract.

25.2 In the event of the arbitrator dying, neglecting or refusing to act or resigning or being unable to act for any reason or his award being set aside by the Court for any reason, it shall be lawful for the Unit head of BHEL Varanasi or his successor, as the case may be, either to act himself as the Arbitrator or to appoint another arbitrator in place of the outgoing arbitrator in the manner aforesaid.

25.3 The arbitrator may, from time to time, with the consent of both the parties to the contract, enlarge the time for making the award. Work under the contract shall

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be continued during the arbitration proceedings. The venue of the arbitration shall be the place from which the contract is issued or such other place as the arbitrator at his discretion may determine.

25.4 Wherever the above sub-clauses are silent w.r.t arbitration, Cl.50 of GCC shall be referred to.

26.0 Responsibilities of contractor.

26.1.1 The contractor shall be fully and finally responsible for correctness and quality of his work to the entire satisfaction of the BHEL/Customer.

26.1.2 The work shall be executed in accordance with the directions, instructions, drawings and specifications, which shall be given to the contractor by BHEL from time to time.

26.1.3 If in the opinion of the contractor any work is insufficiently specified or required modifications, the contractor shall refer the same in writing to the Engineer and obtain his instruction/approval in writing before proceeding with the work. If contractor fails to refer such instance, any excuse for faulty erection, for poor workmanship or delay in completion shall not be entertained.

26.1.4 The contractor will be required to make agreement with BHEL on Non-Judicial stamp paper of Rs.100/- as per Annexure-"E" and Annexure G for Indemnity bond.

26.1.5 The following are the responsibilities of the contractor in respect of observance of local laws, employment of personnel, payment of taxes etc. The contractor shall engage sufficient staff to maintain the required rate of progress and quality of workmanship. If unskilled workers are required to be engaged, the same shall be engaged, as far as possible, from local areas in which the work is being executed.

26.1.6 Material reconciliation statement has to be submitted by the contractor as & when required by BHEL.

27. TIME SCHEDULE OF COMPLETION

Contractor shall complete all works including civil works, as described in BOQ of this tender, within **FIVE MONTHS** from the date of commencement of work. However, a detailed work execution schedule shall be prepared by the contractor and approved by BHEL before commencement of the work followed by monitoring of project progress with help of monthly review programme jointly prepared and signed by contractor & BHEL.

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28. TERMS & CONDITIONS of REVERSE AUCTION (RA)

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

28.1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

28.2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit "online sealed bid" in the Reverse Auction. Non-submission of "online sealed bid" by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

28.3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

28.4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

28.5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

28.6. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

28.7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

28.8. Reverse auction will be conducted on scheduled date & time.

28.9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

28.10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

28.11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL"s standard practice.

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28.12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction“, which will be communicated before the Reverse Auction.

28.13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

28.14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

28.15. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

29. EXECUTION OF WORK:-

Contractor must deploy adequate man power and infrastructure to complete the project within given time.

Details of manpower and machinery shall be intimated before commencement of work. The Engineer-in-Charge may instruct to deploy additional man-power/ machinery to complete the work and the same shall have to be followed.

Adherence to time schedule is of prime importance.

Project manager having sound knowledge of such type of work with financial powers and adequate funds should be posted fulltime during the contract period. This person shall be in the regular rolls of the contractor on whom the contract is awarded. He must be supported by adequate supporting staff including Quality Control personnel, supervisors, stores in-charge, billing & accounts personnel etc. Details of this team including qualification shall be submitted with part-II bid. The technical team of the contractor should have knowledge to handle the fabrication of MS pipe etc if required to modify at site for betterment of work.

In view of the urgency for completion of work the contractor must ensure daily work for at least two (2) shifts. The work must also continue uninterrupted during rainy season. For this necessary and adequate sheds (covered area) shall be constructed at contractor's cost & adequate number of dewatering pumps with pipes shall have to be arranged.

The storage of cement bags shall be such that ingress of moisture from floors shall be prevented.

Contractor shall arrange mould cubes (04 nos.) for casting of cube, slump test apparatus, Level checking instrument etc at site by his own resource, before start of appropriate work.

As the construction site is inside BHEL premises under security, contractor shall have to

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organize passes.

Necessary formalities for material, equipment entry passes shall have to be organized by the contractor. BHEL shall provide necessary assistance in this regard.

30. COMPLIANCE TO STATUARY/GOVERNMENT RULES

The successful bidder will be required to comply with all statutory rules & regulations and also rules of Central/U.P state Government.

Categorical confirmation is required that contractor will fulfill all the requirements applicable to this type of work in Central/U.P State Government including any new registrations etc.

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Special Instructions to Tenderer:

1. Contractor shall be deemed to have included in his tender price of all the plant, machinery and appliance required for the purpose of all operations connected with the work embraced under the contract to secure a satisfactory quality of work and rate of progress which in the opinion of the "Contract Signing Officer" will ensure the completion of the work within the time specified.
2. The contractor may produce the bank guarantee (if any) in the prescribed proforma valid for the contract period for a value calculated at the rates mentioned towards security deposit. The bank guarantee shall have validity of contract completion period plus three months claim period. If performance bank guarantee is produced by contractor for guarantee of work done, its validity should be guarantee period plus three months claim period.
3. This is a time bound contract for period mentioned, and does not envisage any escalation of price.
4. The rates quoted by the contractor shall be firm for the contract period.

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TERMS & CONDITIONS OF THE TENDER

TAKING OVER:

The structure on the site shall be deemed to have been taken over by the Bharat Heavy Electricals Limited when the Engineer-in-charge will have certified in writing that the structure has satisfied the contract conditions and such certificate shall not unreasonably be with-held, nor shall delay the issue of such certificate solely on account of minor omissions or defects, which do not affect its functional utility without any serious risk to the structure, provided always that the contractor undertakes to make good such omissions and defects at the earliest possible moment. Such certificates, however, shall be deemed to be on account and shall in no way release the Contractor from his liabilities and responsibilities in respect of such structure.

MAINTENANCE AND THE GUARANTEE:

The contractor shall give the following guarantee in respect of the structure to be supplied and erected by him.

- a. All structure shall be free from any defects due to faulty materials, structural detailing and / or workmanship or improper packing.
- b. The above guarantees/shall be valid for a period of 12 (Twelve) calendar months after the date of completion of work or date of final taking over by the Bharat Heavy Electricals Limited, whichever is later. During this period, the Contractor's liability shall be limited to the replacement immediately, any of defective parts that may develop in structures/fire fighting system or any part thereof, at his own cost.
- c. All such replacement of defective parts mentioned above shall be made free of cost at site by the contractor and the return of the defective parts to the contractor's works shall be the contractor's responsibility and shall be made at his expenses. Bharat Heavy Electricals Limited, will, however, render such assistance in this matter as will expedite the same. In the case of the defective parts not repairable at site but essential in mean time for the use of structure, the Contractor shall replace at site free of cost to Bharat Heavy Electrical Limited before the said defective parts are removed to his works.
- d. If it becomes necessary for the contractor to replace or renew any defective portions of the structure under this clause, the provisions of this clause shall apply to the portions of the structure so replaced or renewed until the expiration of six calendar months from the date of renewed until the expiration of six calendar months from the date of such replacement or renewal or until the end of the above of the above mentioned period of twelve months whichever is later.

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If any defects be not remedied within a reasonable time, Bharat Heavy Electricals Limited may proceed to do the work at the Contractor's risk and cost.

- e. If the replacements of renewals are of such character as may affect the efficiency of the structure, Bharat Heavy Electricals Limited shall have the right to give to the contractor within one month of such replacement or renewal, notice in writing that "tests on completion" be made once again, in which case such tests shall be carried out as provided in clause 4.
- f. All replacements or renewals to be carried out by the Contractor during the maintenance period shall be subject to such clauses of these conditions as may be considered reasonable by the Engineer-in-charge.
- g. Until the final certificate has been issued, the Contractor shall have the right of entry, at the own risk and expense, by himself or his duly authorized representatives (whose names shall previously have been communicated in writing to the Engineer-in-charge) at all working hours to all necessary parts of the works, for the purpose of inspecting the structure and taking note there from, and if he so desires, making any tests at his own expense subject to the previous approval of the Engineer in charge.
- h. At the end of the maintenance period, the Contractor's liability ceases, except as regards workmanship which the Executive Engineer shall have previously given notice of the contractor to rectify.

CERTIFICATE OF THE ENGINEER:

- a. Every application should be addressed to the Engineer-in charge for his consideration or certification for payment. Payment request must be accompanied by a detailed invoice, setting forth the claims in the same order as is found in the accepted Schedule of quantities and at the same rates. The said certificate will thereafter be issued by the Engineer-in charge at a reasonable time after receipt of the application.
- b. The Engineer-in charge may make any correction or modification in any previous certificate, which may have issued by him and payments, will be regulated and adjusted accordingly.

CERTIFICATE IPSO FACTO NOT TO AFFECT THE RIGHTS OF THE BHARAT HEAVY ELECTRICALS LIMITED OR CONTRACTOR:

No certificate of the Engineer in Charge on account, nor any sum paid on account by the Bharat Heavy Electricals Limited, nor any extension of time for the execution of the works given to the Contractor shall in any way affect or prejudice the rights of Bharat Heavy Electricals Limited against the contractor, or relieve the contractor of his obligation for the due performance of the Contract or be interpreted as approval of the work done or of the materials supplied and no certificate ipso facto shall create liability in Bharat Heavy

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Electricals Limited, to pay for alternations, amendments, variations or discharge in the liability of the contractor for the payment of damages whether due, ascertained, or certified or not, or any sum against the payment of which he is bound to identify the Bharat Heavy Electricals Limited, nor shall any such certificate nor the acceptance by him of any sum paid on account or otherwise, affect or prejudice rights of the contractor against Bharat Heavy Electricals Limited.

CO-OPERATION WITH OTHER CONTRACTORS

The contractor shall agree to co-operate with the Bharat Heavy Electricals Limited's other contractors for associated work and freely exchange all technical information with them to obtain the most efficient and economical execution and to avoid unnecessary duplication of work. No remuneration shall be payable by Bharat Heavy Electricals Limited for such technical co-operation.

The contractor shall forward to Bharat Heavy Electricals Limited copies of all correspondence and drawings so exchanged.

TIME AND PROGRESS CHART AND PROGRESS REPORTS

A detailed implementation schedule shall be prepared and signed by both parties i.e. BHEL and the contractor for successful execution of work under this tender within stipulated time of FIVE MONTHS. Also, monthly monitoring of the project is to be carried out with the help of schedule prepared by the contractor in consultation with BHEL.

ENGINEER'S SUPERVISION:

All the work shall be carried out in co-operation with, and under the direction and to the reasonable satisfaction of the Engineer-in-Charge. The contractor shall be responsible for the correctness of the positions, alignment and dimensions of the works according to the drawings, notwithstanding that he may have been assisted by the Engineer in setting out the same.

CONSTRUCTION EQUIPMENT:

The contractor shall provide all equipments and tools needed to do the work efficiently. Bharat Heavy Electricals Limited shall not be under any obligation to arrange for or give on hire, any construction or erection equipment.

WORK AT SITE:

In the execution of the work, no persons other than the contractor, or his duly appointed representatives, subcontractors and workman shall be allowed to do work at the site, except by the special permission, in writing of the Engineer-in-Charge and his representative and other authorized officials or representatives of BHARAT HEAVY ELECTRICALS LIMITED.

The work so far as it is carried out on Bharat Heavy Electricals Limited premises shall be carried out at such time as Bharat Heavy Electricals Limited, approved and so as not to interface unnecessarily with the conduct of Bharat Heavy Electricals Limited's business but Bharat Heavy Electricals Limited shall give the contractor all reasonable facilities for carry out the work.

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POSSESSION PRIOR TO COMPLETION:

Bharat Heavy Electricals Limited shall have the right to take possession of, or use any completed or partially completed part of the work. Such possession or use shall not be deemed to be an acceptance of any work not in accordance with the contract.

WITH HOLDING PAYMENT:

B.H.E.L may withhold the whole or part of any payment for any work claimed by the contractor, which in the opinion of the B.H.E.L. is necessary to protect itself from loss on account of:

Defective work not remedied or guarantees not met,

Claims filed against the Contractor.

Failure by the Contractor to make due payment for materials or labor employed him.

Damage to another contractor.

Any other reason for which BHEL shall inform in writing to the contractor.

Payments of the amount due to the contractor shall however be made by B.H.E.L after decision on the matter with information to the contractor in writing after deduction of amount if any.

LIENS:

Final payment to the contractor shall not be made until the Contractor shall deliver to BHEL, a complete release of all lines arising out of the contract or receipts in full in lieu thereof and in either case, an affidavit that so far as he has knowledge or information, the releases and receipts include all the labor and material for which a lien could be filled. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to B.H.E.L, all moneys that the latter may be completed to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

RATE & QUANTITY VARIATION.

No extra claim or condition in regard to wages or materials escalation will be entertained and any tender containing such stipulation will be rejected.

All rates quoted shall be for finished work in-situ inclusive of all leads, lifts and other incidental charges etc., and those in general conditions of contract.

The quantities indicated in the BOQ are approximate and liable for variation.

The contractor shall comply with the following general terms, conditions and special instructions.

1. The contractor shall fully comply with the following enactments:

- a. Contract Labour (R&A) Act, 1971.
- b. Wage Rates not less than that notified by State Labour department from time to time.
- c. Payment of Wages Act.
- d. ESI Act, 1948.

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- e. EPF Act, 1952.
 - f. Workmen's Compensation Act, 1923.
 - g. Stamp duty Act, 1898.
 - h. The company's instructions as issued from time to time in regard to working hours, wages, leave, holidays etc.
- 2.(a) The Contractor shall obtain license from the appropriate Labour Commissioner's office, of appropriate Government if he engages 20 (Twenty) or more workmen only.
- 2(b) If the contractor is awarded the contract then he should apply for Form -V from BHEL to obtain Labour license from Appropriate Government .Then the contractor must submit the labour license and PF registration code within fifteen days from the date of issue of LOI. Till then award will be treated as PROVISIONAL.
3. The contractor shall produce the following Registers and forms before commencement of work, verification by the Executing Officer of the company.
- a. Form XIII - Register of workmen employed by contractor (Rule 75).
 - b. Form XIV - Employment card issued by contractor (Rule 76).
 - c. Form XVI - Muster Roll (Rule 78 (1) (a) (i)).
 - d. Form XVII - Register of Wages (Rule 78 (1) (a) (i)).
 - e. Form XVII - Register of wages-cum Muster Roll (in case of weekly payment).
 - f. Form XIX - Wage slip (Rule 78 (b)).
 - g. Form XX - Register of deduction for damages or loss (Rule 78(1)(a) (ii)).
 - h. Form XXI - Register for fines (Rule 78 (1) (a) (ii)).
 - i. Form XXII - Register of advances (Rule 78 (1) (a) (ii)).
 - j. Form XXIII - Register of overtime (Rule 78 (1) (a) (iii)).
 - k. Form XXIV - Register to be sent by the contractor to licensing officer (Rule 82) (1).

The contractor shall maintain the above neatly, completely and legibly for inspection by various statutory authorities and the company officials even at short notice.

4. The contractor shall observe (a) Weekly rest day. (b)The company list of holidays.
5. The contractor shall make himself or his representative available at the work spot everyday during execution of work, for effective supervision.

Sign, Date & Seal of contractor



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6. The contractor shall attend to all inspections notified/conducted by the HR Department, Labour Department, P.F. authorities, Factory Inspectors, ESI Inspectors or any other such authorities under the act.
7. Non – compliance of any provisions under the act/ rule/instructions / guidelines shall make the contractor liable for penal action including termination of contract.
8. Contractor shall furnish in a separate letter his place of residence and postal address. The delivery at the above named place or posting in a Post box regularly maintained by the post and telegraph Department or sending letters registered for acknowledgement of any notice, letter or other communication to the contractor. Change in address shall come into force at any time by an instrument executed by the contractor and delivered to the Company official who has signed the contract.
9. The contractor must satisfy himself by personal study and examination of the drawings/specifications furnished and understands thoroughly the scope of proposed work in detail and all conditions affecting the work. There shall not be at any time dispute / complaint of any misunderstanding with regard to scope of work and interpretation of specifications or any misunderstanding with regard to nature or omission of the work to be done not shall any application for compensation in terms of time and money shall be accepted by company regarding the above.
10. Contractor shall in his absence keep competent agent constantly on the works and any directions or explanations given by the “Contract Signing Officer” or his representative to such agent shall be held to have been given to the contractor himself.
11. Contractor on the advice of company official shall immediately remove any person employed by him, who may in the opinion of the company official is incompetent or misbehaves or commits a deed of misconduct and such persons shall not be again employed on the works without permission of the company official.
12. The contractor shall erect and maintain at his own cost temporary weather proof sheds at such places approved by the company for keeping materials under cover.
13. The contractor shall give all notices required by the acts regulations, bye-laws, legal acts and pay all fees in connection therewith unless and otherwise arranged and decided in writing with the company. He shall also ensure that no attachments are made against materials or work forming part of or for the use of the contractor. In all such cases, contractor shall protect and indemnify the company against any claim or liability arising from or based on the violation of any such laws, ordinances, regulations, orders, decrees or attachments either by himself or by his employees,
14. It shall be contractor’s sole responsibility to protect the public and his employees against accident from any cause and provide required safety equipments and shall indemnify, the company against any claims for damages for injury to the person or

Sign, Date & Seal of contractor



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property resulting from any such accidents and shall, where the provisions of the workmen's compensation act apply, take steps to properly insure against any claims there under.

15. In the event of any accident in respect of which compensation may become payable under the Workmen's Compensation Act VIII of 1923 whether by the contractor or by the company as principal employer, it shall be lawful for the company to retain out of monies due and payable to the contractor such sum or sums of money as may, in the opinion of the company shall be final in regard to all matter arising in this clause.
16. No work shall be done on Sundays or on other declared holidays of the company without the written permission of the company officer in charge of the work. The contractor shall comply with the provisions of the Factories Act Rules framed there-under if the same are applicable.
17. The contractor shall keep his work place clean and safe to avoid injuries to men and damage to finished products / equipments.
18. On the occurrence of an accident, which results in the death of any of the workmen employed by the contractor or which is so serious as to be likely to result in the death of any such workmen, the contractor shall within 24 hours of the happening of such an accident intimate in writing to the company official in charge of the work.
19. The contractor shall indemnify the company against all losses or damages sustained by the company resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or dues if any and become payable by the company, as a consequence of failure, the company to give notice under the workmen's compensation act or otherwise confirm to the provisions of the said act in regard to such accident.
20. The contractor shall ensure adherence to all statutory requirements applicable to BHARAT HEAVY ELECTRICALS LIMITED, Varanasi.
21. The contractor shall abide by all the labour laws especially Contract labour (R & A) Act, Payment of wages Act, Workmen's compensation act, Minimum wages Act, ESI Act and Provident Fund Act as amended from time to time.
22. Notwithstanding the clause, in case of any financial loss incurred by the company on account of contravention of the Provident Fund regulations or any regulations of rule touching the same by the contractor, the contractor shall submit an undertaking to indemnify the company to the extent of the loss incurred by the company.
23. The contractor should engage only those labourers who shall be more than 18(eighteen) years of age.
24. The contractor may resort to sub-contracting but with prior written permission of BHEL. If found sub-contracting without permission of BHEL at a later date, BHEL

Sign, Date & Seal of contractor



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reserves the right to take whatever action it deems fit, including cancellation of the contract.

25. The contractor shall provide the required personal safety equipment , shoes, and tag on their dress for identifying contractor's name to labours engaged by him.
26. Contractor shall issue "Employment Card" as per statute to all the labour and supervisors covered under the job work contract.
27. The contractor shall be responsible to settle any grievances of the labour deployed by him/her.
28. Whenever the term "CONTRACTOR" is used, it shall be understood to refer to the particular person, firm or corporation with whom an agreement has been made by the concerned company official for executing the work defined in the concerned agreement and for the purpose of instructions regarding compliance with contract conditions, it shall include the contractor's authorised agents, who are entrusted with the work by contractor.
29. The quantities mentioned in the agreement schedule are tentative and may change as per the actual requirement at site for execution.
30. The company does not expressly or by implication agree that the actual amount of the work to be done shall correspond there with, but reserves the right to increase or decrease the quantity of any class or portion of the work as it deems necessary.
31. All the works shall be carried out in accordance with the directions and to the satisfaction of the company official in accordance with the drawings, specifications and instructions. Supplementing or explaining the same as may be, from time to time shall be done by the company official.
32. For all modifications, omissions or additions to the approved drawings and specifications, the company shall issue revised plans or written instructions.
33. The company shall have the privilege of ordering modifications, omissions, or additions at any time before completion of the work.
34. All materials, articles, and workmanship shall be the best of their respective kinds for the class of work described in the contract specifications and schedule and materials to be obtained by the contractor shall be from sources approved by the company.
35. Sample of materials shall be furnished by the contractor at his expense to the company when called for before execution of any work.
36. The company shall have power to reject at any stage, any work which is considered to be defective in quality of materials of workmanship and shall not be debarred from rejecting wrong material by reasons of having previously passed them. Any portion

Sign, Date & Seal of contractor



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of the work or materials rejected or pronounced to be inferior or not in accordance with specifications shall be removed from the work site at the contractor's expenses.

37. The decision of the company shall be final and binding on the contractor on all technical questions which may arise in the contract with respect to material, workmanship, removal; of improper work, interpretation of the working drawings, specifications, notes, procedures etc.
38. The decision of the "Contract Signing Officer" or any officer deputed by him duly authorized on his behalf, in respect of the rate of progress and the quality of work or material shall be final.
39. Contracts shall be deemed to have included in his tender, price of all the plants, Machinery and appliances required for the purpose of all operations connected to secure a satisfactory quality of work within the time specified.
40. If at any time, during the progress of work or any part of it such methods or equipment appear to the company official to be insufficient or inappropriate for ensuring the quality of work required or rate of progress, he may order the contractor to increase their efficiency or to improve their quality of work and the contractor shall comply with such order and on failure of which the company may take such action as it deems it fit to improve the quality of work of the company may take such action as it deems if fit to improve the quality of work or the rate of progress required from the contractor and all such actions taken by the company shall be at the cost and risk of the contractor.
41. It is open to the company to lend or supply to the contractor any tools, implement, material and machinery that are needed by the contractor, which in the opinion of the company is essential to improve the quality or progress of work. The contractor shall pay such deposit or charges that may be fixed or determined by the company for any such articles or machinery lent or hired to the contractor. See schedule "C"
42. Any electric power or water required for contractors' lighting/machinery or to use for execution of work under this tender shall be supplied **FREE OF COST** by the company at the written request of the contractor at one point subject to the observance of rules and regulations of Electric board / company. There shall be no recovery for supply of electricity but water charges shall be deducted as per prevailing rate of BHEL-Varanasi. If it is observed that power/water is being wasted, BHEL shall have the right to recover cost of such consumption including arrears. Power will **not** be allowed for **cooking** and **room (air) heating** in winter season: For this purpose, on written application chargeable power can be allowed. The rates shall be the rates as decided by BHEL-Varanasi.

Sign, Date & Seal of contractor



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43. The contractor shall confirm to the regulations and laws of central / state govt. or any local authority and that of the company with whose system the machinery is supposed to be connected.
44. All rubbish as it accumulates shall be removed from the site to the point of disposal as indicated from time to time by the company. If this is not adhered to, the company shall remove the scrap and recover the cost of these operations from the bills of the contractor but before passing of final bill.
45. Any sum due from the contractor on account of tools and plants, stores, or any other items provided by the company shall be deducted from the respective bill due to him.
46. In case of breach of any of the terms and conditions of the contract, a claim shall be lodged under the bank guarantee with the guarantor at the discretion of the competent authority of the company. On successful completion of the contract to the satisfaction of the company, the bank guarantee shall be released after due claim period.
47. In the event of any question or dispute or under this contract, the same shall be referred to a competent Authority in the company for sole arbitration and his decision shall be final and binding on the parties to the contract.
48. In case of any suit or other legal proceeding arising under this contract, the courts at Varanasi (UP) only shall have the Jurisdiction.
49. The company reserves the right to enter into parallel agreement with one or more contractor(s) at its discretion.
50. Disputes, grievances between the contractor and his labour, will have to be settled by the contractor himself/herself.
51. The labor employed by the contractor, if found in betting with fellow labour or contractors or any BHEL employee, the same shall be considered as an act of indiscipline. Such laborers shall be removed from the services of the contractor, on the advice of BHEL. Further the contractor shall initiate every necessary action in accordance with the relevant Laws, Rules & Regulations and enactments of State and Central Government.
52. Wherever, BHEL/COMPANY standards are mentioned, same shall be strictly followed.
53. Nothing contained in the contract agreement and its conditions shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the contractor personally.
54. The works have to be carried out as per CPWD's specifications, Wherever CPWD specifications are silent, work shall carry out as per BIS specifications. In case of

Sign, Date & Seal of contractor



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defective work, BHEL will have full right to reject the work or part thereof. Such defective work if any will have to be rectified at contractor's cost. The opinion of Engineer in charge shall be final in this matter. If the defective work is allowed to stand, BHEL shall have the absolute right to reduce the rates for such items and the contractor shall have no claims over such defective work allowed on reduced rates.

55. The contractor shall have to make his own storage sheds for materials to be issued by BHEL. If deemed necessary by engineer in charge, the contractor shall make separate store for cement with double lock system. **All recoveries due from the contractor for the month/period shall be affected in full from corresponding running bills. The recoveries shall be Income Tax, VAT (as applicable), and water charges and hire charges of any T&P issued to contractor by BHEL.**

NOTE: BHEL General Condition of contract (G.C.C.) will also be applicable in addition to this tender document.

Sign, Date & Seal of contractor



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ANNEXURE -A

FINANCIAL VIABILITY

1.	Owner's capital in the business (in case of partnership, please mention percentage shares and amounts)	Rs :
2.	Quantum of business done during last three financial years 2013-2014 2012-2013 2011-2012	Rs. Rs. Rs.
3.	Value of fixed Assets of the Business in last three years 2013-2014 2012-2013 2011-2012	Rs. Rs. Rs.
4.	Guarantee limits (if any) enjoyed by the firm	Rs.
5.	Over draft limits (if any) enjoyed by the firm	Rs.
6.	Please enclose audited profit and loss account and balance sheet for last 3 years ending 31 st March 2014 (indicate no. of sheets)	
7.	Certificate from Scheduled Bank to prove contractor's financial capacity to undertake the work duly indicating the financial limits the tenderer enjoys	
8.	PERMANENT ACCOUNT NUMBER (PAN):	

Note: All the above documents should be duly certified by auditors /Bank as may be applicable.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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**ANNEXURE - `B`
ANALYSIS OF SIMILAR JOBS EXECUTED/IN PROGRESS**

Sl. No	Agency by whom awarded	Location of the Project	Particulars of the works awarded	Executed Contract value	Date of completion

**ANNEXURE -C
DECLARATION SHEET**

I,on behalf of M/s.....
..... hereby certify that,

1- All the information and data furnished by us with regard to this Tender No:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014 are true and complete. We have gone through the specification, conditions and stipulations in detail and agree to comply with the requirements and intent of specifications.

2- Our firm has not been black listed by any BHEL unit or any other Govt / Public sector organization.

3- Our firm has never been found guilty by a court of law in India for any crimes of fraud, dishonesty or moral turpitude.

4- We agree to abide by all statutory and legal requirements of Central / State Government.

We, further declare that, the rates quoted by us in price bid are unconditional and unambiguous.

Date

Name, Sign & Seal of the bidder

Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

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ANNEXURE – D

CHECKLIST & SCHEDULE OF GENERAL PARTICULARS

NOTE: Tenderers are requested to fill in the following details and no column should be left blank.

1.	Name & Address of the Tenderer	
2.	E-mail ID	
3.	Phone/Mobile No. (Office) Fax No.	
4.	Name & designation of the official of the tenderer to whom all the references shall be made	
5.	Tenderer's proposal No. & date	
6.	Whether Tender Cost/EMD submitted (Demand Draft). Give detail.	
7.	Validity of offer/rates quoted for six months from the date of opening of tender	Yes/ No
8.	Financial Status as per Clause 9.1 (in the format Annexure 'A')	Yes/ No
9.	Permanent account Number as per Clause 9.1	
10.	Details of experience as per Clause 9.3 (in the format Annexure 'B')	Yes/ No
11.	Attested copy of power of attorney as per clause 9.5	Yes/ No
12.	Details about type of the firm as per clause 9.6	
13.	Declaration sheet as per clause 9.7 (in the format Annexure 'C')	Yes/ No
14.	P.F. Code No	
15.	Service Tax Registration Number(PAN based)	
16.	ESI policy no-	
17.	Valid Central labour license no. & date	
18.	Blank price-bid, clause 9.2	
19.	TIN no.	
20.	Consultant detail if appointed	

Note: - Documentary proof in support of all aforesaid to be submitted along with Techno Commercial Bid (Part II)

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

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**ANNEXURE – E
CONTRACT**

(To be issued in appropriate valid non –judicial stamp paper issued from State of Uttar Pradesh)

THIS AGREEMENT MADE THIS..... DAY OF 200.... Between BHARAT HEAVY ELECTRICALS LIMITED, Varanasi (A Government of India Enterprise) a Company incorporated under the Companies Act 1956, having its registered office at BHEL House, Siri Fort, New Delhi – 110 049 (hereinafter called BHEL) of the ONE PART

AND

..... (hereinafter called the `Contractor`) of the SECOND PART.

WHEREAS M/s state that they have acquired and possess extensive experience in the field of and whereas in response to an Invitation to Tender No..... dated issued by BHEL for the execution of the Contractor submitted their offer dated..... And whereas BHEL has accepted the offer of the Contractor on terms and conditions specified in the Letter of Intent No..... dated..... Read with the reference cited therein.

THIS AGREEMENT WITNESSESS AND it is hereby agreed by and between the parties as follows:

That the Contractor shall execute the work of and more particularly described in Tender specification (hereinafter called the said works) in accordance with and subject to terms and conditions contained in these presents, Instructions to Tenderers, General Conditions of Contract, Special Conditions, annexure, Letter of Intent dated and such other instructions, drawings, specifications given to him from time to time by BHEL.

The Contractor is required to furnish to BHEL Security Deposit in the forms of cash/approved securities / Bank Guarantee valid upto for a sum of Rs..... (Rupees) towards satisfactory performance and completion of the Contract.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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The Contractor has furnished a Guarantee bearing No..... Dated for a sum of Rs..... (Rupees.....) executed byBank in favour of BHEL towards Security Deposit valid up to.....(The Contractor has furnished to BHEL an initial Security Deposit of Rs..... in cash /Approved Securities/BG for Rs..... And has agreed for recovery of the balance security deposit by BHEL..... @ 10% of the value of work done from each running bill till the entire security deposit is recovered).

The contractor hereby agrees to extend the validity of the Bank Guarantee for such further period or periods as may be required by BHEL and if the contractor fails to obtain such extension (s) from the Bank, the contractor shall pay forthwith or accept recovery of Rs..... from the bills in one installment and the Contractor further agrees that failure to extend the validity of the Bank Guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum of Rs.....

That in consideration of the payments to be made to the contractor by BHEL in accordance with this Agreement the Contractor hereby convenience and undertakes with BHEL that they shall execute, construct, complete the works in conformity, in all respects, with the terms and conditions specified in this Agreement and the documents governing the same.

That the Contractor shall be deemed to have carefully examined this Agreement and the documents governing the same and also to have satisfied himself as to the nature and character of the works to be executed by him.

That the Contractor shall carry out and complete the execution of the said works to the entire satisfaction of the Engineer or such other officer authorised by BHEL, within agreed time schedule, the time of completion being the essence of the Contract.

Sign, Date & Seal of contractor



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That BHEL shall, after proper scrutiny of the bills submitted by the Contractor; pay to him during the progress of the said works such sum as determined by BHEL in accordance with this Agreement.

That this Agreement shall be deemed to have come into force from the date on which the letter of intent has been issued to the Contractor.

That whenever under this contract or otherwise, any sum of money shall be recoverable from a payable by the Contractor, the same may be deducted in the manner as set out in the General Conditions of Contract or other conditions governing this Agreement.

That all charges on account of Octroi, Terminal and other Taxes including sales tax or other duties on material obtained for execution of the said works shall be borne and paid by the Contractor.

That BHEL shall be entitled to deduct from the Contractor's running bills or otherwise Income Tax under Section 194(C) of the Income Tax Act, 1961.

That BHEL shall be further entitled to recover from the running bills of the contractor or otherwise such sum as may be determined by BHEL from time to time in respect of consumables supplied by BHEL, hire charges for tools and plants issued (where applicable) and any other dues owed by the contractor.

That it is hereby agreed by and between the parties that non-exercise, forbearance or omission of any of the powers conferred on BHEL and/or any of its authorities will not in any manner constitute waiver of the conditions here to contained in these presents and the liability of the Contractor with respect to compensation payable to BHEL or Contractor's obligations shall remain unaffected.

It is clearly understood by the between the parties that in the event of any conflict between the Letter of Intent and other documents governing this Agreement, the provisions in the letter of intent shall prevail.

The following documents:-

(a) Invitation to Tender No..... and the documents specified therein

Sign, Date & Seal of contractor



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(b) Contractor's Offer No..... date.....

(c) Letter of Intent No..... date

(d)

shall also form part of & shall govern this Agreement.

IN WITNESS HEREOF, the parties hereto have respectively set their signature in the presence of:

(CONTRACTOR)

to be signed by a person holding a valid Power of Attorney

WITNESS: -1.

2.

WITNESS: - For and on behalf of Bharat Heavy Electricals Ltd, Varanasi

1.

2.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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ANNEXURE - "F"

(TO BE EXECUTED ON A NON- JUDICIAL STAMP PAPER OF VALUE OF Rs 100/-)

PERFORMANCE BANK GUARANTEE/ SECURITY DEPOSIT

B.G. No _____ Date _____ This
Deed of Guarantee made this the _____ day of _____ Two thousand
between M/s _____ (Bank)

_____ Hereinafter called "the Guarantor" (which expression shall
unless repugnant to the context or meaning thereof be deemed to include its
successors and assigns) of the ONE PART and M/s Bharat heavy Electricals Limited (a
Government of India Undertaking) a Company incorporated under the Companies Act.
1956, having its Registered Office at BHEL House Siri fort, New Delhi - 110 049 through
its Unit At Varanasi - 284129 Uttar Pradesh hereinafter called "the company" (which
expression shall unless repugnant to the context or meaning thereof be deemed to
include its successors and assigns) of the OTHER PART:

WHEREAS M/s _____ (hereinafter referred to as the contractor)
have entered in to a contract Bearing No. _____ dated _____ with
the company.

AND WHEREAS The Contractor has approached the Guarantor and in consideration of
the arrangement arrived at between the Contractor and the Guarantor, the guarantor
has agreed to give the Guarantee as hereinafter mentioned in favour of the Company.

(Full Signature of the Executants with seal)

NOW THIS DEED WITNESSES AS FOLLOWS

This Guarantor do hereby Guarantee to the Company the due and faithful performance,
observance or discharge of the Contract by the contractor and further unconditionally
and irrevocably undertake to pay to the Company without demur and merely on a
demand, to the extent of Rs _____/- (Rupees _____ only) and claim
made by the Company on them for any loss, damage, costs, charges and expenses
caused to or suffered by the Company by reason of the Contractor making any default
in the performance, observance or discharge of the terms conditions, stipulations or any
one of them a contained in the Contract.

2. The decision of the Company whether any default has been occurred or has
been committed by the contractor in the performance, observance or
discharge of any of the terms, conditions, stipulations or undertakings or any
one of them as contained in the Contract and/or to the extent of loss,
damage, costs, charges and expenses caused to or suffered by the Company
by reason of the Contractor making any default in the Performance,

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the Guarantor irrespective of the fact whether the Contractor admits or denies the default or questions the correctness of any demand made by the Company in any Court, Tribunal or Arbitration Proceedings or before any other Authority.

3. The Company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the contract or extend time of performance by the contractor or to postpone for any time and from time to time any of the powers exercisable by it against the Contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the contract or securities available to the Company and the Guarantor shall not be released from its liability under those presents by any exercise by the Company of the liberty with.

(Full Signature of the Executants with seal)

Reference to the matters aforesaid or by reason of time being given to the Contractor any other forbearance, act or omission on the part of the Company or any indulgence by the Company to the Contractor or of any other matter or thing whatsoever which under the law relating to sureties would, but for this provision has the effect of so releasing the Guarantor from its liability under this Guarantee.

4. The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect from _____ to _____ i.e the period that would be taken for the performance of the Contract and its claims satisfied or discharged and till the Company certifies that the terms and conditions of the Contract have been fully and properly carried out by the contrac and accordingly discharges this Guarantee, subject, however, that the Company shall have no claim under this Guarantee after date _____ unless a notice of the claim under this Guarantee has been served on the Guarantor within _____ months from the expiry of the said period in which case the same shall be enforceable against the Guarantor notwithstanding the fact that the same is enforced after the expiry of the said period.

5. The Guarantor undertakes not to revoke this Guarantee during the period it is in farce except with the previous consent of the Company in writing and agree that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the Contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

6. It shall not be necessary for the Company to proceed against the Contractor before proceeding against the Guarantor and the Guarantees herein contained shall be enforceable against them notwithstanding any security which the4 Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealized .

(Full Signature of the Executants with seal)

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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7. The Guarantor hereby declare that it has power to execute this Guarantee under its memorandum and Articles of Association and the executants has full powers to do so on its behalf under the power of attorney a granted to him by the proper authorities of the Guarantor.

8. Notwithstanding any this contained herein before the Guarantee is restricted to Rs. _____ (Rupees _____ only) and shall remain in force from _____ to _____ with a claim period of _____ 3 months thereafter .

9. IN WITNESS WHEREOF THE _____ (bank) hereunto set and subscribed its hands the day, month year firs above written.

SIGNATURE FOR AND ON BEHALF OF THE BANK WITH SEAL

WITNESSES:

(1)

(2)

(Not to be typed on Bank Guarantee).

1. The Bank Guarantee should be from a Nationalized Bank.
2. The Bank Guarantee has to be directly sent by the Banker to BHEL with a covering letter.
3. **Date of execution of B.G. should be after the date of purchase of the Non Judicial stamp paper.**
4. Bank Guarantees executed in foreign countries must be confirmed by an India Bank or Indian Embassy/ Consulate in that country and should be registered in India by affixing requisite no- judicial stamp.
5. Where pre bid tie up is made, both parties shall submit the bank guarantee against the value of work to be done by them.

Sign, Date & Seal of contractor



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ANNEXURE – “G”

INDEMNITY BOND

WHEREAS THE (Name of the contractor) M/s. _____, having its registered office at, _____ has taken the contract for tender NO.....dated & Contractor's Offer No.....datedbut the sub-contractors have also to obtain license under the contract Labour (Regulation & Certificate under Form-V of the said rules. So on the request of (Name of the contractor) M/s.....vide his letter datedM/s Bharat Heavy Electricals Limited, Varanasi has agreed to issue certificate in Form-V in respect of the sub-contractor mentioned below. The contractor shall sole responsible for compliance of laws normally Labour laws rules , Industrial law, U.P.factory act 1948, Contract labour (Regulation & abolition act) 1970 for applicable to U.P. industries . Similarly the contractor shall also be responsible /indemnify if any claim /demand raised by authority of all U.P. state under central acts namely M/s, therefore, undertake to fully indemnify the M/s Bharat Heavy Electricals Limited, Varanasi from any financial implication whatsoever that may arise due to the grant of certificate in respect of sub-contractors of (name of the contractor in Form-V under contract Labour (Regulation & Abolition) Act. 1970 and its rules.

- 1.
- 2.
- 3.

Contractor

Sign, Date & Seal of contractor



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ANNEXURE – H

The following Indian Standards codes shall be followed for missing information in the tender.

I. Steel work:

1. I.S 814 – 1974: Part – I Specifications for covered electrodes for (Or latest) metal arc. Welding of structural steel – for welding products other than sheets. Part II for welding sheets.
2. I.S 818 – 1968: Code of practice for safety & health requirements (Or latest) in electric and gas welding and cutting operations.
3. I.S 1852 – 1973: Specifications for rolling and cutting tolerances (Or latest) for hot rolled and steel products.
4. I.S 816 – 1969: Code of practice for use of metal arc welding for (Or latest) general construction in mild steel.
5. I.S 102 – 1992: Ready missed paint, brushing red lead non-silting (Or latest) priming.
6. I.S 1363 – 1957: Black hexagonal bolts, nuts, etc. (Or latest)
7. I.S 813 – 1961: Scheme of symbol for welding. (Or latest)

II. Any relevant I.S code of practices.

III. CPWD,NBC standard for building/fire fighting work and latest TAC rules.

CONTRACTOR (S)

ACCEPTING AUTHORITY

Sign, Date & Seal of contractor



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(SPECIAL CONDITIONS – SAFETY)

1. The following are a few safety measures suggested while carrying the work. However all the items of work should be carried out in safe working manner taking all precautions?
2. Proper and necessary precautions shall have to be taken wherever the work involves breaking of reinforced cement concrete slab and dismantling of brick work. These items of work will have to be carried in the presence of the Engineer-in-charge.
3. Proper and necessary scaffolding is to be erected wherever work is carried out at height more than 1.80 M.
4. The contractor shall keep supply all safety equipment like safety boots, goggles helmets and safety belts, to all the workers.
5. The contractor shall keep a supervisor always at work site.
6. Power shut down shall be taken before commencement of the work wherever power cables are running.
7. Proper and necessary scaffolding and ladders are to be used for carrying out all types of works.
8. The contractor shall provide safety nets to the work force during the execution of work at height of more than 3 meters and as directed by the engineer in charge.
9. The contractor shall take all necessary safety precautions and arrange for appropriate appliance to its authorized officials to prevent loss of human lives, injuries to personnel engaged and damage to property.
10. The Contractor shall provide to the work force and ensure the use of the following personnel Protective Equipment as found necessary and as directed by the authorized BHEL Officials.
 - i) Safety Helmets conforming to IS: 2925, 1981
 - ii) Safety belts conforming to IS: 3521, 1983
 - iii) Safety shoes conforming to IS: 1.4544. 1998
 - iv) Eye, and face protection devices conforming to IS: 1179, 1967.
 - v) Hand and body protection devices conforming to IS: 2573 - 1975, IS: 6994 - 1973 and IS 8520 - 1978, IS: 578-1985 and IS 6694.

Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

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SAFETY IN CIVIL ENGINEERING WORKS

1. While working at heights, a safe foot holds and hands holds should be provided.
2. No loose material should be allowed to remain in the vicinity of persons working at Heights due to which they may inadvertently loose there balance and fall down.
3. Wherever, it is reasonable practical, workers should be made to use safety belts.
4. Ladders, crawling ladders and crawling boards are to be provided if a person has pass across or work on or from any material liable to fracture under his weight and cause him to fall more than 1.98 meters.
5. In considering whether a material is likely to fracture beneath a person's weight, regard must be had to any additional weight he may be carrying or supporting.
6. Ladders crawling boards etc., to be securely supported and if necessary secured to prevent slipping.
7. Guard rails, coverings or other suitable means may be used to prevent person stepping on to fragile material, while working or passing near it if such material is likely to fracture under his weight and cause him to fall more than 1.98 meters.
8. While working on sloping roofs, suitable, crawling, boards or crawling ladders should be used. These crawling ladders should be properly supported and securely enhanced to the sloping surface or the roof ridge.
9. Suitable and sufficient means are to be provided to prevent fall of articles from a sloping roof.

DEMOLITION:

1. Safe access should be provided to every place at which any person has to work. Scaffolds to be provided for all work that cement safety be done otherwise.
2. Shoring or either steps are to be taken to prevent accidental collapse of the building or part of the building being dismantled.
3. Similar precautions are to be taken against collapse of any adjacent building, if this would involve danger.
4. No steel work or iron work is to be cut or released unless precautions are taken to avoid danger from sudden twist, spring or collapse.
5. No framing is to be removed unless all practicable steps are taken to avoid collapse of the structure.
6. Demolition work is to be placed under the supervision of a competent person experienced in demolition work.

EXCAVATIONS:

Sign, Date & Seal of contractor



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1. Barriers are to be provided round excavations, shafts, pits and opening into which persons can fall a vertical distance of 1.98 meters. These barriers are to be as close as practicable to the edge of the excavations and are to be erected as soon as practicable after excavating begins. They are to be maintained in position except when necessarily removed for the access of persons or materials.
2. Adequate and suitable timbering should be used to prevent danger from falls or dislodgement of sides of excavations etc., or materials adjacent to it. Timbering is to be done as early as practicable in the course of work.
3. No person should be allowed to work in any excavation. Shaft or tunnels after explosives have been used in or near it, in a manner likely to affect stability, until a thorough examination has been made by a responsible person.
4. No person should be allowed to work in any excavation, Shaft or tunnels after an unexpected fall of work rock, earth or to her material or after substantial damager to timber or other supports, unless the part concerned is thoroughly examined by a responsible person declared safe.
5. No material should be placed near the edge of the excavation so as to endanger persons below. No load should be placed or removed near the edge of an excavation etc., where it is likely to cause the collapse of the side of the excavation and so endanger to any person.
6. If excavation is likely to affect the security of the structure (permanent or temporary) steps must be taken to safeguard persons employed from possible collapse of that structure.
7. Means of reaching a place of safety is to be provided, when there may be danger from rising water or irruption of water or materials.
8. Means to prevent over running are to be taken when vehicle is used to tip material into pit or excavation or over the edge of embankment or earth work.

LADDERS:

1. Ladders to be used should be of good construction, of a suitable and sound material of adequate strength.
2. Ladders with missing or defective rungs should not be used.
3. Wooden stiles or sides and wooden rungs should have grain-running length wise.
4. Rungs should be properly fixed to the sides.
5. Ladders standing on a base are to be equally and properly supported on each stile or side.
6. Ladder standing on a base to be securely fixed near its upper resting place, if such fixing is impractical the ladder must be fixed at or near its lower end. If this is also impracticable a person, must be stationed at the feet of the ladder to prevent it from slipping.
7. Ladder should not be placed on loose bricks or loose packing.

Sign, Date & Seal of contractor



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8. Except when there is an adequate handhold, ladder must rise to a height of at least 3 feet 6 inches (1.00 Mtr.) above the landing place or above the heights rung reached by the feet of persons using the ladder.
9. Space at each rung to be sufficient to provide adequate foot hold.
10. Openings in landing places through which ladders pass should be as small as practicable.
11. Folding steps ladders should have level and firm footing and should not stand on loose bricks or other loose packing.

SCAFFOLDS:

1. Materials used for scaffolds should be of sound and adequate strength.
2. The timber used should be suitable quality, good condition, bark complete stripped off, and without paint or other treatment, which would prevent defects from being easily seen.
3. Timber and material with projecting nails should not be used.
4. Metal parts should be of suitable quality, in good condition, free from corrosion or other patent defects likely to affect strength.
5. Defective parts or materials should not be used and no defective ropes or bonds should be used.
6. Standards or uprights should be vertical or slightly inclined towards the building or other structure, where practicable and to be sufficiently close to ensure stability.
7. Displacement or sinking of standards or uprights to be prevented either by provision of base plates or either adequate means.
8. Ladders used as uprights to be adequate strength secured to prevent slipping and so placed that the two stiles of sides of each ladder are evenly supported.
9. Ladders are to be horizontal, as nearly as possible and should be secured to standards or uprights by efficient means.

WORKING PLATFORMS:

1. All working platforms should be closely boarded, planked or plated.
2. Boards should be of sufficient thickness having regard to the distance between putlogs other supports.
3. All boards should be at least 51 mm thick and 210 mm wide.
4. Boards should rest securely and evenly on their supports. Each board should have at least three supports unless the thickness and the distance between the supports are such as to present on due or unequal staging when, supported on the two pipes.
5. No board should project beyond for more than four times its thickness, unless secured to prevent tipping.

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6. No board should project to an extent which makes it unsafe having regard to its thickness and strength and the weight likely to be on it.
7. The platforms should be of adequate width to give sufficient working space.
8. The platforms should extend at least 600 mm. beyond, the end of wall or working face if work is being done at that end of the wall of face.
9. The platforms should have guard rails to a height of between 920 mm and 1150 mm. above the platform or any raised part of it.
10. The platforms should have toe-boards high enough to prevent falls of persons, tools and materials, with a minimum height of 15.5 mm. space between the toe-boards and the lowest guard rail should not exceed 760 mm. guard rails and toe-boards should be on the inside of uprights unless there is some other means of preventing their outward movement.
11. Guard rails and toe-boards should always remain in position except when removal is necessary for the access of persons or materials, or other necessary purposes of the work.

SAFETY NETS AND BELTS:

1. If all or any of the above requirements is not practicable, resources may be taken to use suitable safety belts or nets to prevent persons falling from heights of 1.98 meters and above.
2. Safety belts when used should be attached continuously to suitable and fixed anchorages.
3. Safety nets should be maintained in all positions necessary to protect persons at work, except in so far as they have to be temporarily removed for the passage of materials or for any other purposes.

MATERIAL HANDLING AND STORAGE

Adequate arrangement be made for material handling & storage taking due care against damages.

ACCOUNTING

Proper method of accounting of tor steel, cement & scrap material be followed. The books of such accounting are offered for auditing by BHEL at pre-decided regular interval.

If the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipments or to carry out instructions issued by the authorized BHEL officials, BHEL shall have the right to take corrective steps at the risk and cost of the contractors.

In case of a fatal or disabling injury accident to any person due to lapses by the contractor, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim or his/her dependents. Before imposing the penalty, appropriate enquiry shall be held by BHEL.

Sign, Date & Seal of contractor



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In case of any damage to propriety due to the lapses by the contractor, BHEL shall have the right to recover the cost of such damages from the contractor after holding an appropriate enquiry.

In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from the payments due to the contractor after notifying the contractor suitably.

If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so, BHEL shall have the right to terminate the contract and get the job completed at the risk and cost of the sub contractors.

Sign, Date & Seal of contractor



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GENERAL CONDITIONS OF CONTRACT (GCC)

INTERPRETATION AND DEFINITIONS

1. Singular & Plural :
Where the context so requires, words importing the singular only also include the plural and vice versa.
2. Headings and Marginal Notes to Conditions:
Heading and marginal notes to these General Conditions shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.
3. Definitions:
 - (a) Company/ Corporation shall mean Bharat Heavy Electricals Ltd. Having its register office at Varanasi, Post Office and Town Varanasi, in the State of U.P. and includes a duly authorized representative of the Company/ Corporation or any other person empowered in this behalf by the Company/ Corporation to discharge all or any of its functions.
 - (b) The "Accepting Authority" shall mean DGM (Maint.), BHEL VARANASI.
 - (c) The "Contract" shall mean the notice inviting the tender, the tender and acceptance thereof and the formal agreement, if any, executed between the Bharat Heavy Electricals Ltd. Varanasi and the contractors together with the documents referred to therein including these conditions with appendices and any special conditions, the specifications, designs, drawings, schedule of quantities with rate and amounts and schedule of rates. All these documents taken together shall be deemed to form one contract and shall be complementary to one another.
 - (d) The "Contractor" shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal representatives of such individual or persons composing such firm or unincorporated company, or successor of such firm or company as the case may be and permitted assigns of such individual or firm or company.
 - (e) The "Contract Sum" shall mean:
 - [i] in the case of Lump Sum Contracts the sum for which the tender accepted ;
 - [ii] in the case of Percentage Rate Contracts the Estimated value of the works as mentioned in the tender adjusted by the contractor's percentage;

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- [iii] in the case of item rate contracts the cost of the works arrived at after extension of the quantities shown in Schedule of Quantities by the item rates quoted by the tenderer for the various items.
- (f) A "Day" shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.
- (g) "Engineer – in – Charge" shall mean the engineering officer appointed by the under taking or his duly authorized representative who shall direct, supervise and be in charge of the works for purposes of this contract.
- (h) "Expected Risks" are risks due to riots (otherwise than among Contractor's employees) and civil commotion (in so far as both these are uninsurable)' war (whether declared or not), invasion, act of foreign enemies, hostilities, civil war rebellion, insurrection, military or usurped power any acts of government, damage from aircraft, acts of god, such as earthquake lighting and unprecedented floods and other causes over which the contractor has no control and accepted as such by the Accepting Authority of causes solely due to use or occupation by the Company/ Corporations of the part of Works in respect of which a certificate of completion has been issued or a cause solely due to Company's/ Corporation's fault design of Work.
- (i) "Market Rate" shall be the rate as decided by the Engineer – in – charge on the basis of the cost of materials and labour at the site where the work is to be executed, plus 15% to cover all over- heads and profit.
- (j) Schedule (s) referred to in these conditions shall mean the relevant schedule (s) annexed to the tender papers issued by the company/ corporation or the standard schedule of Rates prescribed by the Company/ Corporation and the amendments thereto issued from time to time.
- (k) The "Site" shall mean the lands and/ or other places on, under, in or through which the work is to be executed under the contract including any other lands or places which may be allotted by the company/ corporation or used for the purposes of the contract.
- (l) "Temporary Works" shall mean all temporary works of every kind required in or about the execution, completion, maintenance of the works.
- (m) "Urgent Works" shall mean any urgent measures which, in the opinion of the Engineer – in – Charge, become necessary during the progress of the works to obviate any risk of accident or failure or which become necessary for security.
- (n) A "Week" shall mean seven days without regard to the number of hours worked in any day in that week.
- (o) The "Works" shall mean the works to be executed in accordance with the contract or part [s] thereof as the case may be and shall include all extra or

Sign, Date & Seal of contractor



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additional, altered or substituted works or temporary and urgent as required performance of the Contract.

SCOPE AND PERFORMANCE

4. Contract Documents:

The Contractor shall be furnished, free of charge, a certified true copies of the Contracts Documents except standard specification and the schedule of rates and of all further drawings which may be issued during the progress of the works. He shall keep one copy of the documents on the site in good order, and the same shall at all reasonable times be available for inspection and use by the Engineer – in – Charge, his representatives or by other Inspecting Officers.

- (1) None of these Documents shall be used by the Contractor for any purpose other than that of this Contract.
- (2) The Contractor shall take necessary steps to ensure that all persons employed an any work in connection with this contract have noticed that the Indian Official Secrets Act, 1923 (XIX of 1923) applies to them and shall continue so to apply even after the execution of such works under the contract.

5. Work to be carried out:

The work to be carried out the contract shall except as otherwise provided in these conditions, includes all labour, materials, tools, plant, 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 shall, unless otherwise stated, be held to include waste no materials, carriage and cartage carry in returns of empties, hoisting, setting, fitting, and fixing in position and all other labours necessary in and for the full and entire execution completion as aforesaid in accordance with good practice and recognized principles.

6. Inspection of Site:

The contractor shall inspect and examine the site and, its surroundings and shall satisfy himself before submitting his tender as to the nature of the ground and subsoil (so far as is practicable), the form and nature of the site, the quantities and nature of work and materials necessary for the completion of the work and to means of access to the site, the accommodation he may require and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or effect his tender. No extra charges consequent on any misunderstanding or otherwise shall be allowed.

7. Sufficiency of Tender:

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

8. Discrepancies and Adjustment Errors:

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.

- (1) 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.
- (2) Any error in description, quantity or rate in Schedule of Quantities or any omission there from 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 form any of his obligations under the contract.
- (3) If on check there found to/be differences between the rates given by the contractor in words and figures or in the amount worked out by him in the schedule of quantities and general summary, the same be adjusted in accordance with the following rules:
 - (a) In the event of a discrepancy between description in words and figures quoted by a tenderer, the description in words shall prevail.
 - (b) In the event of an error occurring in the amount column of schedule of quantities as a result of wrong extension of the unit rate and quantity the unit rate shall be regarded as firm and extension shall be amended on the basis of the rate.
 - (c) All error in totaling in the amount column and in carrying forward totals shall be corrected.
 - (d) The totals of various sections of schedule of quantities amended shall be carried over to the general summary and the tendered sum amended accordingly. The tendered sum so altered shall, for the purpose of the tender, be substituted for the sum originally tendered and considered for acceptance instead of the original sum quoted by the tenderer. Any rounding off of totals in various section of Schedule of Quantities or in General Summary by the tenderer shall be ignored:

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9. Security Deposit:
Please refer techno-commercial bid.
10. Deviations / Variations, Extent & Pricing:
The Engineer – in – Charge shall have power (i) to make alteration in omissions from, additions to or substitution 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 Work in case of non- availability of a portion on the site or for any other reason, and the Contractor shall be bound to carry out the Works in accordance with any instructions given to him in writing signed by the Engineer – in – Charge and such alteration, omissions additions, or substitution 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 above specified as part of the work, shall be carried out by the Contractor on the same conditions in all respects including price on which agreed to do the main work except as hereinafter provided. No work which radically changes the original nature of the Contract shall be ordered by the Engineer – in – Charge as a deviation.
- (a) Rates for such additional, altered or substituted work shall be determined by the Engineer – in – Charge as follows:
- (i) If the rate for additional, altered or substituted item of work is specified in the Schedule of Quantities, the Contractor shall carry out the additional, altered or substituted item at the same rate. In the case of composite tenders. Where two or more schedules of quantities may form part of contract, the applicable rate shall be taken from the schedule of quantities of that particular part in which the deviation is involved, failing that at the lowest applicable rate for the same item of work in the other schedule of quantities.
- (ii) If the rate for any altered , additional or substituted item of work is not specified in the schedule of quantities , the rate for that item shall be derived from the rate for the nearest similar item specified therein. In case of composite tenders where two or more schedules of quantities form part of the contract, the rate shall be derived from the nearest similar items in the bill of Quantities of the particular parts of works in which the deviation is involved failing that from the lowest of the nearest similar items in other schedule of quantities.
- (iii) If the rate for any additional, altered or substituted item of work cannot be determined in the manner specified in sub- paras (i) and (ii) above, then such item of work shall be carried out at the rate entered in the Schedule of Rates plus/ minus the percentages by

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which the tendered amount of the works is higher or lower than the pre priced amount shown in the Schedule of Works. (Applicable to Lump- sum Contracts based on pre priced Schedule of Works.)

- (iv) If the rate for any altered , additional or substituted item of work cannot be determined in the manner specified in sub paras [i] to [ii] above, then the rate for such item of work shall be derived from the schedule of rates specified in sub-para [iii] above plus/ minus the percentage mentioned in that sub-para : Provided always that if rate (s) for part (s) of an item (s) is / are not specified in the schedule of rates the rate(s) for such parts (s) shall be determined by the Engineer – in – Charge on the basis of the purchase price as supported by the vouchers unless the Engineer – in – Charge finds the purchase price unreasonable. In the latter event the price shall be determined on the basis of markets rate (s) prevailing during the fortnight following the date of the order.
- (v) If the rate for any altered , additional, or substituted item of work cannot be determined in the manner specified in sub- paras [i] to [iv] above the Contractor shall, within 14 days of the date of receipt of the order to carry out the said work, inform the Engineer – in – Charge of the rate which he proposes to claim for such item of work, supported by analysis of the rate claimed, and the Engineer – in – Charge shall, within three months there after , giving due consideration to the rate claimed by the Contractor determine the rate on the basis of market rate [s], In the event of the Contractor failing to inform the Engineer – in – Charge within the stipulated period of time, the rate which he proposes to claim the rate for such item shall be determined by the Engineer – in - Charge on the basis of market rate [s].

11. Suspension of Works

- (a) The contractor shall, on receipt of the order in writing of the engineer – in – charge, suspend the progress of the works or any part thereof for such time and in such manner as the engineer – in – charge may consider necessary for any of the following reasons :

On account of any default on part of the contractor or for proper execution of the works or part thereof **for reasons other than the defaults of the contractor** or for safety of the works of 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 the engineer – in – charge.

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- (b) If the suspension is ordered for reasons highlighted above, the contractor shall be entitled to an extension of time equal to the period of every such suspension PLUS 10%.
- (c) If the works or part thereof is suspended on the orders of the engineer – in – charge for more than three months at a time , except when suspension is ordered for reason (i) in sub- para (a) above, the contractor may after receipt of such order serve a written notice on the Engineer – in – charge requiring permission within fifteen days from receipt by the Engineer – in – charge of the said notice, to proceed with the works 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 effects only part of the works as an omission of such part by the company / corporation under conditions 9 & 10 or where it effects the whole of the works, as an abandonment of the works to the company – corporation shall within ten days of expiry of such period of 15 days to give notice in writing of his intention to the Engineer – in – charge. In the event of the contractor treating the supervision as an abandonment of the contract by company/ corporation, he shall have no claim to payment of an compensation on account of any profit or advantage which he may 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 compensation, as the Engineer – in – charge may consider reasonable, in respect of salaries and/ or wages paid by him to his employees and labour at site, remaining idle in consequence and of materials collected which could not be utilized on the works, adding to the total there of 5% to cover indirect expenses of the contractor, provided the contractor submits his claim supported by the details to the Engineer – in – charge within 28 days of the expiry of the period of 3 months.

12. Time and Extension for Delay:

The time allowed for execution of the work or the extended time in accordance with these conditions shall be the essence of the contract. The execution of the work shall commence within 15 days from the date of issue of LOI or date of handing over of the site whichever is later. If the contractor commits default in commencing the execution of the work as aforesaid company/ corporation shall with out prejudice to any other right or remedy at liberty forfeit the earnest money absolutely.

The implementation schedule (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 date of commencement and completion of various sections of the work and may be amended as necessary by agreement between the Engineer – in –

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charge 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.

If the works be delayed by

- (i) force majeure, or
- (ii) civil commotion, local combination of workmen strike or lockout, affecting any of the traders employed on the work, or
- (iii) any other cause which, in the absolute discretion of GM (HERP), 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 Engineer – in – charge but shall nevertheless use constantly his best Endeavour to prevent or make good the delay and shall do all that may be reasonable required to the satisfaction of the Engineer-in-charge to proceed with the works.

Request for 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. The contractor may also, if practicable, indicate in such a request the period for which extension is desired.

In any such case Unit Head (BHEL-HERP, Varanasi) may give a fair and reasonable extension of time for completion of the work. Such extension shall be communicated to the contractor by the Engineer-in-charge in writing, within three months of the date of receipt of such request by the Engineer-in-charge.

12. Hire of T & P from BHEL:-

The contractor shall arrange at his own expense all tools, plant and equipment (hereafter referred to as T & P) required for execution of the work. If the contractor requires any T & P on hire from the company corporation, corporation will, if such item is available for hire, provide it to the contractor at a rate to be fixed by the Engineer-in-charge.

The period of hire will be reckoned from commencement of the day of issue upto the end of the day of return (including all recognized holidays) irrespective of the actual hour of issue and return. The contractor will be exempt from levy charges for the number of days he is called upon in writing by the Engineer-in-charge to suspend execution of the work, provided company's – corporation's T & P in question has, in fact, remained idle with the contractor because of the suspension, provided the contractor in case the period of suspension exceeds 11 days, returns company's – corporation's to T & P to the place from where it was issued

The hire charges shall be reckoned as under

- i. first eight working hours (excluding a break of one hour)..... 1 working day.

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- (ii) Every working hours, at the rate of $1/8^{\text{th}}$ of the hire charges for a working day, provided however if the company- corporation has paid more than at the rate of $1/8^{\text{th}}$ of the wages of the crew far over time under the minimum wages act or any othe law for the time being in force, the excess over $1/8^{\text{th}}$ of the wages shall also be charged to the contractor.
- (iii) If at any time company's / corporation's T & P has not been worked at all during a day except for a break down, or has been worked for less than eight hours during a day, the contractor shall be charged for one working day.
- (iv) If any time of company's/ corporation's T & P has stopped working on account of a break-down before it has worked for four hours in a day, the contractor will be charged for half working day. If the item has stopped working after it has worked for more than hours but less than eight hours, the contractor will be charged for full working day.
- (v) The contractor shall be responsible for care and custody of company's / corporation's T & P (including employment of chowkidars) during the period company's / corporation's T & P remain with him and any damage (fair wear and tear expected) any of the equipment (except for expected risks provided always the contractor has taken precautions necessary to protect if from such risks) shall be made good at the contractor's expense to the satisfaction of the crew provided by the company/ corporation.
- (vi) The company / corporation give no guarantee in respect of output of his T & P hired to the contractor and no reduction in rates or any compensation shall be allowed on the ground that out turn or performance of company's / corporation's T & P was not to the contractor's expectation.
- (vii) Company's / corporation's T & P hired to the contractor shall be returned at place of issue (unless otherwise directed) by the contractor to the Engineer-in-charge on completion of the work or earlier on termination of the hire by the company- corporation as hereinafter provided on a written notice by the Engineer-in-charge. The company/ corporation shall be entitled to terminate the hire on two days notice without assigning any reason what soever and the contractor shall have no claim to any payment of compensation otherwise whatsoever on account of termination of hire of company's / corporation's T & P by the company's / corporation's. in such in event, however, a reasonable extension of time shall be given by the Engineer-in-charge.

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- i. A log book for recording hours during which every item of company's / corporation's T & P issued to the contractor has worked each day shall be maintained by the member of the crew incharge thereof any representative of the Engineer-in-charge appointed in that behalf and shall be daily attested by the contractor or his authorized agent. In case the contractor contests correctness of any entry and / or fails to sign the log book the decision of the Engineer-in-charge shall be final and binding on him. Hire charges shall be calculated in accordance with the entries in the log book. Materials.

13. MATERIALS:-

The contractor shall, at his own expense, provide all materials required for the works other than those which are to be supplied by the company/ corporation.

- i. All materials to be provided by the contractor shall be in conformity with the specifications laid down in the contract and the contractor shall if requested by the Engineer-in-charge, furnish proof, to the satisfaction of the Engineer-in-charge, that the materials so comply.
- ii. The contractor shall, at his own expense and without delay, supply to the Engineer-in-charge samples of materials proposed to be used in the works. The Engineer-in-charge shall within seven days of supply of samples or within such further period as he may require and intimate to the contractor in writing, inform the contractor whether samples are approved by him or not. If samples are not approved, the contractor shall forthwith arrange to supply to the Engineer-in-charge for his approval fresh samples complying with the specifications laid down in the contract.
- iii. The Engineer-in-charge shall have full powers to require removal of any or all of the materials brought to site by the contractor which are not in accordance with the contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the contractor in removing rejected materials the Engineer-in-charge shall be at liberty to have them removed by other means. The Engineer-in-charge shall have full powers to procure other proper materials to be substituted for rejected materials and in the event of the contractor refusing to comply, he may cause the same to be supplied by other means. All costs, which may attend upon such removal and / or substitution shall be borne by the contractor.
- iv. The contractor shall indemnify the company/ corporation or any agent servant or employee of the company/ corporation against any

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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 or other charges which may payable in respect of any article or material or part thereof included in the contract. In the event of any claim being made or action being brought against the company/ corporation or any agent, servant or employee of the company/ corporation in respect of any such matters as aforesaid, the contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with the specific direction issued by the company/ corporation but the contractor shall pay in respect of any such use, the amount so paid being reimbursed to be contractor only if the use was the results of any drawings and/ or specification issued after submission of the tender.

- v. All charges on account of octroi, terminal or sales tax and other duties on materials obtained for the works from any source (excluding materials supplied by the company/ corporation) shall be borne by the contractor.
- vi. The Engineer-in-charge shall be entitled to have tests carried out as specified in the contract for any material supplied by the contractor other than those for which. As stated above, satisfactory proof has already been furnished, at the cost of the contractor and the contractor shall provide at his expense all facilities which the Engineer-in-charge may require for the purpose. If no tests are specified in the contract, and such tests are required by the Engineer-in-charge, the contractor shall provide all facilities required for the purpose and the charge for these tests shall be borne by the contractor only if the tests disclosed that the said materials are not in accordance with the provision of the contract. The cost of materials consumed in tests shall be borne by the contractor in all cases except when otherwise provided. Materials required for the works, brought by the contractor shall be stored by the contractor only at places approved by the Engineer-in-charge. Storage & safe custody of materials shall be the responsibility of the contractor.
- vii. Company's/ corporation's officials concerned with the contract shall be entitled at any time to inspect and examine any materials intended to be used in or on the works either on the site or at factory or workshop or other places, where such materials are assembled, fabricate manufactured or at any place (s) where these are lying or from which these are being obtained and the contractor

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shall give such facilities as may be required for such inspection and examination.

- viii. All materials brought to the site shall become and remain the property of the company/ corporation and shall not be removed off the site without the prior written approval of the Engineer-in-charge. But whenever the works are finally completed and advance, if any respect of any such material is fully recovered the contractor shall at his own expense forthwith remove from the site all surplus materials originally supplied by him and upon such removal, the same shall revert in and become the property of the contractor.

14. LABOUR

The contractor shall employ labour in sufficient numbers either directly or through sub- contractors to maintain the required rate or progress and of quality to ensure workmanship of the degree specified in the contract and to the satisfaction of the Engineer-in-charge. The contractor shall not employ in connection with the works any person who has not completed his eighteen years of age.

- (a) The contractor shall furnish to the Engineer-in-charge at monthly intervals, a distribution return of the number and description by trades of the work people employed on works. The contractor shall also submit on the 4th and 19th of every month to the Engineer-in-charge a true statement showing in respect of the second half of the proceeding month and the first half of the current month (i) 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 (ii) the number of female workers who have been allowed maternity benefit as provided in the maternity benefit act, 1961 or rules made there under and the amount paid to them.
- (b) The contractor shall pay to labour employed by him either directly or through sub- contractor's wages not less than fair wages as defined in the contractor's labour regulations.
- (c) The contractor shall in respect of labour employed by him either directly or through sub- contractors comply with or cause to be complied with the contractor's labour regulations in regard to all matters provided therein.
- (d) The contractor shall comply with the provision of the payment of wages act, 1936, minimum wages act, 1948, employers liability act, 1938, workman's compensation act, 1923, industrial disputes act, 1947, maternity benefit act, 1961, and bonus act, 1952 or any modifications thereof or any other law relating there to and rules made there under form time to time.

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- (e) The contractor shall be liable to pay his contribution and the employees contribution to the state insurance scheme in respect of all labour employed by him for the execution of the contract, in accordance with the provision of "The Employees State Insurance – Act, 1948" as amended from time to time. In case the contractor fails to submit full details of his account of labour employed and the contribution payable, the Engineer-in-charge shall recover from the running bills of contractor and amount of contribution as assessed by him. The amount so recovered shall be adjusted against the actual contribution payable for employees state insurance.
- (f) The Engineer-in-charge shall on a report having been made by an inspecting officer as defined in the contractor's labour regulations have the power to deduct from the money 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 workers, non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the contract or non-observance of the said contractor's labour regulations.
- (g) The contractor shall indemnify the company/ corporation against any payment to be made under and for observance of the regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors.
- (h) In the event of the contractor committing a default or breach of any provisions of the aforesaid contractor's labour regulations, as amended from time to time, or furnishing any information or submitting or filling any form/ register/ slip under the provisions of these regulations which is materially incorrect then on the report of the inspecting officer as defined in the contractor's labour regulation. The contractor shall without prejudice to any other liability pay to the company/ corporation a sum not exceeding Rs. 1000/- as liquidated damages for every default, breach or furnishing, making, submitting, filling, materially incorrect statement as may be fixed by the Engineer-in-charge and in the event of the contractor's default continuing in this respect, the liquidated damages may be enhanced by Rs. 1000/- per day for each day of default subject to maximum percent of the estimated costs of the works put to tender. The Engineer-in-charge shall deduct such amount from bills or security deposit of the contractor and credit the same to the welfare fund constituted under regulations. The decision of the Engineer-in-charge in this respect shall be final and binding.

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(i) Model Rules for Labour Welfare :

- i. The contractor shall at his own expense comply with or cause to be complied with Model Rules for Labour Welfare as appended to these conditions or rules framed by government from time to time for the protection of health and for making sanitary arrangements for workers employed directly or indirectly on the works. In case the contractor failed to make arrangements as aforesaid, the Engineer-in-charge shall be entitled to do so and recover safety code.
- ii. The contractor shall at his own expense arrange for the safety provisions as appended these conditions or as required by the Engineer-in-charge in respect of all labour directly or indirectly employed for performance of the works and shall provide all facilities in connection therewith; In case the contractors fail to make arrangements and provide necessary facilities as aforesaid, the Engineer-in-charge shall be entitled to do so and recover the cost thereof from the contractor.
- iii. Failure to comply with model rules for labour welfare, safety code or the provisions relating to report on accidents and to grant of maternity benefits to female workers shall make the contractor liable to pay to the company/ corporation a liquidated damages an amount not exceeding Rs. 1000/- for each default or materially incorrect statement.

The decision of the Engineer-in-charge in such matter based on reports from the inspecting officers defined in the contractor's labour regulation as appended to these conditions shall be final and binding and deductions for recovery of such liquidated damages may be made from any amount payable to the contractor.

15. Setting out the works :

The Engineer-in-charge shall supply dimensions, drawings, levels and other information necessary to enable the contractor to set out the works. The contractor shall provide all labour and setting out apparatus required and set out the works and be responsible for the accuracy of the same. He shall amend at his own cost and to the satisfaction of the Engineer-in-charge any error found at any stage which may arise through inaccurate setting out unless such error is based on incorrect data furnished in writing by the Engineer-in-charge in which case the cost of rectification shall be borne by the company/ corporation. The contractor shall protect and preserve all bench marks used

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in setting out the works till end of the defects liability period unless the Engineer-in-charge directs their earlier removal.

- 16. Site Drainage :** All water which may accumulate on the site during the progress of the works or in trenches and excavations, from other than the expected risks shall be removed from the site to the satisfaction of the Engineer-in-charge and at the contractor's expense.
- 17. Nuisance :** The contractor shall not at any time do, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to owners, tenants or occupiers of other properties near the site and to the public generally.
- 18. Materials obtained from Excavation:** - Materials of any kind obtained from excavation on the site shall remain the property of the company/ corporation and shall be disposed of as Engineer-in-charge may direct.
- 19. Protection of Trees:** - Trees designated by the Engineer-in-charge shall be protected during the course of the works and earth level within 1 meter of each such tree shall not be changed. Where necessary, such trees shall be protected by providing temporary fencing.
- 20. Watching and Lighting:-** The contractor shall provide and maintain at his own expense all lights, guards, fencing and watching when and where necessary or required by the Engineer-in-charge for the protection of the works or the safety and convenience of those employed on the works or the public.
- 21. Contractor's Supervision:-** The contractor shall either himself supervise the execution of the works or shall appoint a competent agent approved by the Engineer-in-charge to act in his stead if in the opinion of the Engineer-in-charge the contractor has himself not sufficient knowledge and experience to be capable of receiving instructions or cannot give his full attention to the works, the contractor shall, at his own expense, employ as his accredited agent an engineer approved by the Engineer-in-charge, orders given to the contractor's agent shall be considered to have the same force as if these had been given to the contractor himself. If the contractor fails to appoint a suitable agent as directed by the Engineer-in-charge, the Engineer-in-charge shall have full powers to suspend the extension of the works until such date as a suitable agent is appointed and the contractor shall be held responsible for the delay so caused to the works.
- 22. Inspection and Approval:-** All works embracing more than one process shall be subject to examination and approval at each stage thereof and the contractor shall give due notice to the Engineer-in-charge or his authorized representative when each stage is ready. In default of such notice, the Engineer-in-charge shall be entitled to appraise the quality and extent thereof.

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- (a) No work shall be covered up or put out of view without the approval of the Engineer-in-charge or his authorized representative and the contractor shall afford full opportunity for examination and measurement of any work which is about to be covered up or put out of view and for examination of foundations before permanent work is placed thereon. The contractor shall give due notice to the Engineer-in-charge or his authorized representative whenever any such work of foundation is ready for examination and the Engineer-in-charge or his representative shall without unreasonable delay, unless he considers it unnecessary and advises. The contractor accordingly, attend for the purpose of examining and measurement such work or of examining such foundation. In the event of the failure of the contractor to give such notice he shall, if required by the Engineer-in-charge, uncover such work at the contractor's expense.
- (b) Departmental officers concerned with the contractor shall have powers at any time to inspect and examine any parts of the works and the contractor shall give such facilities as may be required for such inspection and examination.

Duties and Powers of Engineer-in-charge's Representative:

23. The duties of the representative of the Engineer-in-charge are to watch and supervise the works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to order any work involving any extra payment by the company/ corporation not to make any variation in the works.
- (a) The Engineer-in-charge may from time to time in writing delegate to his representative any of the powers and authorities vested in the Engineer-in-charge and shall furnish to the contractor a copy of all such written delegation of powers and authorities, any written instruction or written approval given by the representative of the Engineer-in-charge to the contractor within the terms of such delegation shall bind the contractor and the company/ corporation as though it had been given by the Engineer-in-charge.
- (b) Failure of the representative of the Engineer-in-charge to disapprove any work or materials shall not prejudice the powers of the Engineer-in-charge thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.
- (c) If the contractor shall be dis-satisfied with any decision of the representative of the Engineer-in-charge he shall be entitled to refer the matter to the Engineer-in-charge who shall thereupon confirm, reverse or vary such decision.

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Removal of Workmen :

24. The contractor shall employ in and about the execution of the works only such persons as are skilled and experienced in their several trades and the Engineer-in-charge shall be at liberty to object to and require the contractor to remove from the works any person employed by the contractor in or about the execution of the works who in the opinion of the Engineer-in-charge misconducts himself or is incompetent or negligent in the proper performance of his duties and such person shall not be again employed upon the works without permission of the Engineer-in-charge.

Uncovering and Making Good :

25. The contractor shall uncover any part of the works and/ or make openings in or through the same as the Engineer-in-charge may from time to time direct for his verification and shall reinstate and make good such part to the satisfaction of the Engineer-in-charge. If any such part has been covered up or put out of view after being approved by the Engineer-in-charge and is subsequently found on uncovering to be executed in accordance with the contract, the expenses of uncovering and/ or making openings in or through, reinstating and making good the same shall be borne by the contractor.

Work during or on Sundays and Holidays :

26. Subject to any provisions to the contrary contained in the contract, none of the permanent works shall be carried out during night or on Sundays or on authorized holidays without the permission in writing of the Engineer-in-charge except when the work is unavoidable or absolutely necessary for the safety of life. Property or works in which case the contractor shall immediately advise the Engineer-in-charge accordingly.

27. Completion Certificate :

- (a) As soon as the works is completed, the contractor shall give notice of such completion to the Engineer-in-charge and within ten days of receipt of such notice the Engineer-in-charge shall inspect the work and shall furnish the contractor with a certificate of completion indicating (a) the date of completion, (b) defects to be rectified by the contractor and/ or (c) items for which payment shall be made at reduced rates. When separate periods of completion have been specified for items of groups of items, the Engineer-in-charge shall issue separate completion certificates for such items or groups of items, No certificate of completion shall be issued, nor shall the work be considered to be complete till the contractor shall have removed from the premises on with the works has been executed all scaffolding, sheds and surplus except such as are required for rectification of defects, rubbish and all huts and sanitary arrangements required for his workmen on the site in connection with the execution of the work, as shall have been erected by the

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contractor or the workmen and cleaned all dirt from all parts of building (s) in, upon or about which the work has been executed or of which he may have had possession for the purpose of the execution thereof and cleaned floors, gutters and drains, eased door and windows, oiled locks and fastening, labelled keys clearly and handed them over to the Engineer-in-charge or his representative and made the whole premises fit for immediate occupation or use to the satisfaction of the Engineer-in-charge. If the contractor shall fail to comply with any of the requirements of this conditions as aforesaid, on or before the date of completion of the works, the Engineer-in-charge may, at the expense of the contractor fulfil such requirements and dispose of the scaffolding, surplus material and rubbish, etc. as he thinks fit and the contractor shall have no claim in respect of any such scaffolding or surplus materials except for any sum actually realized by sale thereof less the cost of fulfilling the requirements and any other amount that may be due to from the contractor, if the expense of fulfilling such requirements, is more than the amount realized on such disposal as aforesaid, the contractor shall forthwith on defined pay such excess.

- (b) If at any time before completion of the entire work, items or groups of items for which separate periods of completion have been specified, have been completed, the Engineer-in-charge with the consent of the contractor takes possession of any part or parts of the same (any such part (s) being hereinafter in this condition referred to as the relevant part) then not withstanding anything expressed or implied elsewhere in this contract :-
- i. Within ten days of the date of completion of such items or groups of items or of possession of the relevant part the Engineer-in-charges shall issue completion certificate for the relevant part as in condition 30(a) above provided the contractor fulfills his obligations under that condition for the relevant part,
 - ii. The defects liability period in respect of such items and the relevant part shall be deemed to have commenced from the certified date of completion of such items or the relevant part as the case may be.
 - iii. The contractor may reduce the value insured under condition 33/33A by the full value of the completed items or relevant part as estimated by the Engineer-in-charge for this purpose. This estimated shall be applicable for this purposes only and for no other.
 - iv. For the purposes of ascertaining compensation for delay under condition 31 in respect of any period during which the works are not complete the relevant part will be deemed to form a separate item or group, with date of completion as given in the contract or as extended

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under condition 14 and actual date of completion as certified by the Engineer-in-charge under this condition.

Compensation for Delay:

28. If the contractor fails to maintain the required progress as per contract or to complete the work and clear the site on or before the contract Or extended date – period of completion, he shall, without prejudice to any other right or remedy of the company/ corporation on account of such breach, pay as agreed compensation amount equal to half percent of contract sum for delay of every week or part thereof subject to maximum of 10% of contract sum or such smaller amount as may be fixed by the authority on the contract value of the work. The amount of compensation may be adjusted or setoff against any sum payable to the contractor under this or any other contract with the company/ corporation.
29. The contractor shall be responsible to make good and remedy at his own expense within such period as may be stipulated by the Engineer-in-charge any defect which may develop or may be noticed before the expiry or the period mentioned hereto from the certified date of completion and intimation of which has been sent to the contractor within seven days of the expiry of the said period by a letter sent by hand delivery or by registered post.
30. From commencement to completion of the works, the contractor shall take full responsibility for the case thereof and for taking precautions to prevent loss or damage and minimize loss or damage to the greatest extent possible and shall be liable for any damage or loss that may happen to the works or any part thereof and all company's/ corporation's T & P from any cause whatsoever (save and except the excepted risks) and shall at his own cost repair and make good the same so that at completion, the works and all company's/ corporation's T & P shall be in good order and condition and in conformity in every respect with the requirements of the contracts and instructions of the Engineer-in-charge.
- 30 (1) In the event of any loss or damage to the works, the following provisions shall have effect.
- (a) The contractor shall, as may be directed in writing by the Engineer-in-charge, remove from the site any debris and so much of the works as shall have been damaged, taking to the company's/ corporation's store such company's/ corporation's T & P articles and/ or materials as may be directed.
- (b) The contractor shall, as may be directed in writing by the Engineer-in-charge, proceed with the erection and completion of the works under and in accordance with the provisions and conditions of the contract; and
- (c) There will be added to the contract sum, the net amount due, ascertained in the same manner as for deviations, or as prescribed

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for payment, in respect of the re-execution of the works lost or damage, the replacement of any T & P and of any materials and articles lost or damaged but not incorporated in the works on the day when the loss or damage occurred and the removal by the contractor as provided above of company's/ corporation's T & P articles and/ or materials in the company's/ corporation's store and of debris and damaged works referred to their in and the compensation paid by him under any law for the time being in force, to any workmen employed by him or any injury caused to him, or to the workmen's legal successors for loss of the workmen's life.

- 30 (2) **PROVIDED** always that contractor shall not be entitled to payment under the above the provisions in respect of so much loss or damage as has been occasioned by any failure on his part to perform his obligations under the contract or not taking precautions to prevent loss or damage or minimize the amount of such loss or damage.
- 30 (3) Where company's/ corporation's building or a part thereof is rented by the contractor he shall insure the entire building if the building or any part thereof is used by him for the purpose of storing or using materials of combustible nature as to which the decision of the Engineer-in-charge shall be final and binding.
- 30.(4) The Contractor shall indemnify and keep indemnified the Company/Corporation against all losses and claims for injuries or damage to any persons or any persons or any property whatsoever which may arise out of or in consequence of the construction and maintenance of the works and against all claims, demands proceedings, damages, cost charges and expenses whatsoever in the respect or in relation thereto, PROVIDED always that nothing herein contained shall be deemed to render the contractor liable for or in respect of or indemnify the Company-Corporation against any compensation or damage caused by the excepted risks.
- 30.(5) Before commencing execution of the work, the contractor shall, without in any way limiting his obligations and responsibilities under this condition, insure against any damage, loss or injury which may occur to any property, (excluding that of the Company-Corporation but including the Company /Corporation 's building rented by the contractor wholly or in a part and any part of which is used by him for storing combustible materials), or to any person (including any employee of the Company-Corporation) by or arising out of carrying out of the contract.

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- 30.(6) The contractor shall at all times indemnify the Company/Corporation against all claims, damages or compensation under the provisions of payment of wages act. 1948. Employer's Liability Act. 1938, The workmen's compensation Act. 1923, Industrial Disputes Act. 1947 and The maternity benefit Act. 1961 or any modification thereof or any other law relating thereto and rules made there under from time to time or as a consequence of any accident or injury to any workman or other persons in or about the works whether in the employment of the contractor or not , save and except where such accident or injury has resulted from any act of the Company – Corporation his agents or servants, and also against all costs, charges and expenses of any suit, action or proceedings arising out of such accident or injury and against all sum or sums which may with consent of the contractor be paid to compromise or compound any claim. Without limiting his obligations and liabilities as above provided the contractor shall ensure against all claims damages or compensation payable under The workmen's compensations Act, 1923 or any modification thereof any other law relating thereto.
- 30.(7) The aforesaid insurance policy – policies shall provide that they shall not be cancelled till the engineer-in-charge has agreed to their cancellation.
- 30.(8) The contractor shall prove to engineer-in-Charge from time to time that he has taken out all the insurance policies referred to above and has paid the necessary premiums for keeping the policies alive till expiry of the defects Liability Period.
- 30.(9) The contractor shall ensure that similar insurance policies are taken out by his sub- contractors (if any and shall be responsible for any claims or losses to the Company/ Corporation resulting from their failure to obtain adequate insurance protection in connection thereof. The contractor shall produce or cause to be produced by his sub contractors (if any) as the case may be the relevant policies and premium receipts as and when required by the engineer-in-charge.
- 30(10) If the Contractor and / or his sub-contractors (if any) shall fail to effect and keep in force the insurance referred to above or any other insurance which he/they may be required to effect under the term of the Contract then and in any such case the Company/Corporation may, without being bound to, effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by company /corporation from any moneys due or which may become

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due to contractor or recover the same as a debt due from the contractor.

Notice to Local Bodies:

- 31.** The contractor shall comply with and give all notices required under any governmental authority, instrument, rule or order made under any act of parliament, State laws or any regulation or bye- laws of any local authority relating to works. He shall before making any variation from the contract drawing necessitated by such compliance give to Engineer-in-charge written notice giving reasons for the proposed variation and obtain the Engineer-in-Charge's instructions thereon.
The Contractor shall pay and indemnify the Company/Corporation against any liability in respect of any fees or charges payable under any act of parliament, state law of any government instrument, rule or order and any regulations or buys laws of any local authority in respect of the works, Sub Contracts:
- 32.** The contractor shall not sublet any portion of the contract with out the prior written approval of Authority.
Instruction and notice:
- 33.** Subject as otherwise provided in this contract, all notices to be given on behalf of the Company /corporation and all other action to be taken on its behalf may be given or taken by the Engineer-in-Charge or any officer for the time being entrusted with the functions, duties and powers of engineer-in-Charge.
- 33.1** All instructions, notice communications etc. under the contract shall be given in writing and if sent by registered post to the last known place of above or business of the contractor shall be deemed to have been served on the date when in the ordinary course of cost these would be delivered
- 33.2** The Contractor or his agent shall be in attendance at the site (s) during all working hours and shall superintend the execution of the works with such additional assistance in each trade as the Engineer-in-Charge may consider necessary 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.
- 33.3.** The Engineer-in-charge shall communicate or confirm his instructions to the contractor in respect of the execution of work in a 'Works Site Order Book' maintained in the office of the Engineer-in-Charge and the contractor or the authorized representative shall

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confirm receipt of such instructions by signing the relevant entries in this book. If required by the contractor he shall be furnished a certified true copy of such instructions (s).

Foreclosure of contract in Full or in part (due to Abandonment) or reduction in scope of work

34. If at any time after acceptance of the tender the Company/Corporation shall decide to the abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole to be carried out the Engineer-in-Charge shall give notice in writing to that effect to the contractor and 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 execution of the Works in full but which he did not derive in consequence of foreclosure of the whole or part of works.
- 35.1 The contractor shall be paid contracts rates full amount for work's executed at site and , in addition, a reasonable amount as certified by the Engineer-in-Charge for items hereunder mentioned which could not be utilized on the work of the full extent because of the foreclosure.
- (a). Any expenditure incurred preliminary site work, e.g. Temporary access roads, temporary Labour huts staff quarters and site office, storage accommodation and water storage tank.
- (b)(i) The Company /Corporation shall have the opinion to take over contractor's material 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 however, the company /Corporation shall be bound to take over the materials or such portion thereof as the contractor dose not desire to retain . For material taken over or to be taken over by the Company /Corporation, cost of such materials. The cost shall however ,taken into account purchase price ,cost of transportation and deterioration or damage which may have been caused to materials whilst in custody of the contractor.
- (ii) For Contractor's material not retained by the Company/Corporation, reasonable cost of transporting such materials from site to contractor's permanent stores or to his other works, whichever is less will be payable if material are not transported to either of the said places, no cost of transportation shall be payable.
- (c) If any materials supplied by the company/Corporation are rendered surplus the same except normal wastage shall be returned by the

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contractor to the Company/Corporation at rates not exceeding those at 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 the Company/ Corporation stores, if so required by the Company /Corporation.

- (d) Reasonable compensation for transfer of & T. & P. from site to contractors 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 the transportation shall be payable.

- 35(2) The Contractor shall; if required by the Engineer-in-Charge, furnish to him books of account, wage books, time sheets and other relevant documents as may be necessary to enable him to certify the reasonable amount payable under this condition.

Termination of contract for death

36. If the contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the contractor is a partnership concern and one of the partners dies then unless the Accepting Authority is satisfied that the legal representatives of the individual contractor or of the proprietor of the proprietary concern and in the case of partnership, the surviving partners, are capable of carrying out and completing the contract, the accepting Authority shall be entitled to cancel the contract as to its in completed part without the Company/Corporation being in any way liable to payment of any compensation to the estate of the deceased Contractor and/or to the surviving partners of the contractor's firm on account of the cancellation of the contract. Decision of the accepting Authority that the legal representatives of the deceased contractor or the surviving partners of the Contractor's firm can not carry out and complete the contract shall be final and binding on the parties. In the event of such cancellation the company /Corporation shall not hold the estate of the deceased Contractor and/or the surviving partners of the Contractor's firm liable in damages for not completing the Contract.

Cancellation of contract in full or in part:

37. If the Contractor –

- (a) At any time makes default in proceeding with the work with due diligence and continues to do so after a notice in writing of 7 days from the Engineer-in-Charge; or
- (b) 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 with in 7 days after a notice in writing is given to him in that behalf by the engineer-in-Charge or
- (c) fail to complete the works or items of work with individual dates of completion, on or before the date (s) of completions , and dose note

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complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-Charge;

Or

- (d) shall offer or give or agree to give to any person in Company/Corporation'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 obtaining or execution of this or any other contract for the Company/Corporation; or
- (e) shall enter in to a contract with the company/Corporation in connection with which commission has been paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the Accepting Authority/Engineer-in-Charge; or
- (f) shall obtain a contract with the company/Corporation as a result offering tendering or other non –bonafide methods or complicit tendering ; or
- (g) 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 bone fit 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; or
- (h) being a company, shall pass a resolution or the court shall make an order or for the liquidation of its affairs, or a receiver or manager on behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the court or debenture holders to appoint a receiver or manager; or
- (i) shall suffer an execution being levied on his goods and allowed it to be continued for a period of 21 days; or
- (j) 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 attempts to assign , transfer or sublet the entire works or any portion thereof without prior written approval of the accepting authority may, without prejudice to any

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other right to remedy which shall have accrued or shall accrue thereafter to the company /Corporation by written notice cancel the contract as a whole or only such items of work in default from the correct.

37.1 The Accepting Authority shall on such cancellation have powers to :

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

37.2 On cancellation of the contract in full or in part, the Engineer-in-charge shall determine what amount if any is recoverable from the contractor for completion of the works or in case the work or part of the works is not completed, the loss or damage suffered by the company/corporation. In determining the amount, credit shall be given to the contractor for the value of the work executed by him up to the time of cancellation, the value of contractor's materials taken over and incorporated in the work, and use of tackle and machinery belonging to the contractor.

37.3 Any excess expenditure incurred or to be incurred by the company/ corporation in completing the works of part of the excess loss or damages suffered or may be suffered by the company/ corporation as aforesaid after allowing such credit shall be recovered from any moneys due to the contractor on any account, and if such moneys are not sufficient the contractor shall be called upon in writing to pay the same within 30 days.

37.4 If the contractor shall fail to pay the required sum within the aforesaid period of 30 days. The Engineer-in-charge shall have the right to sell any or all of the contractors unused materials, constructional plant implements, buildings etc. and apply the proceeds of sale there of towards the satisfaction of any sums due from the contractor under the contract and if there after there be any balance outstanding from the contractor, it shall be recovered in accordance with the provisions of the contract.

37.5 Any sums in excess of the amounts due to the company/ corporation and unsold materials, constructional plant, etc. shall be returned to the contractor, provided always that if cost or anticipated cost of completion by the company/ corporation of the works or part of the works is less than the amount which the contractor would have been paid had he completed the works or part of the works, such benefit shall not accrue to the contractor.

38. Liability for damage, Defects or Imperfections and Rectification thereof :

If the contractor or his workman or employees shall injury or damage if any, part of the building in which they may be working or any building, road, fence, etc. contiguous to the premises on which the work or any part of it is being executed or if any damage shall happen to the work while in progress the contractor shall upon receipt of a notice

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in writing in that behalf make the same good at his own expense, if it shall appear to the Engineer-in-charge or his representative at any time during construction or re-construction or prior to the expiration of the defects liability period. That any work has been executed with unsound, imperfect or unskillful workmanship or that any materials or articles provided by the contractors for execution of the work are unsound or of a quality inferior to that contracted for, or otherwise not in accordance with the contract, or that any defect, shrinkage or other fault have appeared in the work arising out of defective or improper materials or workmanship, the contractor shall upon receipt of a notice in writing in that behalf from the Engineer-in-charge, forthwith rectify or remove and re-construct the work so specified in whole or in part, as the case may require or as the case may be, and/ or remove the materials or articles so specified and provide other proper and suitable materials or articles at his own expense, notwithstanding that the same may have been inadvertently passed, certified and paid for and in the event of his failing to do so within the period to be specified by the Engineer-in-charge in his notice aforesaid, the Engineer-in-charge may rectify or remove and re-execute the work and/ or remove and replace with others the materials or articles complained of, as the case may be by other means at the risk and expense of the contractor.

In case of repairs and maintenance works, splashes and dropping from the white washing, painting, etc. shall be removed and surfaces cleaned simultaneously with completion of these items of work in individual rooms, quarters or premises, etc., where the work is done, without waiting for completion of all other items of work in the contract. In case the contractor fails to comply with the requirements of this condition the Engineer-in-charge shall have the right to get the work done by other means at the contractor. Before taking such action, however, the Engineer-in-charge shall give three day's notice in writing to the contractor.

39. Urgent Works:- If any urgent work (in respect where of the decision of Engineer-in-charge shall be final and binding) become necessary and the contractor is unable or unwilling at once to carry it out, the Engineer-in-charge by his own or other work people, carry it out as he may consider necessary. If the urgent work shall be such as the contractor is liable under the contract to carry out at his expense, all expenses incurred on it by the company/ corporation shall be recoverable from the contractor and be adjusted or set off against any sum payable to him.

40. Changes in Constitution: - Where the contractor is a partnership firm, prior approval in writing of the accepted authority shall be obtained before any change is made in the constitutions 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 work hereby undertaken by the contractor. If prior approval as aforesaid is not

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obtained the contract shall be deemed to have been assigned in contravention of condition 41 (J) hereof and the same action may be taken and the same consequences shall ensue as provided for in the said condition 41.

- 41. Training of Apprentices:** - The contractor shall during the currency of the contract when called upon by the Engineer-in-charge engage and also ensure engagement by sub- contractors and others employed by the contractor in connection with the works, for such periods as may be required by the Engineer-in-charge. The contractor shall train them as required under the apprentices Act. 1961 and shall be responsible for all obligations of the employer under the act including the liability to make payment to apprentices as required under the Act.
- 42. VALUATION AND PAYMENT:** - The Engineer-in-charge shall except as otherwise stated ascertain and determine the measurement the value in accordance with the contractor of work done in accordance therewith. All items having a financial value shall be entered in measurement book, level book, etc. prescribed by the company/ corporation so that a complete record is obtained of all work performed under the contract. Measurement shall be taken jointly by the Engineer-in-charge or his authorized representative and by the contractor or his authorized representative. Before taking measurements of any work the Engineer-in-charge or the person deputed by him for the purpose shall give the reasonable notice to the contractor. If the contractors fail to attend or send an authorized representative for measurement after such a notice or fails to countersign or to record the objection within a week from the date of measurement, then in any such event measurement taken by the Engineer-in-charge or by the person deputed by him shall be taken to be correct measurements of the work. The contractor shall, without extra charge, provide assistance with every appliance, labour and other things necessary for measurement. Measurement shall be signed and dated by both parties each day on the site on completion of measurement. If the contractor objects to any of the measurement recorded on behalf of the company/ corporation a note in that effect shall be made in the measurement book against the item objected to and such note shall be assigned and dated by both parties engaged in taking the measurement.
- 43. Methods of Measurements:** - Except where any general or detailed description of the work in quantities expressly shows the contrary, schedule of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with the procedure set forth in the schedule of rates – specification 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 the schedule of rates – specification, measurement shall be taken in accordance with the relevant standard method of measurement issued by the Indian standards institution.

Sign, Date & Seal of contractor



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44. Payment on Account:-

Interim bills shall be submitted by the contractor at monthly intervals on or before the date fixed by the Engineer-in-charge for the work executed. The Engineer-in-charge shall then arrange to have the bill verified by taking or causing to be taken, where necessary, the required measurements of the work. Payment on account for amount admissible shall be made on the Engineer-in-charge certifying the sum to which the contractor is considered entitled by way of interim payment for the following:- all works executed, after deducting there-from the amounts already paid, the security deposit and such other amounts as may be deductible or recoverable in terms of the contract. Any interim certificate given relating to work done or materials delivered, may be modified or corrected by any subsequent interim certificate or by the final certificate. No certificate of the Engineer-in-charge supporting an interim payment shall of itself be conclusive evidence that any work or material to which it relates is/are in accordance with the contract. Pending consideration of extension of date of completion interim payments shall continue to be made as herein provided.

Time Limit for Payment of Final Bill: - The final bill shall be submitted by the contractor within three months of physical completion of the works. No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payment of those items of the bill in respect of which there is no dispute and of items in disputes of quantities and at rates as approved by Engineer-in-charge shall be made within the specified period.

After payment of the amount of the final bill payable as aforesaid has been made, the contractor may if he so desires, reconsider his position in respect of the disputed portion of the final bill and if he fails to do so within 90 days, his disputed claim shall be dealt with as provided in the contract.

45. Overpayments and Underpayments:- Where-ever any claim for the payment of a sum of money to the company/ corporation arises out of or under this contract against the contractor the same may be deducted by the company/ corporation from any sum then due or which at any time thereafter may become due to the contractor under this contract and failing that under any other contract with the company/ corporation or from any other sum due to the contractor from the company/ contractor (which may be available with the company/ corporation) or from his security deposit, or he shall pay to claim on demand. The company/ corporation reserves the right to carry out post-payment audit and technical examination of the final bill including all supporting vouchers, abstracts, etc. the company/ corporation further reserves the right to enforce recovery of any overpayment when detected, notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an

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arbitrator appointed under condition 50 of this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award. If a result of such audit and technical examination any overpayment is discovered in respect of any work done by the contractor or alleged to have been done by him under the contract, it shall be recovered by the company/ corporation from the contractor by any or all of the methods prescribed above or if any under payment is discovered, the amount shall be duly paid to the contractor by the company/ corporation. Provided that the aforesaid right of the company/ corporation to adjust over payments against amounts due to the contractors under any other contract with the company/ corporation shall not extend beyond the periods of two years from the date of payment of the final bill or in case the final bill is a MINUS bill, from the date the amount payable by the contractor under the MINUS final bill is communicated to the contractor. Any amount due to the contractor under this contract for under payment may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the contractor, from him to the company/ corporation on any other contract or account whatsoever.

ARBITRATION AND LAWS

46. ARBITRATION AND GOVERNING LAW :

In all cases of disputes emanating from and in reference to this Agreement and all questions, disputes or differences of any kind what-so-ever arising out of or relating to this agreement the dispute shall be referred for arbitration to sole arbitrator to be appointed by the Head of the unit-Varanasi. The arbitration shall be under THE ARBITRATION AND CONCILIATION ACT OF 1996 and the rules there under. The arbitrator may from time to time with the consent of the parties enlarge the time for making and publishing the award. No person other than the above or his nominee can act as arbitrator. The venue of arbitration shall be at Varanasi or the place decided by the sole arbitrator. The award of the arbitrator shall be final and binding on the parties to this agreement. All questions, disputes, differences arising under, out of or in connection with this contract shall be to the exclusive jurisdiction of Varanasi -Uttar Pradesh Courts.

Indemnity clause

In the event of any accident in respect of which compensation may become payable under the workmen's compensation Act. VIII of 1923 whether by the contractor or by BHEL-Varanasi as principal, it shall be lawful for BHEL to retain out of monies due and payable to the contractor such sum or sums of money as may, in the opinion of BHEL-Varanasi shall be final in regard to all matter arising in this clause. On the occurrence of an accident, which results in the death of any of the workmen employed by the contractor or which is so serious as to be likely to result in the death of any such workmen, the contractor shall within 24 hours of the happening of such an accident

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intimate in writing to the BHEL-Varanasi official In charge of the work The contractor shall indemnify BHEL-Varanasi against all losses or damages sustained by BHEL-Varanasi resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or dues if any and become payable by BHEL-Varanasi, as a consequence of failure, BHEL-Varanasi to give notice under the workmen's compensation Act or otherwise confirm to the provisions of the said Act in regard to such accident.

47. Laws governing the contract: - This contract shall be governed by the Indian laws for the time being in force.

Sign, Date & Seal of contractor



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SPECIAL CONDITIONS (PART-A)

1. These special conditions supplement the conditions to tenders and contract and the general conditions of contract and form part of the contract documents. Where these special conditions are at variance with the general conditions of contract these special conditions shall prevail.
2. All rates quoted shall be for finished work in-situ inclusive of all leads, lifts and other incidental charges and those general conditions.
3. The tenderer is not allowed to alter the specifications of the unit of work noted in the Schedule A (Price bid). For the sake of uniformity in comparison of tenders, tenders should not add any conditions of their own. Tenders not complying with these conditions are liable for rejection.
4. The issues of materials/T & P are governed by the conditions specified in Schedule B & C. all other materials shall be supplied by the contractor himself and the rates for the relevant items are inclusive of all such supplies.
5. The works shall be executed as per the technical specifications and drawings. The detailed drawings shall be prepared by contractor and submit BHEL for its approval.
6. The quantities shown above are approximate and liable for variations and no rate variation is acceptable on this account. Payment shall be made on the basis of quantity actually executed at the site.
7. The rates quoted by the contractor shall be firm in all respects. Any statutory increase in the labor wages and materials during the period of execution shall be borne by the contractor. The contractor shall quote the rates considering the above.
8. The rate quoted for reinforced cement concrete items shall include smooth finishing of exposed faces. The top surfaces of roof slab shall be laid to specified slope and mortar that comes to surface due to vibrations shall be trowel led so as to obtain smooth and even surface.
9. The paint/primer/cement paint to be used shall be of standard make and shall be approved by the Engineer-in-charge before applying.
10. The tenderer should specify the plant and machinery such as a pan mixer, vibrators, steel shuttering etc., that he possesses and is going to use them on the work.
11. Contractor shall execute work as per specifications in the BOQ. if the specifications found wanting relevant Technical specifications along with the tender shall be followed. Further missing details relevant CPWD and IS specifications shall be followed. Wherever, there is difference in between CPWD and IS specifications latter shall prevail.
12. The BHEL reserves the right to deviate either by additions or by deductions from the schedule of items of work given in the tender document after awarding work.
13. In case of any difference between agreement wording and detailed drawings the interpretation of the BHEL shall be final and binding on the contractor.

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14. The final acceptance of work in all items are subject to proper performance after testing regardless of whether the items are paid for or not.

15. All debris and surplus materials shall be cleared from the site as and when directed by the Engineer-in-charge. Any temporary structure / stores made by the contractor for the work shall be demolished and site cleared before payment of final bill.

16. Curing shall be done with the help of hose pipe in addition to manual curing. Curing shall be done in off days and holidays also. Curing has to be done by ponding water for slabs & spraying for columns and beams for 27 days.

17. Rates tendered by contractors shall be for complete item of the work covering all materials, labor, carriage, royalties, work contract, sales tax, octroi, wastage, tools & plants including all other taxes on temporary construction, overhead charges, profits, general royalties, risks etc., and rate shall be applied to all heights, levels, depths, leads and lifts etc. (Please refer schedule B for free issue items and chargeable items)

18. If discrepancy in specifications observed between schedule of quantities and general / technical conditions, the specifications in schedule of quantities will have precedence over the general / technical conditions.

19. Water will be supplied at one point and will be charged @ **0.1% of gross value of the bill.**

20. Erection and construction equipment, lifting tools and tackles shall not be provided by BHEL and they are in scope of contractor.

21. Quantity/Quality records of cement / structural fabrication, test records shall be prepared, maintained and submitted by contractor during the course of execution.

22. All structural fabrication works shall be as per drawings and BHEL specifications for quality and testing.

23. Rate for supplementary items, which are not covered in the BOQ, will be finalized as per CPWD Specifications or based on market rate as decided by Engineer-in-charge.

24. For want of specifications related to structural steel like fabrication, erection, welding, material etc., following IS Codes are to be followed i.e. 1. IS: 816-1969, 2. IS 2139-1976, 3) IS 7215-1974, 4) IS 813-1961, 5) IS – 2062 – 1980.

25. Inserts are required to be fixed in concrete as per the requirement and direction of Engineer-in-charge.

26. Specialized works are to be executed by specialized agency with the approval of BHEL.

27. Test Certificates are to be supplied for all bought-out items as required by the Engineer-in-charge.

28. If blasting for breaking hard rock required then controlled blasting should be done through license holder approved by BHEL.

29. All material shall be of best quality confirming to specification and subject to the approval of the Engineer-in-charge.

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30. Pipe and fittings shall be fixed truly vertical, horizontal or in shapes as required in a neat workman like manner.
31. Pipes shall be securely fixed to brick/RCC wall/columns by suitable clamps at intervals specified. Only approved type of anchored fasteners shall be used.
32. The exposed pipe/fittings shall be painted with anticorrosive primer and two coats of "FIRE RED".
33. The pipe buried in the ground shall be painted with anticorrosive primer, two coats of hot enamel paint and 4mm thick pypcoat.
34. Pipes for risers and header running inside the building shall be M.S. galvanized confirming to IS: 1239(heavy class) with screwed/welded joint shaving flanges at regular intervals.
35. Joints MS/GI pipes of size 50mm and above shall be either screwed or butt welded with flanges at regular intervals. The hoisting with MS/ GI pipes of less than 50 mm dia shall be with conventional heavy class screwed fittings like TEE, SOCKET, ELBOW, REDUCERS etc. All flanges shall confirm to IS:6392-1091 table 17/18 as applicable.
37. Excavation for underground pipe lines shall be in open trenches to levels or as required at site. Pipeline shall be buried to a minimum depth of one meter.
38. On completion of testing and coating & wrapping trenches shall be refilled with excavated earth in 15cms layers and consolidated to rejoining structure or pipe line is damaged/affected.
39. Pipes shall be measured by linear meter and shall include all fittings, flanges, jointing, clamps, hangers and all other material necessary and required to complete the system including paintings, testing and commissioning.
40. After laying and jointing the piping shall be pressure tested by hydrostatic method. The piping shall be slowly filled with water in order to expel all the air. The piping shall then be allowed to stand full of water in order to expel all the air. The piping shall then be allowed to stand full of water for 24 hours. Any leakage at flanges or elsewhere shall be rectified. The pressure shall then be applied by means of a test pump (either hand operated or power operated). The test pressure shall be not less than 1.5 times the working pressure of the system. However, the test pressure not exceeds 12.5 kg/sq cm in any case.

NOTE: Water and power will be given at one point. All other things to be arranged by Contractor.

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SPECIAL CONDITIONS (PART-B)

1. General:-

Work under this contract shall be executed as shown in the approved drawings and described in the specifications/BOQ as per site requirement whether specifically shown or not. Notwithstanding the sub division of the documents into these separate section and volumes every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

Where it is mentioned in the specification that the contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his cost and BHEL shall pay for those works (executed quantity) as per rate agreed in the agreement. The material, design and workmanship shall satisfy the regulations of the TAC, the job specifications contained herein and codes referred to where the job specification and TAC requirements stipulate in addition to these contained in the standard codes and specification, these additional requirements shall also be satisfied.

2. Scope of work:-

Work under this contract consist of providing labour, materials, equipment and appliances necessary and required to completely do all works relating to the fire protection system as described here-in-after, consisting of:

- i) Arranging/ preparing all relevant working drawings, as per site condition, along with bill of materials (BOM) clearly marked on each drawing and its submission to BHEL/Local fire authority for its approval before commencement of work.
- ii) Supply, installation, testing and commissioning (SITC) of all fire fighting equipments, appliances, pipeline, pumps along with associated civil works viz. construction of water tank, pump house and support system of pipeline etc and all other items as described in bill of quantity (BOQ).
- iii) Connection of existing pipeline to newly erected pipeline and pump to create fire ring main.
- iv) Arranging NOC from Chief Fire Officer and/or other local fire authority, as the case required, after testing in presence of representative from local fire authority.
- v) Supply of any other item or services, FREE OF COST, not specifically mentioned anywhere in this tender but required by the Local Fire Authority or essential for the operation.

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3. Interpretation:-

In interpretation of specification, the following order of decreasing importance shall be followed:-

- i) Bill of Quantity (BOQ).
- ii) General Technical Specifications.
- iii) List of approved make of materials.
- iv) General/ Special Rules and Conditions of the contract.

Matters not covered by the specifications given in this contract as a whole shall cover by relevant and latest Indian Standard Codes. If such codes on a particular subject have not been framed, the decision of the "person nominated by BHEL for this work" called hereinafter "Engineer-in-charge/ Project Manager" shall be final and binding.

4. Responsibilities of Contractors:-

Contractor shall be responsible for procuring, supplying and providing all labour, tools/plant and equipment, etc., required for completing the work in all respects and as per the scope of the contract. All expenses towards mobilization at site and demobilization including brining in equipment, work force and materials, dismantling the equipment, clearing the site etc. shall be deemed to be included in the rates quoted by the contractor against various items and no separate payment on such expenses shall be entertained. The contractor shall acquaint himself with access availability, facilities such as local labour etc. to provide suitable allowance in his quotation. The procurement and supply, in sequence and at the appropriate time, of all materials and consumables shall be entirely the contractor's responsibility and his rates for execution of work will be inclusive of supply of these entire item.

5. Specifications:-

Work shall be carried out strictly in accordance with the specifications attached to the tender.

Works not covered in the specifications shall be carried out as per relevant Indian Standard Code of practice specifications of materials.

6. Execution of work:-

The work shall be carried out in conformity with approved (by BHEL/Local Fire Authority) drawings which shall be arranged/prepared by the contractor in consultation with BHEL considering site condition and existing services viz. Plumbing, sanitary, electrical etc.

Contractor may **sub-contract** civil works but with prior permission of BHEL in writing. He shall ensure/liason with civil contractor for various associated civil works viz. Construction of water tank, pump house and support system for pipeline etc well in

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advance to prevent hold up of the construction schedule. Completion of civil works shall be **sole** responsibility of the contractor and no time extension shall be granted by BHEL due to delay in civil works.

On award of work, the contractor shall submit a schedule of construction in the form of PERT Chart or Bar Chart for approval of Engineer-in-charge, all dates and time schedule, agreed upon shall be strictly adhered to.

The work shall be executed strictly as per the time schedule given in the tender document.

A joint program of execution of work will be prepared by the Contractor based on priority requirement of the project. This program will take in to account the time of completion mentioned in 6.4 above and the time allowed for the priority works by the BHEL.

Monthly construction program will be drawn up by the BHEL jointly with the Contractor based on availability of work fronts and joint construction program as per 6.5 above.

The contractor shall scrupulously adhere to these targets /programs by deploying adequate personnel and construction tools and tackles and he shall also supply himself all materials of his scope of supply in good time to achieve the urgent/ program. In all matters concerning the extent of targets set out in the monthly targets programs and the degree of achievement, the decision of the BHEL will be final and binding on the Contractor.

7. Drawings:-

i). Working/shop drawing means equipment/accessories/appliance layout, piping, wiring diagram, instrumentation, Manufacturer's/contractor's fabrication/erection/commissioning drawings for material/equipment or any other detail required for clear understanding of the complete work.

ii). The contractor shall submit all relevant drawings for its approval to Engineer-in-charge/Local fire authority. After approval of drawings by BHEL/Local fire authority, three copies of the working/shop drawings shall be submitted by the contractor to BHEL.

iii). Contractor shall verify all dimensions at site before commencement of work and also bring in to the notice of BHEL any or all discrepancy or deviations followed by submission of revised drawings with "revision marks" clearly marked on the drawings. In case of any dispute on this matter, decision of the Engineer-in-charge shall be final and binding to the contractor.

iv). The contractor shall maintain one set of all drawings issued to him as reference drawings. These shall not be used on site.

v). All corrections, deviations and changes made on the site shall be shown on these reference Drawings for final incorporation.

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vi). On completion of works, contractor shall submit one complete set of drawings in soft (CD/Pen Drive) copy along with two prints of "As Built" drawings to the Engineer-in-charge. These drawings shall have the following information:-

- a) Run of all piping, with diameters on all floors and vertical stacks.
- b) Run of all fire lines with diameters, location of control valves, access panels.
- c) Location of all mechanical equipment with layout and piping connections.
- d) Run of control wiring and circuit diagrams of motor control panels.

vii). Contractor shall provide three sets of catalogues, maintenance manuals, performance data and list of spare parts together with the name and address of the manufacture for all electrical and mechanical equipment provided by him.

viii). All "Warranty Cards" given by the manufacturers shall be handed over to the Engineer-in-charge before payment of final bill.

ix). All drawings prepared/ arranged by the contractor for the work shall be property of the BHEL and shall not be lent, reproduced or used on any other works than intended, without the written permission of the BHEL

8. Tender Information:-

The Contractor shall obtain all information related to the preparation of the tender entirely on his own responsibility and expense.

The contractor shall visit the site before submitting their offer and familiarize himself with the actual site conditions, access, availability of materials and other related problems for the speedy execution of the work.

The contractor shall examine all specifications, tender conditions etc. before submission of their offer.

The contractor shall obtain all information pertaining to the local regulations, bye- laws, application of any and all laws relating to him work or profession. No additional claims shall be admissible on this account.

9. Materials:-

All materials used on this work shall be new, conforming to the specifications.

Materials shall conform to the latest TAC Regulations/ Indian Standards, Specifications as amended up to date and carry certification mark, wherever so required.

All materials used on the project shall be approved by the Engineer-in-charge.

Contractor may be required to purchase such materials of particular make or from a particular source if in the opinion of the Engineer-in-charge the same is necessary and required for the proper and reasonable compliance of the specifications and in the interest of better quality of work.

Any damage during cartage, execution, installation or before formally handing over shall be made good by the contractor at his own expenses.

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10. Inspection and testing of materials:-

Contractor shall be required to produce manufacturer's test certificates, if applicable, for the particular Batch of materials supplied to him. The test carried out shall be as per the relevant Indian Standards.

For examination and testing of materials and works at site, contractor shall provide all necessary Testing and gauging equipment viz. Steel tapes, Painting/Coating thickness gauge, Plumb bobs, spirit levels, hammers, Micrometers/Vernier callipers, Hydraulic test machine, pressure gauge, flow meter, Clamp-on-ammeter, Megger, Holiday Test machine etc.

Contractor may be asked for calibration Test Certificate, not older than 15 days, for all such Equipments/ instruments. Further if required by the Engineer-in-charge, calibration test certificate of any approved laboratory may have to be submitted by the Contractor. The contractor shall carryout various tests as enumerated in the technical specifications of tender documents.

All tests whether on the field or outside concerning the execution of the work and supply of Materials by the contractor shall be carried out by the contractor at his own cost.

The work is subject to inspection at all times by the Engineer-in-charge. The contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical specifications/general or special condition and terms of this tender.

The contractor shall provide for purpose of inspection access ladders, lighting and Necessary instruments at his own cost.

All results of inspection and test will be recorded in the inspection reports, Performa of which will be approved the Engineer-in-charge. These reports shall form part of the completion documents.

Any work not conforming to the execution drawings, specifications or codes shall be rejected forth with and the contractor shall carryout as per the specification at his own cost.

12. Contractor's Rates:-

Rates quoted for this tender shall remain valid and unaltered for minimum period of **SIX MONTHS** from the opening date of this tender.

Rates quoted in this tender shall be inclusive of cost of materials, labour, supervision, Erection, tools, plant, breakage, wastage etc.

Rates quoted are for all heights and depths required for this work and must be for complete Items inclusive of such accessories, fixtures and fixing arrangements, nuts, bolts, hangers as are a standard part of the particular item unless given separately in the schedules of quantities.

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The schedule of rates is to be read with all the other sections of this tender document. The BHEL reserves the right to interpolate the rates of such items of work fall in between similar items of lower and higher magnitude.

All items of work, in the schedule of rates shall be carried out as per the specifications, Drawings and instructions of the Engineer-in-charge, and the rates shall provide for supply of required materials, consumables, skilled and unskilled labour, supervision, tools and tackles etc., as called for in the detailed specifications and conditions of the contract.

13. Testing:-

Piping system shall be tested as specified under the relevant clause of the TAC Regulations /Specifications and shall be performed in presence of representative from BHEL/Local fire authority.

All materials and equipment found defective shall be replaced and the whole work again tested to meet the requirements of specifications, at the cost of the contractor.

Contractor shall perform all such tests may be necessary and required by the local authorities to meet the Local Fire Authority/Municipal or other bye-laws in force at his own cost.

Contractor shall provide free of cost all labour, equipment and materials for the performance of the test.

14. Site clearance and clean-up:-

The contractor shall clear away all debris and excess material accumulated at the site time to time.

After all the fixtures, equipment and appliances have been installed and commissioned, contractor shall clean up the same and remove all plaster, paint, stains, stickers and other foreign matter and discoloration leaving the system in a ready to use condition.

15. Approval of Fire Installation:-

Contractor shall keep a constant liaison with the above authorities to keep them aware of the progress and standards of works followed, and for the inspections to be carried out during the fabrication / construction phase.

Contractor shall obtain all necessary NOC/Approvals/Completion Certificates with respect to the fire fighting installations from the District Magistrate/Local Fire Officer.

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**TECHNICAL
SPECIFICATIONS
FOR
CIVIL & FIRE
FIGHTING WORK**

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ABBREVIATIONS

In the technical specifications, as well as in the bill of quantities, the following abbreviations have been used:

Cu. M.	Cubic Metre
Sq. M.	Square Metre
R. M.	Running Metre
Q. R.	Quote Rate
NO.	Numbers

1.0 Specification for material for construction :

1.1 Cement

The cement to be used for the Works shall be
Portland Pozzolana Cement(fly ash based)

IS: 1489 (Part 1)

and Supply for cement for the Works shall be arranged by BHEL as per the provisions of the tender.

1.2 COARSE AGGREGATE

Aggregates for use in concrete (other than light-weight concrete) shall comply with the requirements of IS 383. As far as possible preference shall be given to natural aggregates.

The maximum quantities of deleterious materials in the coarse aggregate shall not exceed the limits indicated in the IS 383 when tested as per IS 2386 Part-I & Part-II "Method of Tests for Aggregate for Concrete".

Once a specific source of supply of coarse aggregate is accepted, the source shall not be changed without prior approval of the Engineer. If quality of any other source is good then it can be accepted after approval of the Engineer-in-charge.

Coarse aggregate to available sizes shall be stored at site as separate stacks over clean and well maintained hard floor and areas not liable to flooding. Alternatively, they will be stored in bins.

Contamination with foreign matters and earth during storage and while heaping the materials shall be avoided. It shall be kept in layers not exceeding 1.2m. in height to prevent coning or segregation.

Each type and grading of aggregate shall be stored separately in bins, in such a manner that mixing of the various size particles does not occur and shall be sloped sufficiently to ensure adequate drainage of surplus water.

Sufficient quantities of each type of aggregate shall be maintained on site at all times to ensure continuity of work.

Coarse aggregate, which is not clean, shall be washed with clear fresh water before use in the job. Screening should be done, if considered necessary by the Engineer, without extra cost.

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1.3 FINE AGGREGATE

Fine aggregate for different end uses (other than light-weight concrete) shall conform to the following standards:

- | | | |
|----|-------------------------|--|
| a. | For structural concrete | IS: 383 (between Grading Zones I & II) |
| b. | For mortar & grout | IS 2116 |
| c. | For plastering | IS 1542 (Class A Grading) |

Fine aggregate shall consist of natural sands or machine crushed rock/gravel. It shall be clean, sharp, hard, strong and durable and free from dust, vegetable substances, adherent coating, clay, loam, alkali, organic matter, mica, soluble sulphate, gypsum or any other deleterious substances which can be injurious to the setting qualities / strength / durability of concrete. The use of sea sand is prohibited.

1.4 WATER

Water for construction shall be supplied by BHEL.

1.5 STEEL REINFORCEMENT

Steel reinforcing bars shall conform to the following standards:

Mild steel and medium tensile steel bars	IS 432 (Part I)
High strength deformed steel bars	IS 1786
Hard drawn steel wire fabric	IS 1566
Structural steel, Grade A	IS 2062

Binding wire shall conform to IS 280 and shall be soft drawn mild steel wire of size not less than 1.5 mm. in dia. (16 g.) soft annealed/galvanized steel wire.

All reinforcement shall be free from loose mill scales, loose rust and coats of paints, oil, mud or any other substances, which may destroy or reduce bond.

All reinforcement for the Works shall be arranged by contractor as per requirement.

Storage of materials shall be as described in IS 4082.

2.0 SPECIFICATION for WORKMANSHIP

2.1. GENERAL

In case of omissions or discrepancies, the specifications mentioned in IS 456-2000 shall be final.

Surplus of cast concrete and completed plaster shall be marked with the completion dates.

STANDARD

In all cases the work shall be carried out in accordance with the latest Indian Standard Specifications and the best engineering practice. In the absence of such specifications, work shall be executed in accordance with any other relevant standards issued elsewhere as approved by the Engineer or as per the instructions and directions of the Engineer.

CONSTRUCTIONAL PLANT

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The CONTRACTOR shall be responsible for the supply, use and maintenance of all Constructional Plant and Equipment so as to ensure smooth and efficient working of the job. The Engineer shall have access to the Plant at all times. In case of total/partial break down of plant, stand-by/alternative arrangements be made available.

WORKMEN AND STAFF

The CONTRACTOR shall ensure that he employs only capable and experienced labour force, foremen, other tradesmen and supervisory staff on the job capable of handling the types of work they are required to handle in a workman-like and efficient manner to the satisfaction of the Engineer. He shall also ensure that his Sub-Contractors or nominated Sub-Contractors also employ all workmen and supervisory staff capable of delivering work of high standard.

For all concrete work, a fully qualified and experienced quality control engineer shall be employed by the CONTRACTOR and he shall be available on Site at all times when concreting operations are in progress. Operators for mixers, mechanical vibrators and personnel in-charge of placing of concrete shall be fully trained and experienced for their class of work.

DEFINITIONS

Engineer-in-charge: PMO/Owner-designated engineer who is in charge of the site and its authorized representative(s).

Approved/Approval: Approval by the Engineer-in-charge.

CONCRETE – PLAIN AND REINFORCED
GRADES OF CONCRETE

Various grades of concrete shall be as per IS 456-2000 with specified characteristic compressive strength against these grades in accordance with Table 2 in the said IS. In the grade designation, 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. The characteristic strength is defined as the strength of material below which not more than 5 percent of the test results are expected to fail.

The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in Table 2 of IS 456:2000. The target mean strength of concrete mix should be equal to the characteristic strength plus 1.65 times the standard deviation.

DESIGN MIX OF CONCRETE

2.2.2.01 Reinforced concrete (RC) work shall be in “Design Mix Concrete”, if specified. The CONTRACTOR shall make all the necessary tests to determine for each grade of concrete, the preparation of various ingredients by weight to arrive at the desired design mix to the satisfaction of the Structural Consultant. Such mix will be known as the “declared mix”. No deviation from the “declared mix” will be permitted without the expressed sanction of the Structural Consultant / Engineer in writing. No agreement by the Engineer to such “declared mix” shall relieve the CONTRACTOR of

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his responsibility to use in the Works at all times only concrete as specified in the relevant drawings.

2.2.2.02 The CONTRACTOR shall be entirely responsible for design of concrete mixes of the specified performance to suit the degree of workability and characteristic strengths required for the various parts of the Works.

2.2.2.03 Concrete shall meet with the strength requirements and minimum cement contents, maximum w/c ratio as indicated in Table 5 of IS 456-2000 hereinafter unless specifically stated otherwise.

2.2.2.04 Alternative mixes may be designed by the CONTRACTOR for use in both thin and narrow sections and thick sections. Special mixes using finer aggregates may be designed by him for in filling pockets and narrow spaces and for regions of congested reinforcement.

2.2.2.05 Notwithstanding the above, the following additional specifications shall be applicable.

2.2.2.06 Design Assumptions:

TABLE 1

Main Reference Codes:	IS 456, 516, 10262, 383, 2386, 269, 8112, 12269, 1199 and other related codes. The latest revisions or amendments shall be enforced.
Type of exposure	Moderate
Degree of quality control	Good
Initial Slump	75-80mm.
Slump Retention after 60 minutes	25-30mm
Portland Cement	Grade 43/53 (from source approved by Owner)
Maximum size of aggregate	20mm (may be in two fractions)
Flakiness Index	Up to M35: Maximum 25% above M35 Above M35: Maximum 15%
Elongation Index	Up to M35: Maximum 25% Above M35: Maximum 15%
Crushing Value	As per IS 383
Sand	Natural sand of Zone II or Zone III only (as per IS 383). Blending of sand may be permitted.
Specific Gravity & Water Absorption	Actual
Trials	Trial shall be conducted with materials which the contractor plan to use at site

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The minimum cement content and the maximum water-cement ratio shall be as per IS 456-2000.

2.2.2.07 Submission of Design Mix for approval: The contractor shall submit the mix design of concrete mixes to the structural consultant/Owner well in advance for approval. The minimum period required for the approval shall be 30 days (for individual mixes).

2.2.2.08 The Contractor is required to submit the following data along with the mix design:

2.2.2.09 Aggregate Test Results:

Sieve analysis for coarse and fine aggregate.

Specific gravity & water absorption for coarse & fine aggregate.

Flakiness index, elongation index and crushing value of coarse aggregate.

Water Test Results as per IS 456.

Cement Test Results:

Consistency.

Setting Time (Initial and Final).

Compressive Strength (3, 7 and 28 days)

Blains Fineness.

Type of Exposure

Degree of Quality Control

Initial Slump and Compaction Factor recorded during the trials.

Retention (Slump and Compaction Factor) after 30 and 60 minutes.

2.2.2.010 The Contractor shall submit materials for trials in sufficient quantity at his own cost as per the given detail (for the approval of each grade of mix):

2.2.2.011 Cement (1 bag, sealed)

2.2.2.012 Sand (2 bags, dry)

Coarse Aggregate (20mm) (3 bags, dry)

Coarse Aggregate (10mm) (2 bags, dry)

Super plasticizer (if proposed) (1 Lts, with product literature)

Compressive Strength achieved for 3, 7 and 28 days

Super plasticizer Details:

Specific Gravity

Chloride Content

Dose used ((mentioning maximum limit with all data, with respect to the slump/c.c. recorded with varying doses of super plasticizer)

Note:

1. The use of plasticizer/super plasticizer may not be allowed by the Owner/Consultant.

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2. The base material of plasticizer/super plasticizer may be specified by the Owner/Consultant.
 3. If super plasticizer is used, then the workability detail for controlled mix shall also be submitted and the water retention for plasticizer shall be minimum say 10 to 15% and for super plasticizer it shall be minimum 25 to 30%.
 4. For the approval of super plasticizer, the Contractor shall conduct the performance trial in the presence of the Owner and the compressive strength to be verified for 3, 7, 28 and 180 days.
 5. The basis for the approval shall be referred under title "Acceptance Criteria of Mix Design and Approval of Plasticizer/Super plasticizer".
- Acceptance criteria of mix design and approval of plasticizer / super plasticizer:

Place for the trials	At the Owner's laboratory
Restrictions to the number of trials	Contractor may submit three options for each grade of mix in the event of rejection of trial mixes contractor has to pay as per the approved rate of central material testing laboratory on per trial basis.
Witness of trials	One representative of the Contractor with the authorization letter.
No. Of trials for one grade of mix	Minimum three trials
Total number of cubes:	3, 7, and 28 days (3 cubes for each age). The acceptance criteria for the mix design will be the 28 days average compressive strength. Out of three trials minimum two trials shall meet the compressive strength and workability requirements.
The average	The average shall be the average of three cubes.

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Strength Requirement	<p>The acceptable strength requirement shall not be less than the target strength (Characteristic strength + 1.65*Standard Deviation) and shall not be more than +10% of the target strength.</p> <p>In case the strength from the trial is more than +10% of target strength, the mix shall be considered uneconomical and shall be rejected and the Contractor shall submit a new mix design. The Owner shall not be responsible for this lapse of time and it will be considered on part of the Contractor to bear it.</p> <p>No allowance shall be paid for difference of cement content from the actual consumption of the base cement content used for the analysis.</p> <p>The variation in cement content with the assumed cement content (taken for analysis) will be applicable after the approval of mix design.</p>
Workability	<p>Initial Slump: 75-80mm After 60 minutes: 25-30mm.</p> <p>If the retention is not obtained, the Contractor may propose the use of super plasticizer.</p>
Plasticizers/Super plasticizers	<p>The trials for the performance check of plasticizers/super plasticizers will be conducted. The other requirements will be the same as mentioned above, but the number of trials are restricted to three different doses.</p> <p>For any approval of any mix, the two additional confirmatory trials will be required (of same mix and dose)</p>
Responsibility	<p>The responsibility to prepare mix design and submission for approval, shall be of the Contractor and no reminders will be given by the Owner.</p> <p>Irrespective of the approval, the Contractor</p>

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	<p>is responsible for achieving characteristic strength in the field. Concrete cube strength shall be considered as indicative strength. Hence, in case of any doubt, the Engineer-in-charge is free to conduct non-destructive tests on the structure and the Contractor shall arrange for the same at his own cost.</p>
Review of Mix Design	<p>If there is a considerable drop in compressive strength, (i.e., characteristic strength) is observed more than 10%, then the review of mix design will be required at the Contractor's cost. If the drop in compressive strength is less than 10% of characteristic strength, the concrete making process, raw materials shall be thoroughly observed.</p>

2.1.1. NOMINAL MIX CONCRETE

2.1.2. Nominal mix concrete may be allowed by the Engineer at his discretion. The proportions of materials shall be in accordance with Table 9 of IS 456-2000. The relevant details at a glance are indicated in Table 2.

TABLE - 2

Grade of Concrete	Total quantity of dry aggregates by Mass per 50kg of Cement, to be taken as the sum of the individual Masses of Fine & Coarse Aggregate, Kg, <i>Max.</i>	Quantity of water per 50 Kg. of cement, <i>Max.</i>
M 5	800 Kg.	60 Litres
M 7.5	625 Kg.	45 Litres
M 10	480 Kg.	34 Litres
M 15	330 Kg.	32 Litres
M 20	250 kg.	30 Litres

The proportion of fine aggregate to coarse aggregate by mass shall generally be 1:2 subject to an upper limit of 1:1 ½ and lower limit of 1:2 ½.

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TABLE - 3

I.S. Sieve Designation	Percentage passing for single sized aggregate of nominal size					Percentage passing for graded aggregate of nominal size			
	40 mm.	20 mm.	16 mm.	12.5 mm.	10 mm.	40 mm.	20 mm.	16 mm.	12.5 mm.
63 mm.	100	-	-	-	-	-	-	-	-
40 mm.	85-100	100	-	-	-	95-100	100	-	-
20 mm.	0-20	85-100	100	-	-	30-70	95-100	100	100
16 mm.	-	-	85-100	100	-	-	-	90-100	-
12.5 mm.	-	-	-	85-100	100	-	-	-	90-100
10 mm.	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75 mm.	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36 mm.	-	-	-	-	0-5	-	-	-	-

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2.1.3. QUALITY ASSURANCE MEASURES

2.1.4. In order that properties of the completed structure be consistent with the requirements and the assumptions made during planning and design, adequate quality assurance measures shall be taken. Quality Assurance procedures be developed and submitted to the approval of Engineer-in-charge . The said Quality Assurance plan shall fulfil the requirements detailed under Clause no. 10.1 of IS 456-2000.

2.1.5. PROPORTIONING AND BATCHING

2.1.6. Preliminary tests shall be carried out to determine the proportions by weight of cement, coarse and fine aggregate to produce the desired grade of concrete. These proportions shall be maintained during subsequent concrete batching by means of weight batchers conforming to IS 2722 (portable swing batcher for cement) capable of controlling weights with one percent of the desired value).

The accuracy of the measuring equipment shall be within +/- 2 percent of the quantity of cement being measured and within +/- 3 percent of the quantity of aggregate, admixtures and water being measured.

If the weigh batcher loses its calibration, an alternative arrangement of platform balance of required capacity shall be arranged by the Contractor.

The batcher shall be tested for accuracy of calibration before commencement of the work and at least once a week thereafter or more frequently, if so required by the Engineer. In case of failure, stand-by arrangement shall be available.

In batching concrete, the quantity of both cement and aggregate shall be determined by mass; admixture, if solid, by mass; liquid admixture may however be measured in volume or mass; water shall be weighed or measured by volume in calibrated tanks.

All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked.

Batching Plant where used should conform to IS 4925.

Grading of Aggregate and Foreign Material Limitations:

Coarse Aggregate:

Coarse aggregates shall be either in single size or graded; in both cases, the grading shall be within limits indicated in TABLE 3.

The percentages of deleterious substances in the coarse aggregate delivered to the mixer shall not exceed the volumes given in TABLE 4.

TABLE - 4

Deleterious Substance	PERCENT BY WEIGHT	
	Uncrushed	Crushed

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i) Coal & Lignite	1.00	1.00
ii) Clay lumps	1.00	1.00
iii) Material finer than 75 micron	3.00	3.00
iv) Soft fragments	3.00	-
v) Shale	-	-
vi) Total of percentages of all the deleterious materials (except mica) including Sl no. (i) to (v) .	5	5

Fine Aggregate:

- I. Unless otherwise directed or approved, the grading of sand shall be within the limits indicated in TABLE 5.

TABLE - 5

I.S. Sieve Designation	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10 mm.	100	100	100	100
4.75 mm.	90-100	90-100	90-100	95-100
2.36 mm.	60-95	75-100	85-100	95-100
1.18 mm.	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron I.S. sieve, by total amount not exceeding 5 percent, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron I.S. sieve or to percentage passing any other sieve size on the coarser limit of Grading Zone I or the finer limit of Grading Zone IV. Fine Aggregates conforming to Grading Zone IV shall not be used unless mix designs and preliminary tests have shown its suitability for producing concrete of specified strength and workability.

Sand shall have a fineness modulus of not less than 2.2 or more than 3.2. The fineness modulus is determined by adding the cumulative percentages retained on I.S. sieve sizes 4.75 mm., 2.36 mm., 1.18 mm., 600 micron 300 and 150 micron and dividing the sum by 100.

The recommended sand for concrete is from Zone II and Zone III

Fineness modulus of sand shall be between 2.5 and 3.25

Sand for Plaster shall comply with IS 1542

- II. The percentage of deleterious substances in sand delivered to the mixer shall not exceed the values given in TABLE 6.

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TABLE - 6

Deleterious Substance	PERCENT BY WEIGHT	
	Uncrushed	Crushed
i) Coal & Lignite	1.00	1.00
ii) Clay lumps	1.00	1.00
iii) Material finer than 75 micron	3.00	15
iv) Soft fragments	-	-
v) Shale	1.00	-
vi) Total of percentages of all the deleterious materials (except mica) including Sl no. (i) to (v) for uncrushed and Sl. No. (i) and (ii) for crushed fine aggregate.	5.00	2

Water-Cement Ratio:

The water-cement (W/C) ratio is defined as the weight of water in the mix (including the surface moisture of the aggregates) divided by the weight of cement in the mix. Free water-Cement should not exceed 0.40 for the substructure and 0.45 for superstructure.

Only such quantity of water shall be added to the cement and aggregates in the concrete mix as to ensure dense concrete, specified surface finish, satisfactory workability, consistent with the strength stipulated for each class of concrete. Water added to the mix shall be such as not to cause segregation of materials or the collection of excessive free water on the surface of the concrete.

The actual water-cement ratio to be adopted shall be determined in each instance by the CONTRACTOR and approved by the Engineer. W/C ratio determined and approved for use by the Engineer shall be maintained throughout the corresponding part of the Works. Approved tests shall be undertaken periodically by the CONTRACTOR for maintaining the consistency. Such ones comprise frequent determination of the water content of the aggregate during the Work progress as specified in IS 2386 (Part-III). To allow for the variation in weight of aggregates due to variation in their moisture content, suitable adjustments in the weights of aggregates shall also be made.

The CONTRACTOR shall exercise special precautions on the water content for fair faced concrete work since the colour of such concrete is sensitive to small variations of water in the mix.

Volumetric mixing may be allowed by the Engineer at his discretion by converting the "declared mix" to corresponding mix by volume. Allowance for bulkage shall be made accordance with IS 2386(Part 3). Periodic checks shall be made on mass / column relationship of the materials. Similarly where cement is measured by bags directly

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reasonable number of cement bags should be weighed periodically to check the net mass as directed by the Engineer.

Workability:

Workability of concrete should be checked at frequent intervals. It shall be checked at frequent intervals by approved tests such as slump tests, compacting factor tests, etc., in accordance with IS 1199. If required, the same shall be controlled by adjusting the dosage of the admixtures, if permitted by the Engineer-in-charge.

The range of slumps for various types of work shall generally be as follows subject to approval by the Engineer unless stated otherwise. Slump required for workability shall be achieved, if necessary, by using approved super plasticizer without any extra cost.

Placing condition	SLUMP (in mm.)	
	Maximum	Minimum
Blinding concrete; shallow sections; Pavement using Pavers	75	25
Mass concrete; Lightly reinforced sections in slabs, beams, walls, columns; Floors; hand placed pavements; Strip footings	75	25
Heavily reinforced sections in slabs, beams, walls, columns;	100	50
Slipform work; Pumped concrete	100	75
Trench fill; In-situ piling	150	100

Note:

For most of the placing conditions, internal vibrators (needle vibrator) are suitable. The diameter of the needle shall be determined based on the density and the spacing of reinforcement bars and thickness of the sections. For trieme concrete, vibrators are not required to be used and clause 7.1.2 of Isn 456:2000 shall be followed in such case.

Mixing of Concrete:

All concrete whether design mix or nominal mix shall be mixed in an approved mechanical mixer. The mixer shall comply with IS 1791 and IS 12119. The mixer shall be soffitted with water measuring (metering) devices.

Material for concrete shall be deposited into the mixer drum while it is in rotation in the following order: Coarse Aggregate, Cement, Fine Aggregate and Water.

The mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer, the concrete should be remixed.

For guidance, the mixing time shall be at least 2 minutes. For other types of more efficient mixers, manufacturer's recommendations shall be followed; for hydrophobic cement it may be decided by the Engineer-in-charge.

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The volume of mixed material shall not exceed the manufacturer's rated mixer capacity. Temperature of aggregate, water and cement when added to the mixer shall be such that the temperature of the concrete at the time of placement is less than 35 Deg. C. The mixer shall be thoroughly cleaned of all hardened sticking concrete and foreign materials before beginning the concreting operations and also at frequent intervals between batches and at the end of concreting work by spraying the drum with cool water.

Concrete shall be discharged from the mixer on to a level, clean and watertight surface. The area surrounding the mixer and the aggregate stacks shall be kept clean.

Subject to the approval of the Engineer, the CONTRACTOR may use waterproofing admixtures and / or other chemical admixtures and additives in concrete. The proportions and the mode of use shall be as per the manufacturers' instructions. The CONTRACTOR shall furnish complete literature in regard to such admixtures / additives to the Engineer.

Dosage of retarders, plasticizers and super plasticizers shall be restricted to 0.5, 1.0, and 2.0 percent respectively by weight of cementations materials, unless a higher value is permitted by the Engineer-in-charge. Actual dozes shall be worked out after trials.

Mixing of cement mortar or concrete, which has partially set, shall not be permitted under any circumstances.

TRANSPORTING AND PLACING OF CONCRETE

Concrete shall be handled from the place of mixing to the place of final placing as rapidly as practicable by methods which will prevent the segregation or loss of any of the ingredients and maintaining the required workability. Entire operation shall not take time more than the initial setting time of concrete under the prevailing site conditions.

During hot or cold weather, concrete shall be transported in deep containers. Other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather may also be adopted.

The concrete shall be deposited as nearly as practicable in its final position to avoid re-handling. No concrete shall be permitted to be used in the Works after initial set has taken place. Concreting of beams, slabs and similar members shall be carried out in one continuous operation to the full depth of the member and the sequence of placing shall be so arranged as to avoid disturbance of partially-set concrete.

The concrete shall be deposited as nearly as practicable in its final position to avoid re-handling. No concrete shall be permitted to be used in the Works after initial set has taken place. Concreting of beams, slabs and similar members shall be carried out in one continuous operation to the full depth of the member and the sequence of placing shall be so arranged as to avoid disturbance of partially-set concrete.

Method of placing of concrete should be such that no segregation occurs during placing. Generally concrete shall not be dropped freely from a height of more than 1.5 meters in

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the Works of watertight structures and 2 m. in all other works. When required to be deposited from a greater height, it shall be done through a metal-lined chute with slope no flatter than 1:2 (vert. : Horiz.) and not steeper than 1:3. The discharge end of the chute will be provided with a baffle plate to prevent segregation. The discharge end of the chute shall be maintained above the surface of the concrete in forms and concrete shall not be permitted to fall from the end of chute by more than 1 m. During cleaning the chute, the waste water shall be kept clear of the forms.

When placing concrete by mechanical equipment, the following shall apply:

Central-bottom-dump buckets, which provide for positive regulation of the amount and rate of deposition of concrete in all dumping position shall be employed. Concrete shall be discharged by a vertical drop into the middle of bucket or hopper. In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall clear the concrete already in place and shall be opened slowly to avoid high vertical bounce. The height of drop of concrete shall not exceed 1 m. Dumping in a manner which would result in segregation of concrete ingredients shall not be permitted. If pumps and pneumatic placers are used for conveying and placing concrete:

Concrete mix shall be appropriately designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping is started.

Before commencing to pump concrete, the pipeline shall be "lubricated" with two batches of 1:2 cement and sand mortar.

Manufacturers' instructions regarding pipeline layout, concrete quantity, etc., shall be taken to avoid problems as blockages and excessive wear, etc.

In case of break-down/failure, stand-by/alternative arrangements be made available & be used as directed and approved by Engineer-in-charge.

Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 cm. to 30 cm. such that the formation of cold joints of planes of weaknesses between each succeeding layer within the pour are avoided. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shovelling.

Freshly laid concrete shall not be wheeled over or walked over or otherwise disturbed.

When depositing concrete adjacent to a construction joint, special care shall be taken not to disturb the dowels or other reinforcing bars projecting from the existing concrete. While resuming the concrete work, procedure as per clause no.3.2.12.03 to be followed.

In vertical members like walls, columns, pardis, etc., where the full height is not being poured in one continuous operation, the surface of each lift shall be finished horizontal and any laitance removed between the period of initial and final set.

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2.1.7. COMPACTION OF CONCRETE

Except for thin layer of plain concrete (for which tamping may be allowed) each layer of all grades / mixes of concrete shall be thoroughly compacted with approved mechanical vibrators of adequate power (Ref. IS 2505, IS 2506, IS 2514) supplemented by hand spreading, rodding and tamping as directed so that concrete works around the reinforcement, around embedded fixtures and into corners of the formwork, embedded air is expelled, dense concrete is obtained and the exposed surfaces are free from air pockets, honey-combing and other defects.

Type of vibrators (immersion vibrators, shutter vibrators, surface vibrators, etc.) to be used shall depend on the type of structure for which concreting is done and shall have the approval of the Engineer. The size and number to be provided shall be such as to ensure proper consolidation.

General precautions to be taken in vibration work shall be as follows:

Concrete once vibrated shall not be vibrated again.

Partially hardened concrete or mortar shall not be re-tamped.

Over-vibration, under-vibration or vibration of very wet mixes should be avoided.

Tapping or external vibration of forms by hand tools or immersion vibrators shall not be permitted.

Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. These vibrators shall not be allowed to come in contact with the reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.

Whenever external vibrators are used, the design of formwork and the disposition of vibrators should be given special consideration to ensure sufficient compaction and surface blemishes.

2.1.8. CONCRETING IN INCLEMENT WEATHER

During heavy rains, concreting shall be stopped keeping appropriate temporary stop ends (V-grooves, etc.) and newly-cast concrete shall be instantly covered by suitable protective means. Any concrete damaged due to rainstorms, etc., shall be replaced appropriately as directed by the Engineer at the expense of the CONTRACTOR.

2.1.9. CONCRETING UNDER WATER

When it is necessary to deposit concrete under water, the CONTRACTOR shall submit to the Engineer for his approval, the mode of carrying out the work together with the materials and proportions thereof he proposes to use. In no case such concrete be considered as "Design Mix Concrete".

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2.1.10. CURING

All concrete shall be protected during hardening from the harmful effects of sunshine and drying winds. All exposed surfaces of newly placed concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacking, canvas, hessian or similar other absorbent materials and kept continuously wet for at least 7 days from the date of placing of concrete in case of ordinary Portland cement, 10 days in case of mineral admixtures or blended cements are used. Likewise all formwork directly in contact with concrete shall be kept wet. Curing compounds to provide surface coating with specking equipment may also be used if permitted by the Engineer. The necessary literature shall be furnished by the CONTRACTOR for the purpose.

For in-situ slabs (whether for flat roofs or other level surfaces, floors, pavements, side walks, etc.), curing shall be by ponding only.

In case of concrete exposed to dry and hot weather conditions or for watertight structures, curing period shall be 10 days. In the case of concrete where mineral admixtures or blended cements are used the curing period shall be extended to 14 days.

The CONTRACTOR shall take good care in the arrangement (whether by continuous fine mist spraying or sprinkling or by covering with clean sand or wet gunny bags or by any curing compounds) and execution of curing so that curing will be carried out without interruption during the nights, Sundays and holidays.

Water for curing shall be of the same quality as used for concrete.

2.1.11. EXPANSION JOINTS

Expansion joints in the watertight structures shall always be provided with water-stop for the entire length of joints or as specified. The work shall be carried out in strict accordance with the manufacturer's instructions.

2.1.12. CONSTRUCTION KEYS AND JOINTS

Concrete shall be placed without interruption until completion of the part of the work between predetermined construction as specified hereinafter. Time lapse between the pouring of adjoining units shall be as specified on the drawings or as directed by Engineer.

If stopping of concreting becomes unavoidable anywhere, a properly formed construction joints shall be made where the work is stopped. Joints shall be either vertical or horizontal, unless shown otherwise on drawings. In case of an inclined or curved member, the joint shall be at right angles to the axis of the member. Vertical joints in walls shall be kept to a minimum. Vertical joints shall be formed against a stop board, horizontal joints shall be level and wherever possible, arranged so that the joint

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lines coincide with the architectural features of the finished work. Battens shall be nailed to the formwork to ensure a horizontal line and if directed shall also be used to form a grooved joint. For tank walls and similar work joints shall be formed as per IS 3370. Concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering. Horizontal and vertical construction joints and shear keys shall be located and shall conform in detail to the requirements of the plans unless otherwise directed by Engineer. Where not described, the joint shall be in accordance with the following:

Column Joint: In a column, the joints shall be formed 75mm below lowest of soffit of the beams including haunches if any. In flat slab construction, the joint shall be 75 mm. below the soffit of column capital. At least 2 hours shall elapse after depositing concrete in columns, piers or walls, before depositing in beams, girders or slabs supported thereon.

Beam and Slab Joints: Concrete in a beam shall be placed throughout without a joint but if the provision of a joint is unavoidable the joint shall be vertical and at the centre or within the middle third of the span unless otherwise shown on drawings. Where a beam intersects a girder, the joints in the girder shall be offset a distance equal to twice the width of the beam and additional reinforcement provided for shear. The joints shall be vertical throughout the full thickness of the concrete member. A joint in a slab shall be vertical and parallel to the principal reinforcement. Where it is unavoidably at right angles to the principal reinforcement, the joint shall be vertical and at the middle of the span.

Joints in Liquid Retaining Structures: Vertical construction joints in watertight construction will not be permitted unless indicated on the drawings. Where a horizontal construction joint is required to resist water pressure, special care shall be taken in all phases of its construction to ensure maximum water tightness.

Where the work has to be resumed on a surface which has hardened, any skin or laitance shall be removed and the surface roughened by hammering with an approved power-operated "bush" hammer followed by wire brushing to remove all loose practices. When using this

procedure, great care shall be taken to avoid breaking of the arises of the joint face and stunning the stones. The surface is then thoroughly wetted. Fresh concrete should thoroughly be vibrated near the construction joint so that mortar from the new concrete flows between large aggregates and develop proper bond with old concrete. Where high shear resistance is required at the construction joints, shear key may be provided. Sprayed curing membranes and release agents should be thoroughly removed from joint surfaces.

Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire on bristle brushes, care being taken to avoid dislodgment of particles of aggregate. The prepared surface should be in a clean saturated surface dry

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condition when fresh concrete is placed, against it. Fresh concrete should be thoroughly vibrated near construction joint so that mortar from new concrete floors between large aggregates and develop proper bond with old concrete.

2.1.13. SAMPLING AND TESTING OF CONCRETE

For preliminary tests, test specimen shall be prepared with at least two different water-cement ratios for each class of concrete consistent with the workability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works. All the cubes shall be made, cured and tested in accordance with IS 516.

Facilities required for sampling materials and concrete in the field, if Engineer so desires, shall be provided by CONTRACTOR at no extra cost. The following equipment with operator shall be made available at Engineer's request (all must be in serviceable conditions):

Concrete cube-testing machine suitable for 15 cm. cubes of 100 Tonnes capacity with providing calibration ring	1 No.
Cast Iron cube moulds 15 cm. Size	18 Nos. (min.)
Slump cone complete with temping rod	1 Set
Laboratory balance to weight upto 5 Kg. with sensitivity of 10 gm.	1 No.
1.5 sieves for coarse & fine aggregates	1 Set
A set of measures from 5 l to 0.1 l	1 Set
Laboratory balance of 2 Kg. capacity and of sensitivity of 1 gm.	1 No.

Note: Arrangement can be made by CONTRACTOR to have the cubes tested in an approved laboratory in lieu of a testing machine at site at his expense, with the prior consent of the Engineer.

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

For works test, samples from fresh concrete shall be taken as per IS 1199 and cubes shall be made, cured and tested in accordance with IS 516 unless specified or instructed otherwise by the Engineer. Minimum frequency for sampling of concrete of each grade shall be in accordance with the following:

Quality of concrete in the Work, m ³	Number of samples
1 – 5	1
6-15	2
16-30	3

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31-50	4
51 and above	4 plus one additional sample for each additional 50 m ³ as part thereof.

Note : At least one sample shall be taken from each shift when concrete is produced at continuous production unit, such as ready-mixed concrete plant, frequency of sampling subjected the approval of Engineer-in-charge.

The acceptance criteria of concrete tests shall be as per Clause 16.1, 16.2, 16.3, 16.4, 16.5 & 16.6 of IS 456-2000.

2.1.14. CONCRETE BELOW SPECIFIED STRENGTH

Should the concrete tests fail to meet the minimum specified strength requirements for the respective grades of concrete, the Engineer may take one of the following decisions: Instruct the CONTRACTOR to carry out such additional tests (e.g. core test, load-test etc.) and/or remedial measures to ensure the soundness of the structure at the CONTRACTOR's expense.

The Consultant may accept the work provided it meets the relevant acceptance criteria as stipulated in IS 456-2000. Any decision to accept the work shall be entirely at the discretion of the Engineer who may make a reduction in the rate of the appropriate item.

The work will be rejected and any consequential action as needed shall be taken at the CONTRACTOR's expenses including cutting out and replacing a part or whole of the work.

2.1.15. REPAIR AND REPLACEMENT OF UNSATISFACTORY CONCRETE

Immediately the shuttering is removed, the surface of concrete shall be very carefully gone over and all defective areas called to the attention of Engineer who may permit patching of the defective areas or also reject the concrete unit either partially or in its entirety. **Rejected concrete shall be removed and replaced by CONTRACTOR at NO additional expense to Owner.** Holes left from belts, etc., shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing 2.36 mm. IS sieve after removing may loose stones adhering to the concrete. Mortar filling shall be struck off flush at the face of the concrete. Concrete surfaces shall be finished as described under the particular items of work.

Superficial honey compound surfaces and rough patches shall be similarly made good immediately after removal of shuttering, in the presence of Engineer and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float Excess water shall be avoided. Unless instructed otherwise by Engineer, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other Irregularities, care

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being taken to avoid damaging the surface. Surface irregularities shall be removed by grinding.

Use of Epoxy: The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer. Epoxies shall be applied in strict accordance with the instructions of the manufacturer.

Method of Repair: Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of from bolts, grout insert holes and slots cut for repair of cracks shall be repaired as follows. The holes to be patched shall be roughened and thoroughly soaked with clean water until absorption stops.

A 5 mm. thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching concrete which shall be well consolidated with a wooden float and left slightly proud of the surrounding surface. The concrete patch shall be built up in 10 mm. thick layers. After an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden flat and a smooth finish obtained by wiping with hessian, a steel trowel shall be used for this purpose. The mix for patching shall be of the same materials and in the same proportions as that used in the concrete being repaired, although some reduction in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible

Mortar filling by air pressure (guniting) shall be used for repair of areas too large and / or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the colour and texture of the surrounding concrete. White cement shall be substituted for ordinary cement, if so directed by Engineer, to match the shade of the patch with the original concrete.

Curing of Patched Work: The patched area shall be covered immediately with an approved water retaining, water saturated material such as gunny bags which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by a fine spray or sprinkling for not less than 10 days.

Approval by Engineer: All materials, procedures and operations used in the repair of concrete and also the finished repair work shall be subject to the approval of Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from cracks after the fillings have been cured and dried.

2.1.16. Finishing

This specification is intended to cover the treatment of concrete surfaces of all structures. Areas requiring special finish not covered by this specification shall be clearly indicated on the drawings and special specifications shall be furnished.

Finish for Formed Surfaces: The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer:

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For surface against which backfill or concrete is to be placed, no treatment is required except repair of defective areas.

For surfaces below grade, which will receive, waterproofing treatment the concrete shall be free of surface irregularities, which would interfere with proper application of the waterproofing material, which is specified for use.

Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repair of damaged or defective concrete, removal of fins and abrupt irregularities, filling of holes left by form ties and rods and clean up of loose or adhering debris.

Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage. Unless the drawing specifies a horizontal surface or shows the slope required, the tops of narrow surface such as stair treads, walls, curbs and parapets shall be sloped across the width approximately 1 in 30. Broader surface such as walkways, roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete, sub-floors to be covered with concrete topping, terrazzo or quarry tile and similar surfaces shall be smoothing screeded and levelled to produce even surfaces. Surface irregularities shall not exceed 6 mm. Surfaces which will not be covered by backfill, concrete or tiles toppings such as outside decks, floors of galleries and sumps, parapets, gutters, side walks, floors and slabs, shall be consolidated, screeded and floated. Excess water and laitance shall be removed before final finishing. Floating may be done with hand or power tools and started as soon as the screeded surface has attained and stiffness to permit finishing operations and these shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints and edges shall be tooled as called for on the drawings or as directed by the Engineer.

Standard Finish for exposed concrete: Exposed concrete shall mean any concrete, other than floors or slabs, exposed to view upon completion of the job. Unless otherwise specified on the drawings, the standard finish for exposed concrete shall be a smooth finish. A smooth finish shall be obtained with the use of lined or plywood forms having smooth and even surfaces and edges. Panels and form linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, projections etc. removed leaving the surfaces reasonably smooth and unmarred.

Integral Cement Concrete Finish: When specified on the drawings an integral cement concrete finish or specified thickness for floors and slabs shall be applied either monolithic or bonded, as specified on the drawings, as per IS 2571. The surface shall be compacted and then floated with a wood float or power floating machine. The surface shall be tested with a straight edge and any high and low spots eliminated. Floating or trowelling of the finish shall be permitted only after all surface water has

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evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

Protection: All concrete shall be protected against damage until final acceptance by Engineer/Owner.

2.2. FORMWORK

2.2.1. GENERAL

Formwork (or shuttering) comprises of all forms and moulds made up of planks and sheeting, etc., shores, bracings and struts, ties, anchors and hangers, steel rods, bolts and allied inserts, uprights, walling, wedges and all other temporary supports for concrete work during the process of concreting and setting.

2.2.2. MATERIAL

Formwork may be of timber, plywood, steel or other metal, plastic or concrete or any suitable material. For special finishes, the formwork may be lined with plywood, steel sheets, oil tempered hard board, etc. Dented steel plates will not be allowed and shall not be used at all.

Timber shall be easily workable without splitting and shall not warp when exposed to sun or rain or wetted during concreting. Plywood shall be 12 mm. thick complying with IS 4990 and steel shall be 3 mm. black sheets suitably stiffened with angles or appropriate equivalent.

Sliding forms and slip forms may be used for special purpose construction with the approval of the Engineer.

2.2.3. DESIGN

Formwork shall be adequately designed to cater to all the vertical (dead load of wet concrete, superimposed live loads during working, materials, equipment, etc.) and lateral loads, without causing displacement, deflection or movement of any kind. The CONTRACTOR shall be entirely responsible for the design and stability of formwork regardless of whether he is instructed to furnish the design calculation, drawings and other particulars of his proposal or not, and regardless of whether his proposal has been approved by the Consultant or not. All the expenses arising out of defective shuttering resulting in dismantling/redone the work, etc., shall be made to the Contractor's account. For details regarding design, detailing, etc., reference may be made to IS 14687.

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2.2.4. ERECTION OF FORMWORK

Forms shall be true to shape, lines, levels and dimensions of the concrete work as shown on the drawings and shall be rigidly constructed using adequate number of props, struts, ties, braces, etc. Where props rest on natural or filled-up ground, the soil shall be thoroughly compacted to avoid any settlement. False-work shall be so constructed that vertical adjustments can be made to compensate the settlements. Wedges may be used at the top or bottom of timber shores, but not at both ends to facilitate vertical adjustments or dismantling of the formwork. No bamboo and wooden bullies shall be permitted to be used for props or cross beams.

Proper precautions shall be taken to see that all joints in the formwork are watertight to prevent escape of slurry, by using masking tapes.

Connections in formwork shall be constructed to permit easy removal of the shuttering and shall be adequately secured by screws, bolts, clamps, wire, etc. so as to be strong enough to retain the correct shape during consolidation.

Faces in contact with concrete shall be free from adhering ground, projecting nails, splits or any defects so that when stripped, any formation of blemishes is avoided. All formwork shall be carefully cleaned and thoroughly wetted or treated with an approved composition, care being taken to keep all reinforcement away from contact from such composition.

Unless specifically allowed in writing, wire ties passing through the walls and through bolts are not permitted. For fixing of formwork, alternative arrangements such as coil nuts shall be adopted at the CONTRACTOR's cost.

Plywood shall be used for all concrete surfaces; where called for. Sawn and wrought timber may not be used unless allowed or approved by EIC. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planed to remove irregularities or unevenness in the face. Formwork with linings will be permitted.

All new and used form timber shall be maintained in good condition with respect to shape, strength, rigidity, water tightness.

Excessive construction camber to compensate for shrinkage, settlement, etc., that may impair the structural strength of members will not be permitted.

Forms for substructure concrete may be omitted when, in the opinion of Engineer, the open excavation is firm enough to act as the form. Such excavations shall be slightly larger than required by the drawings to compensate for irregularities in the excavation and to ensure the design requirements.

Forms shall be so designed and constructed that their removal will not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conform to the architectural features of the structure as to location of joints and be as directed by Engineer.

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Where exposed smooth or rubbed concrete finishes are required, the forms shall be constructed with special care so that the resulting concrete surface requires a minimum finish.

2.2.5. BRACINGS, STRUTS AND PROPS

Shuttering shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboo shall not be used as props or cross bearers.

The shuttering for beams and slabs shall be so erected that the shuttering on the sides of the beams and under the soffit of slabs can be removed without disturbing the beam bottoms. Re-propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges, or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering.

2.2.6. MOULD OIL

Care shall be taken to see that the faces of formwork coming in contact with concrete are perfectly cleaned and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and/or other items to be cast in the concrete shall not be placed until coating of the forms is complete. Adjoining concrete surfaces shall also be protected against contamination from the coating material. Use of form oil will not be permitted on the surfaces which require painting.

2.2.7. CHAMFERS AND FILLETS

All concrete and angles exposed in the finished structure shall be formed with moldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 mm. x 20 mm. Care shall be exercised to ensure accurate moldings. The diagonal face of the molding shall be planed or surfaced to the same texture as the forms to which it is attached.

2.2.8. VERTICAL CONSTRUCTION JOINT CHAMFERED

Vertical construction joints on faces which will be exposed at the completion of the work shall be chamfered as above except where not permitted by Engineer for structural or hydraulic reasons.

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2.2.9. WALL TIES

Wire ties passing through the walls shall not be allowed. In their place, bolts passing through sleeves shall be used.

2.2.10. REUSE OF FORMS

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retracted to prevent adhesion, to the satisfaction of Engineer. Warped timber shall be resized. Number of repetitions will be decided on the quality of plywood used after successive repetitions.

2.2.11. REMOVAL OF FORMS

CONTRACTOR shall record on the drawing or a special register, the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from.

In no circumstance shall forms be struck until the concrete reaches a strength of at least twice the stress due to self weight and any construction/erection loading to which the concrete may be subjected at the time of striking formwork.

In normal circumstances, generally where ambient temperatures are above 15 Degree C and ordinary Portland cement is used, forms may be struck after expiry of the following periods:

Type of formwork	Ordinary Portland Cement Concrete
a) Vertical formwork to columns, walls, beams	16-24 hrs
b) Soffit formwork to slabs (Props to be refixed immediately after removal of formwork)	3 days
c) Soffit formwork to beams (Props to be refixed immediately after removal of formwork)	7 days
d) Props to slabs 1) Spanning up to 4.5 m 2) Spanning over 4.5 m	7 days 14 days
e) Props to beams and arches: 1) Spanning up to 6 m 2) Spanning over 6 m	14 days 21 days

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For other cements and lower temperature, the stripping time as above may be suitably modified with prior approval of the Engineer-in-charge.

2.2.12. TOLERANCES

Variation from the plumb:

In the lines and surfaces of columns, piers, walls and in arises: 5mm per 2.5m, but not more than 25mm.

For exposed corner columns and other conspicuous lines:

In any bay of 5m maximum: 5mm.

In 10m or more: 10mm.

Variation from the level or from the grades indicated on the drawings:

In slab soffits, ceilings, beam soffits, and in arises:

In 2.3 m. .5mm.

In any bay or 5 m. maximum 8mm

In 10 m. or more 15mm.

For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

In any bay of 5m maximum: 5mm.

In 10m or more: 10mm.

Variation of the linear building lines from established position in plan and related position of columns, wall and partitions:

In any bay of 5m maximum: 10mm.

In 10m or more: 20mm.

Variation in the sizes and location of sleeves, openings in walls and floors: 5 mm. (except in the case of and for anchor bolts).

Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: (-5mm. +10mm).

Variation in Footings:

Variation in dimension in plan: -5mm. +50mm.

Misplacement or eccentricity: 2% of footing width in the direction of misplacement, but not more than 50 mm.

Reduction in thickness: 5% of specified thickness subject to a maximum of 50 mm.

Variation in Steps:

	RISE	TREAD
In a flight of stairs	3mm.	5mm.
In consecutive steps	1.5mm	3mm.

Tolerances in other concrete structures:

Variation of the constructed linear out line from established position in plan:

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In 5m 10mm.

In 10m or more: 15mm.

Variation of dimensions to individual structure features from established positions:

In 20mm or more 25mm.

In buried construction 50mm.

Variation from plumb, from specified better or from curved surfaces of all structures:

In 2.5m.: 10mm.

In 5m.: 15mm.

In 10m. or more: 25mm.

In buried construction: Twice the above amounts

Variation from level or grade indicated on drawings in slabs, beams, soffits, horizontal grooves and visible arises:

In 2.5m.: 5mm.

In 7.5m.: 10mm.

In buried construction: Twice the above amounts

e. Variation in cross sectional dimensions of columns, beams buttresses, piers and similar member **(- 5 mm. + 10 mm.)**

f. Variation in the thickness of slabs, walls, arch sections and similar members. **(-5 mm. + 10 mm.)**

g. Footings for columns, piers, walls, buttresses and similar members

i) Variation of dimensions in plan **(-10 mm. + 50 mm.)**

ii) Misplacement or eccentricity

2% of footing width in the direction of misplacement but not more than 50 mm.

iii) Reduction in thickness 5% of specified thickness subject to a min. of 50 mm.

Tolerances in other types of structures shall generally conform to those given in Clause 2.4 of Recommended Practice for Concrete Form-work (ACI-347).

2.2.13. REMOVAL

No formwork shall be removed or otherwise allowed to move until concrete attains sufficient strength against own weight and external loads as per stipulations of clause 11.3 of IS 456: 2000.

2.14.2. The stripping of formwork shall be done without shock or vibration so that no damage is caused to cast concrete. Any damage resulting from premature removal of shutters or from any other cause whatsoever shall be made good by the CONTRACTOR at his own expense as directed by the Engineer.

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2.2.14. SPECIAL PROVISION

Where exposed smooth or rubbed concrete finishes are required, the forms shall be constructed with special care so that the resulting concrete surfaces will required a minimum finish.

All corners and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 mm. x 20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the molding shall be planed or surfaced to the same texture as the forms to which it is attached. Vertical construction joints on faces which will be exposed at the completion of the work shall be chamfered as above except where not permitted by Engineer for structural or hydraulic reasons.

Wherever the concreting of narrow members is required to be carried out within shutters of considerable depth, temporary openings in the sides of the shutters shall, if so directed by the Engineer, be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided as necessary at the bottom of shutters of columns, walls and deep beams to permit the expulsion of rubbish, etc.

2.3. REINFORCEMENT

2.3.1. FABRICATION

Bar bending schedule shall be prepared by the CONTRACTOR and approved by Engineer-in-charge before commencement of work. Bending of reinforcement shall be in accordance with IS 2502-1963 and as required by the Drawings and sketches and any written instructions in this connection, bars shall not be bent or straightened in a manner injurious to the materials. All bars shall be bent cold except for bars over 25 mm. dia. which may be bent hot if specifically approved by the Engineer. Bars which depend on their strength on cold working shall not be bent hot. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 645 Degree C) and after bending shall be allowed to cool slowly without quenching.

No reinforcement bar shall be bent when in position without the Engineer's approval, whether or not it is partly embedded in hard concrete.

Spiral reinforcement shall have 1 ½ finishing turns at both top and bottom unless shown otherwise.

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care shall be taken to ensure that at no time is the radius of the bend less than 4 bar diameters for plain M.S. bars and 6 bar diameters for deformed bars. Care shall also be taken when bending back bars, to ensure that concrete around the bar is not damaged.

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Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

2.3.2. BINDING

All bars shall be bound tightly together where they cross, with black annealed steel binding wire. The free ends of the binding wire shall be bent inwards. The binding wire shall satisfy IS 280.

2.3.3. PLACING AND FIXING

The reinforcement as per the Drawings and instructions shall be placed, fixed and maintained in the forms within a tolerance of ± 10 mm. for effective depth 200 mm. or less and ± 15 mm. for effective depth over 200 mm. during the placing and compaction of concrete.

Precast concrete blocks, MS chairs and spacers as required shall be provided to maintain the steel in position. In fair faces of concrete temporary spacers only shall be used and withdrawn as compaction of concrete proceeds.

Tack welding of crossing bars shall be done without any extra cost any only if permitted by the Engineer.

2.3.4. COVER

Spacing of reinforcement shall be governed by Clause 25.3 and cover to reinforcement by Clause 25.4 of IS 456. Increased covers, if shown on the drawings or instructed by the Engineer, shall be provided at the respective locations. Cover to reinforcement shall be as per IS 456. Fully cured cement mortar blocks of 1:2 max shall be used as cover blocks where no grade of concrete is specified and where grade of concrete as specified it shall be as per proportion of cement and sand in the approved mix of concrete. Any other cover blocks shall be used only on approval by the Engineer. However, use of pebbles or stones shall not be permitted. Where the bars cross, the outer one shall have the minimum cover. Minimum curing of cover blocks shall be 14 days.

2.3.5. SPLICING AND LAPPING

Where splicing and / or overlapping in reinforcement are required, the bars shall be provided with such splices or overlaps as are shown on the drawings or directed by the Engineer. Laps shall be staggered only as approved by the Engineer.

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2.3.6. WELDED LAPS

Butt welding of reinforcing steel bars shall be used only when specified or shown on the drawings or expressly permitted in writing by the Engineer. When butt-welding is carried out, the ends of the bars shall be prepared with single 45 Degree C and a backing plate shall be used. The minimum root face will be one quarter of the bar diameter. Welding shall be done in accordance with the recommendations of IS 2751 and 816. Electrodes shall comply with IS 814. The maximum size of electrodes shall be based on following table:

Diameters of Bars in mm.	Diameters of Bars in inches	Maximum size of Electrodes	Amperage corresponding to maximum size of Electrodes	
12 to 25	1/2" to 1"	10 3.25 mm. (0.128)	} As specified by the } manufacture of } Electrodes	
25 to 32	1" to 1 1/4" Double bevel	8 4.06 mm. (0.160)		} }
		10 3.25 mm. (0.128)		} }
32 to 50	1 1/4" to 2" Double bevel	10 3.25 mm. (0.160)		} }
		8 4.06 mm. (0.160)	} }	
25 to 50	1" to 2"	6 4.06 mm. (0.160)	}	
		6 4.88 mm. (0.192)		}

Before doing the welding of bars at site, the CONTRACTOR shall make minimum 3 No. joints and get them tested in an approved laboratory (including X-ray testing of welds if necessary). Only on these tests proving satisfactory, the CONTRACTOR would be permitted to weld at site.

The following precautions shall be taken while providing welded laps:

If the cold twisted deformed bar has an untwisted end at the lapping point, the said portion shall be cut off for a minimum length of 10 cm. from such end prior to welding.

Bars shall be aligned on a proper axis to avoid crookedness after welding.

The joints to be welded shall be rust free.

Weld slag shall be chipped off and removed by brush.

Welding Contract:

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The welding work shall not be given to a CONTRACTOR who does not produce satisfactory evidence of his ability to handle the work in a competent manner. The CONTRACTOR shall also prove the ability of the operators employed by him to produce welding connection of the required strength.

The CONTRACTOR shall employ a competent welding supervisor or charge-hand to ensure that the standard of workmanship is satisfactory.

The Engineer shall have free access to the work being carried out by the CONTRACTOR at all reasonable times and facility shall be provided so that during the course of welding he may be able to inspect any layer of weld metal. He shall be at liberty to reject any work not conforming to the relevant specifications, defective welds shall be cut out and re-welded.

Safety Requirements and Health Provisions: The CONTRACTOR shall make all safety and health provisions for his welders as are laid in IS 818-1968 i.e. Code of Practice of safety and health requirements in electric and gas welding and cutting operation.

All steel reinforcement before the concrete is deposited shall be clean, free dust, loose scales, oils, rust, grease or any other deleterious materials. Particular care shall be taken to avoid contamination of reinforcement with mould oil.

No concrete shall be deposited until all formwork and reinforcement have been inspected and approved by the Engineer. There shall be in attendance on each concreting gang a competent steel fixer who shall ensure that the reinforcement and other embedded so fittings are kept in position during placing and compaction of concrete.

The CONTRACTOR shall provide temporary gangways, platforms and other means of access to prevent men from walking on the reinforcement bats. These shall be independent of the reinforcement.

2.4. STRUCTURAL STEEL

2.5. APPLICATION OF SPECIFICATION

Notwithstanding what is stated in the specifications herein, general structural drawings and notes appended thereon, shall be deemed to form part of the specifications and to supersede the same in case of discrepancy.

All drawings submitted by the Structural Engineer shall be checked for dimensions, figures, sizes and strength of structural members and connections and any discrepancy or inaccuracy shall be reported forthwith.

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2.5.1. GENERAL

Full facilities shall be provided to enable the the consultant or his representative to visit the workshop at any reasonable time for the purpose of inspecting equipment and structural steel work under fabrication. Similar facilities shall be provided at site.

A set of shop drawings bearing the approval stamp shall be supplied to the workshop inspector.

A program or progress chart shall be drawn up within two weeks of intimation of the award in consultation with the architects. The program will be chalked out so as to start erection as fabrication progress.

2.5.2. MATERIAL

All raw materials are to be procured by contractor .

The process of manufacture and the quality of all steel used or structural members and connections shall be governed by the following requirements:

Mild steel shall conform to the requirements of latest editions of I.S. 226.

Other steel not complying with the above specification can be used only by approval in writing of the Consultant. If approval is obtained, due regard will be given to the yield point stress, ductility, ultimate resistance to tensions and other essential properties.

All sections must be free from seams, flaws, cracks, laminations or injurious defects of any kind.

2.5.3. TESTING AND INSPECTION

All materials used be inspected by the Engineer's representative and the contractor shall produce the manufacturers' test certificate.

2.5.4. SETTING OUT ON SITE

The contractor shall accept responsibility for accuracy in positioning and levelling of all steel work, plumbing in columns, and the placing of every part of structure in accordance with the approved drawings and to the satisfaction of the structural consultants. Any checking or approval of the setting out by the architect and the structural consultants shall not relieve the contractor of his responsibilities in this respect.

Foundations will be provided by the general contractor. Anchor bolts should be supplied by the contractor earlier to enable the general contractor to put these in foundation. The contractor will have to check for the correctness of the centres of bolts and in no case he shall get relieved of his responsibility in this respect.

Stanchion bases shall be mounted on steel wedges preferably square bar cutting of requisite size as packing clear of the top of footings, stanchions accurately set in

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position plumbed and leveled and the beam above fixed. The gap shall then be rammed solid with a stiff 1:2 cement mortar using minimum of water so as to entirely fill up the spaces.

2.5.5. FABRICATION

General: All workmanship and finish of the fabricated steel work shall be of the highest class in every respect conforming to the best accepted standard of practice. Methods of fabrication,, transportation and erection shall be such that the finished structure is free from defects or injuries, which would render it unfit for use. Greatest accuracy shall be observed to ensure that all parts will properly fit together on erection. In repetition, work the standard of accuracy such that similar parts are infact, interchangeable.

Fabrication should conform to IS800.

Straightening, planning, machining, etc.: Cold straightening & flatterring of sections must be by pressure and not by hammering. All materials before being used shall be straight and free from furs, etc. All ends of beams used as stanchions are to be machined or cut true, any burring of the edges being removed. Flange plates, if made from sheared plates, must have had at 1/8" removed on each sheared edge by planning.

Cutting: Cutting shall be effective by shearing, cropping or sawing. Sheared members shall be free from distortion at the sheared face.

Holes for Bolts and Rivets: Ordinary round holes are to be of a diameter 1/16" larger than the specified diameter of bolt or rivet. Where not otherwise stated, holes must be drilled or else punched 3 mm small and afterwards drilled or reamed (but not drifted) to the required size. All burrs due to punching or drilling must be removed. All holes for site connections must be accurately centered so as to render reaming or drifting during erection unnecessary. Multiple members such as flange plates to be drilled as far as practicable in one operation.

Rivets: Rivets to be of soft steel of the quality and to the test prescribed for rivets in I.S. 1148. Ordinary rivets to have cup head formed groom length of shank equal to not less than 40 mm diameters. Rivets on bearing surfaces to be flush counter - sunk whether indicated on the drawing or not. All rivets are to be machine-drawn as far as practicable and must completely fill the holes when closed. If loose or if the heads are badly formed, cracked or eccentric to the shank, or do not bear truly on the plate or bar, such rivets shall be cut out and replaced. All surface to be riveted to be in close contact throughout.

Bolts: Ordinary bolts & nuts to be of mild steel conforming to I.S. 1148. Bolt head and nuts to be hexagonal and to with worth standard, the heads being forged out of the solids, truly concentric and square with the shank which must be perfectly straight. Treads to be cut in oil and the fit of the nuts should be spanner tight. Bolts must be long enough, allowing for washers, to project (say 1/4") beyond the nut when tightened and the screwed portion must be long enough for subsequent tightening. When nut or bolt

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heads bear on the tapered flanges of joints, angles etc. bevel washers to be provided of corresponding taper. In all cases the threads should be clear of the parts bolted together. The nut shall be secured after tightening by barring when there is the risk of their becoming loose of accidental removal. Turned bolts to be driven soffit in the hole they occupy and to have the screwed portion 1/16" less in diameter than the shank and the bearing faces of the heads and nuts shall be machined squared. The shank of turned bolts shall have sufficient length to ensure contact through the entire thickness of the plates. Accordingly, washers, truly flat, must be provided under the nuts to ensure that they can be screwed home.

Connections: The assembly of fabricated parts shall be permitted only after all parts are properly straightened and are free burrs, mid oil etc. The Structural Engineer's drawings show only typical connection details. The main principal governing all connection between beams and columns shall be that all vertical loads are to be carried by riveted cleats, whereas sufficiently rigid and conditions take up binding moments, eccentric loading and/or wind pressure are to be accomplished by welding. All shop connections shall be riveted or welded. Head of rivets in surfaces carrying brick walls shall be flattened to 3/8".

Painting: The whole of the finished iron and steel work shall be cleaned of all scale, rust or dust and shall be thoroughly coated with one coat of freshly mixed re-lead paint before erection, well worked into joints and open spaces.

Steel work which will be entirely embedded in concrete is not to be painted but coated with two coats of Portland cement wash of the consistency of cream, the second coat being applied immediately prior to encasing. Where tow surfaces will be permanently in contact, after assembly, each of them shall receive, immediately before being assembled after being thoroughly scrapped, one coat of red oxide paint and the surface shall be brought together while the paint is still wet.

Erection: The contractor must furnish and erect at his own expense all derricks, gantries, sheer legs, staging and centering necessary for the proper completion of the work and perform all adjustment required to place the material in its correct position in the completed structure.

His tender must include for all transport of materials on site and unloading and erecting, and care of the steel work during construction.

At the completion of the erection, the contractor must remove at this own cost all temporary staging, centering and other obstructions when ordered by the architects or Engineer and leave work in a neat and workman like condition.

Erection, in general, shall conform to I.S. 800. All parts of the structure shall be suitably lettered or numbered to facilitate erection at site.

Installment checking for correctness of setting up of structures as also the final adjustment should be carried out immediately after the completion of assembling of each block of building (frame work) in the sequence determined by the design. Crane

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girders and rails requiring higher accuracy while setting them up, should be adjusted after the consolidation of basic structures.

As each part of the contract works is erected, it shall be passed by the architect/consultants. This, particularly, applies to the accurate plumbing of all stanchions and columns, and to the levelling, setting and aligning of the various parts and to the fitting and adjusting of bearing plates and other parts. Previous ascertainment from the purchaser which parts they wish to inspect and pass from time to time but such passing in no way exonerate the contractor from any of his guarantee.

Supervision: The carrying out of all work included in this contract shall be supervised throughout by a sufficient number of qualified representatives of the contractor who have had through experience in the erection structure similar to that to be supplied.

Tests: The contractor shall carry out the test specified (at the manufacturer's works) and are necessary to determine that the contractor's work comply with the conditions of the specifications. The cost of such tests should be borne by the contractor.

Clearance: The erection clearance for cleated ends of members connecting steel to steel not be greater than 1/16" at each end. The erection clearance at ends of beams without wed cleats shall be not more than 1/8" at each end. Where, for practical reasons, greater clearance is necessary, suitably designed seating shall be provided.

2.5.6. METAL ARC WELDING

Electrodes: All electrical welding shall be carried out with coated electrodes of best make from approved manufacturers (such as ADVANI ORLIKON, ESAB or equivalent) to conform to relevant Indian Standards. The welding procedure shall be taken as meaning the following:

Size of electrodes in S. W. G.

Current in amperes

Number of runs

Length of run per electrode

Position of welding

Welding sequences

The welding procedure shall be arranged to suit the details of joints as indicated on the drawings and the position in which the welding is to be carried out and shall be such as to ensure that the weld metal can be fully and satisfactorily deposited throughout the length and thickness of all joints.

The contractors shall record the welding procedure and shall provide each operator with all relevant details.

Butt welds: All steel parts shall before butt welding, be separated by a gap the dimension of which shall be shown on the drawings. The ends of the butt welds shall be extended so that the weld metal at the extreme ends of the weld is sound and the

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additional metal shall be afterwards ground smooth. In all other respects butt welds shall conform to the requirements of I.S. 815

Fillet welds: Minimum leg length of the fillet welds to deposited shall be not less than the specified size. The throat of the fillet weld so deposited shall be not less than 7/10ths of the specified size.

Where a fillet is applied to the rounded toe of a rolled section the specified size of the weld shall generally not exceed 3/4 of the thickness of the sections of the toe.

Fillet welds terminating at the ends of the sides or parts of members shall, where ever practical, be returned continuously around the corners about a distance not less than twice the size of the welds.

In all other respects, fillet welds shall conform to the requirements of I.S. 816, clause 6.2.

Welding Standards: The surface to be welded and the adjoining metal for a distance of atleast 15mm. must be cleaned free of rust, scale paint, etc., by a wire brush.

Means must be adopted to minimize distortion of the finished parts, e.g. by jigs, tack welding or other effective means, and shall be securely held in their relative positions during welding.

For fusion faces, which require to be cut, a special form or shape may be cut by shearing, clipping or gas cutting.

In all cases the prepared fusion faces should be regular and should be dressed by chipping, filling or grinding.

Each bead of metal must have the slag removed by light hammering and wire brushing before the next bead is deposited.

The weld must show a good clean contour and on a cut specimen, good fusion with purest metal.

The current used must be within the range defined by the electrode manufacturers.

Under-cutting must be avoided and if it occurs, any reduction of area from this cause must be made good by an additional run. Before applying paint to welded joints, they should be carefully chipped or wire brushed.

Adequate steps shall be taken to ensure that the work is of the highest quality and thoroughly reliable so that all work is done under competent and skilled supervision.

Mode of measurements: Rate for fabrication, supply and erection shall be quoted on the basis of unit price per metric tone which rate will be applied to the estimated weight of finished steel work. The weight shall be figured on the basis of minimum rectangular dimensions of all plates and the minimum rectangular overall dimensions of all structural shapes with no deductions for copes, clips, sheared edges, etc. and the theoretical weights of the steel section in accordance with the I.S. Specifications, no deduction being made for bolt and rivet holes. Deductions shall not be made for skew cuts. No allowances shall be made for extra weight due to rivet heads and nuts or welded material and rolling margins.

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The structural steel including chequered plates shall be supplied by the OWNER free of cost. The rate shall be inclusive of supply of all raw materials, fabrication, delivery at site and erection, oiling and painting, temporary erection etc. all bolts and nuts, electrodes and electrical energy for welding.

Electrical Energy: Electricity will be supplied by the owners at one suitable point free of charge and further distribution cost will have to be borne by the contractor. Contractor will put his own tested meter and bear energy consumption charges as per meter reading, and prevalent rates.

Metal Work: Steel used in the manufacture of rolled steel sections shall conform to IS 226 and IS 1977 latest edition or any alternative quality of steel subject to structural.

2.5.7. ANTI-CORROSIVE TREATMENT

2.5.8. Polysulphide epoxy zinc chrome anti-corrosive primer - a two component air drying polysulphide - epoxy composition with polyamino curing and anti-corrosive chrome pigments as per manufacturers specification.

Method of application of polysulphide epoxy steel structural coating:

Clean the steel surface by sand blasting/hand or power tool cleaner.

If the surface is rusted, remove by cleaning with 10% phosphoric acid solution followed by cleaning with water to remove acid traces. Allow to dry and wipe out with clean cloth soaked with solvent.

Apply polysulphide epoxy zinc chrome anti-corrosive primer two coats at an interval of 20-24 hours. this will give a coverage of 80 sq.ft. per liter for single coat. for two coats it will be in between 40-45 sq.ft. per ltr.

Before application of finish coat lightly sand the primer surface with emery paper no.320. clean the dust with dry cloth.

apply two coats of polysulphide epoxy finish coat at an interval of 16 to 20 hrs. this will give a coverage of 100-125 sq.ft./ltr. for single coat. for two coats it will be 50-60 sq.ft. per ltr.

If required use xylene as a thinner or Asian thinner t-121.

Method of application of polysulphide epoxy concrete structural coating:

Remove dirt and dust by wire brushing.

Treat the surface with 10-15% dilute hydrochloric acid solution. Allow it to remain there for 15-20 minutes. Wash it with water 3-4 times. Allow the surface to dry.

Apply one coat of polysulphide epoxy primer. this will give a coverage of 80 sq.ft./ltr. Allow to cure for 20-24 hrs.

Before application of finish coat lightly sand the primer surface with fine emery paper no.320. Remove the dust by clean dry cloth.

Apply two coats of polysulphide epoxy finish coat. This will give a coverage of 80-90 sq.ft./ltr. for single coat. for 2 coats it will be 40-45 sq.ft./ltr.

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3.00 The various motor pump sets shall be supplied erected, tested and commissioned perfectly by the contractor to charge wet riser cum down comer for fire hydrant system as per the detailed schedule of quantity and specification given hereunder.

TECHNICAL SPECIFICATIONS

The various motor pump sets shall be supplied erected, tested and commissioned perfectly by the contractor to charge fire hydrant system as per the detailed schedule of quantity and specification given hereunder.

APPLICATION	FIRE PUMPSET	JOCKEY PUMPSET	ENG DRI PUMPSET
LIQUID	WATER	WATER	WATER
TEMPERATURE	AMBIENT	AMBIENT	AMBIENT
SPECIFIC GRAVITY	1	1	1
NO. OF STAGES	ONE	ONE	ONE
PUMP TYPE	HORI	HORI	HORI
SUCTION/DELIVERY	END SUC	END SUC	END SUC
SIZE (mm)	150X125	50X25	150X125
SPEED (RPM)	2900	2900	1800
CAPACITY (M3/HR)	273	10.8	273
TOTAL HEAD (MTR)	80	80	80
EFFICIENCY (%)	71	32	76
NPSHR (MTR)	6	1.5	2.25
HP ABSORBED	113.92	10.00	106.43
RECOMMENDED MOTOR HP	150	15	6R1080T/133HP
REC. SUC/DEL PIPE SIZE (mm)	-	-	-
MAX. PERMISSIBLE SOLID SIZE (mm)	NIL	NIL	NIL
<u>MATERIAL OF CONSTRUCTION</u>			
CASING	CI	CI	CI
IMPELLER	BRONZE	BRONZE	BRONZE
SHAFT	STEEL	STEEL	STEEL
SHAFT SLEEVE	AISI410	AISI410	AISI 410
IMPELLER WEARING RING	CI	BRONZE	CI
STUFFING BOX	MECH SEAL	MECH SEAL	MECH SEAL

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MOTOR HP/KW	150/110	15/11	6R1080T/133HP
SPEED (SYN.) (rpm)	3000	3000	1800
TYPE	----- TEFC SQ. CAGE 415 V \pm 10%, 50 HZ \pm 5% -----		

3.01 . FIRE PUMPING SETS:

1. All the fire pumps and motor sets shall be as per relevant IS : Standards
2. The motor pump sets shall be provided with starting & control gear housed in motor control centre to enable automatic as well as manual starting. They shall be supplied complete with foundation chasis, bolts, cables flexible conduits as per requirement to ensure smooth & trouble free operation
3. The Pumps shall be of type approved by TAC & 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 of pumps shall not exceed 120% of the rated head.
4. Bearings of the pumps shall be effectively sealed to prevent loss of lubricant or entry of water/dust.
5. The Pump casing shall be designed to withstand a pressure of 1.5 times of working pressure.
6. All Pumps shall be operated in an automatic manner by means of pressure switches to be provided in the common discharge header sequentially so as to maintain a pressure of 3.5 kg/cm² at the farthest point of topmost floor & delivery pressure at the outlet of each pump shall not be less than rated 8.8 kg/cm².
7. The pressure setting of the jockey pump shall be such that it cuts in approximately at 0.35 kg/cm² below the normal system pressure and cuts out at normal system pressure. The pressure setting of the main pump shall be such that it cuts in approximately at 1.0 kg/cm² below the normal system pressure & shall be capable only of manual shut down at churn pressure/cuts out at normal system pressure automatically.
8. The Contractor shall furnish the performance characteristics, range of heads, capacity and efficiency curves of the pumps.
9. All the pump and motor sets shall be mounted on common base frame of MS channel & anti- vibrations pads shall be provided between foundation & base frame for vibration free operations of pumps.
10. A Common air vessel / priming tank shall be provided for priming purpose of all the pumps.

3.02. ELECTRIC MOTORS

The Following IS: Codes shall be applicable for the motors:
IS: 325 : Induction motors, three phase

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IS: 900 : Induction motors, installations and maintenance, code for practice for

IS: 7816 : Guide for testing installation resistance of rotating machines

IS: 4029: Guide for testing three phase induction motors

IS: 3043: Code for practice for earthing

Further to those stated above, the design, manufacture, installation and performance of motors shall conform to the latest Indian Electricity Act and Indian Electricity Rules.

1. The electric motors to operate the above pumps shall be of totally enclosed fan cooled (TEFC) type. The motors shall be squirrel cage A.C induction type, drip proof suitable for operation of 415 Volts, 3 phase 50 HZ system. The rating and design of motors and switch gears shall conform to the relevant Indian Standard Specifications. The motor shall be of continuous rating type and its rating shall be at least equivalent of the horse power required to drive the pump at 150% of its rated discharge. The Motors shall conform to IS:325
2. The design, type ratings etc. of the electric motors shall be duly approved by TAC.
3. The Contractor will put up a work schedule in detail after award for approval of engineer in charge.

3.03. Diesel Engine :

The Following codes are to be followed for the design, manufacture, erection & testing of diesel engine.

IS: 1600 Code for type testing of constant speed internal combustion engines for general purposes.

IS: 160 Performance of constant speed internal combustion engines for general purposes.

Code of Diesel Engine Manufacturer's Association, USA

1. GENERAL

The Diesel engine shall be of multi cylinder type 4 stroke cycles with mechanical (airless) injection, cold starting type.

The diesel engine shall be of approved make & TAC approved type having bare engine horse power rating (After correction for altitude and ambient temperature) equivalent to the higher of the following of the two values:

- a) 20% in excess of the maximum brake horse power required to drive the pump at its duty point.
- b) The brake horse power required to drive the pump at 150% of its rated discharge.

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The engine shall be complete with cooling mechanism, air filter, exhaust system including exhaust pipe upto 05 meter, shut down mechanism, fuel tank, starting mechanism, batteries, battery charger, ancillary equipment, and 01 set of tools kit & all other accessories to complete the work as per TAC Rules. The noise and pollutant produced by the engine at full load should be within limits as prescribed by the state pollution control board. A test report for pollutant emitted by the engine at full load and decibel level of the engine shall be submitted by the contractor.

2. STARTING

The engine shall be capable of both automatic & manual start. Generally the engine shall be started automatically, but in case of auto start system failure the engine shall be capable of manual start. Engine shall be able to start without any preliminary heating of combustion chamber. However engine shall be equipped with heaters for heating the combustion chamber if, necessary. One set of 02 Nos batteries along with trickle & boost type battery charger shall be installed along for the starting of engine. The battery system shall be able to start for 10 consecutive times without fail & recharging. After start of the engine the charger shall be disconnected from battery & battery will be feeded from engine dynamo.

3. GENERATING SYSTEM

The engine shall have a speed control device that will control the speed under all condition of load. The governor shall be suitable for operation without external power supply. The governor shall offer following features.

- A) An adjustable governor tip regulates engine speed within a range of 10% between shut off & maximum load conditions of pumps. The governor shall be set to maintain rated pump speed at maximum pump load.
- B) An over speed shut down device to shut down the engine at speed approx 20% above rated engine speed with manual reset, so that the automatic engine controller will indicate an over speed signal until the devices is manually reset to normal operating conditions.
- C) All the pump & motor sets shall be mounted on common base frame of MS channel & anti-vibrations pads shall be provided between foundation & base frame for vibration free operation of pump.
- D) All the gauges for operating parameters start switch shall be mounted on engine itself on the control panel of engine. However, engine shall be able to start & stop from Main control panel & engine panel.

4. FUEL SYSTEM

The diesel engine is to run on HSD (High Speed diesel), the tank provided being enough to hold the volume required for 6 (six) hours (minimum) continuous operation. The fuel tank shall be of welded steel constructed to relevant Indian Standard for M.S.

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drums. The tank shall be mounted above the engine fuel pump to provide gravity feed. The tank shall be fitted with digital indicator showing the level of the fuel in the tank.

5. ENGINE COOLING:

A frame or engine mounted air cooled radiator with a multiple fan belt driven from the engine. When half the belts are broken, the remaining shall be capable of driving the fan. The water in the closed circuit shall be circulated by means of an auxiliary pump driver by the engine & the capacity of the closed circuit shall be not less than that recommended by the engine manufacturer.

6. AIR FILTRATION

The air intake shall be fitted with a filter of adequate size to prevent foreign matter entering the engine.

7. EXHAUST SYSTEM

The exhaust system shall be fitted with a suitable residential silencer & the total back pressure shall not exceed the engine manufacturer recommendation. When the exhaust system rises above the engine, means shall be provided to prevent any contractor for erecting the silencer. The exhaust system shall be equipped with scrubber to minimize the smoke.

3.04. MCC PANEL FOR FIRE PUMPS:

The fire pumps should consist of the following

Design, manufacture, supply, installation, testing, and commissioning of following MV switchgear panel suitable for 415V, 3-phase, 4wire, 50Hz power distribution system, the panel should be indoor, free standing, floor mounted, sheet metal clad, cubical, dead front dust & vermin proof conforming to IP-55 enclosure, compartmentalized design, fabricated out of 14 SWG sheet steel complete with AC bus bars, separate earth bus bar to be provided throughout the length of the panel. The incoming & outgoing feeder shall be accommodated in a modular multiter arrangement, adequate size cable alley, painting, earth numbering damper plate etc. as required as per specifications. The panel shall withstand a fault level of 35 MVA. The items shall be supplied & installed as per the schedule of items & quantities.

1. The necessary interlocks shall be provided as per system description.
2. Control wiring from pressure switches of different settings in hydrant line, jockey pump for sequence of operation shall be included to complete the system. The wiring shall be used as per schedule of items & quantities. The incoming & outgoing feeders shall be installed as per schedule of items & quantities.
3. The motor starter shall conform to IS: 1822-1967
4. To prevent the dry running of fire pumps, dry run protection shall be provided for the main fire pumps sets.
5. The panel shall be front operated type with all connection accessible from the front. Front doors shall be hinged type and back doors shall be hinged or

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removable type for inspection. The panel design shall be got approved before fabrication, the cubical construction shall be to IP21 as per IS: 2147.

6. Cable entries and gland plates: All cable entries shall be through gland plates which are removable & sectionalized. Necessary compression type glands shall also be provided. Where heavy cables are brought in & termination, suitable clamps shall be incorporated to relieve the stress & the glands due to the weight of the cables. Cable. Cable entries may be from top or bottom depending on the equipment layout & cable screen as approved.
7. The wiring in all installations shall be done in accordance with the Rules for Electrical Installations -1988 issued by the Tariff Advisory Committee.

8. **BUSBAR & CONNECTIONS**

The bus bars shall be air insulated, made of aluminum of high conductivity electrolytic quality (Grade E 91 E to IS 5083) & of adequate cross-section. The bus bars & the connection shall be suitably covered with PVC sleeves or in an approved manner. High tensile bolts & spring washers shall be provided at bus bar joints. Layout/drawing of the panel and bus bar will be approved by the engineer in charge prior to installation at site.

9. **EARTHING ARRANGEMENT**

GL Strip 25mmX55MM shall be run at the rear of the board, bonding all the sections suitably. Two nos. earth terminals shall be provided at the ends of the GL strip for connection to earth system. Earth terminals shall be with a flexible loop & the hardware shall be GL. Proper qty. of earthing strips shall be provided to ensure the desired earth resistance.

10. **INSTRUMENTS & LAMPS**

All indication lamps should be high glow LED and desired colour & instruments shall be flush mounted type in front of the panel. The voltmeter & ammeter shall not be less than size 96X96mm confirming to clause 1.5 of IS1248 for accuracy. CT's shall be provided with ammeters, wherever necessary.

Indicating lamps to indicate the availability of electric supply shall be provided at the incoming section. Necessary indicating lamps for alarm indications battery charges shall be provided in the respective sections.

All indicating lamps & voltmeter shall be protected with HRC cartridge type fuses.

All the voltmeter, ammeters, power meter of ratings as per specified in schedule of items & quantities installed on the panel shall be digital type & as per modest standards.

LABLES

All internal components shall be provided with suitable identification labels. Suitably engraved labels shall be fixed at the panel for all switches, instruments, push buttons. Indicating lamps etc.

11. **PAINTING**

Sign, Date & Seal of contractor



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The entire panel shall be painted with two coats properly with grey colour shade stove enameled paint. All the motors & diesel pump set shall be painted red properly giving a food finish. The various conduits for firm alarm system shall also be painted with red enameled paint. All the hydrant pipe lines shall be painted with red shade of enameled paint.

3.05. TECHNICAL SPECIFICATIONS FOR PIPES

All the work shall be executed as per technical specifications for wet riser & down comer

hydrant system as per TAC rules & specifications given herein

In the absence of any definite provision of any particular issue in the specification/codes reference may be made to the relevant latest IS: specifications. Wherever the IS codes are silent, the design & construction shall confirm to sound & modest engineering practice.

- a) All the material shall be new & of the best quality conforming to specifications. All works to be accepted shall be to the satisfaction of the Engineer in-charge.
- b) Pipes & fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmen like manner.
- c) Short or long bends shall be used on all main pipe lines as far as possible. Use of elbow shall be restricted for short connections.
- d) Pipes shall be fixed in manner as to provide easy accessibility of repair & maintenance & shall not cause obstruction in shafts, passage etc.
- e) Pipes shall be securely fixed to walls & ceiling by suitable clamps at interval specified
- f) Clamps, hangers & support on RCC Walls, columns & slabs shall be fixed only by mean of approved expandable metal fasteners inserted by use of power drills.
- g) All pipes, clamps, supports, nuts, bolts, washers shall be galvanized mild steel throughout the building. Painted M.S. clamps & M.S. nuts, bolts & washers shall not be accepted.
- h) Pipes for down comer in side the building shall be M.S. confirming to IS:1249 (heavy class) with screwed/ welded joints having flanges wherever essential.

JOINTING

Joints with M.S/G.I pipes of size 50mm and above shall be either screwed or butt welded with flanges at regular intervals of 18 meter and will be properly sealed & leakage proof. The jointing with M.S/G.I pipe of less than 50mm dia. shall be with conventional heavy class screwed fitting like Tee, socket, elbow, reducers etc. Welded joints shall be V-Nutt type & V-notch to be prepared angle grinder.

3.05.01 Under Ground Pipes

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Pipes for underground ring shall be M.S. black steel heavy duty (class "C") pipes as per (IS: 1239 Part –I, ERW & IS 3589) fitting like flanges, tees, elbows, bends, junctions, reducers etc. These pipes shall be provided with anti-corrosive treatment (coating and wrapping with PYPKOTE anticorrosive tapes) as per IS: 10221. A 01 meter distance shall ne maintained between the topmost portion of pipe laid & average ground level.

3.05.02 ABOVE GROUND PIPES:

The above ground pipe shall be M.S. black steel heavy duty (class "C") pipes as per (IS: 1239 Part- I, ERW & IS : 3589) & fitting like flanges, tees, elbows, bends, junctions, reducers etc. Clamps structural steel supports as required/ directed at site including cutting & making good the walls, floor RCC work etc. cutting chases & filling the same with cement concrete 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20mm nominal size) or cement mortar 1:4 (1 cement: 4 coarse sand) as required including painting the exposed pipes with desired red shade enamel paint.

3.06.01 BUTTERFLY VALVE (WAFER TYPE)

The Wafer type butterfly valves, flanged type shall be provided by the contractor. All the flanges, gaskets, nuts bolts, & other hardware items as required during installation shall be to contractor's account. The item shall be confirming to IS: 13095. The valve shall be able to bear a test pressure of 16kg/cm². The shaft of valve shall be stainless steel & body of cast iron. The clamping shall be of stainless steel. The bearings provided in the design of valve shall be Gun- Metal. The function of item will be to stop/start the flow of water in the laid hydrant line.

3.06.02 GATE VALVE

The Item shall be supplied & installed as per IS: 779. The material of valve shall be brass/bronze/gun metal & of reputed make. Any hardware accessories like socket, nipple, gaskets etc. required shall be to contractor's account.

3.06.03 CHECK VALVE/NON RETURN VALVE:

Non return valves shall be of cast iron body and bronze/ gunmetal seat. They shall be conform to Class I of IS:5312 and have flanged ends. Non return valves shall be of horizontal / vertical runs of piping & withstand a minimum pressure of 10 kg/cm².

3.07 .01 PRESSURE GAUGES:

All Pressure gauges shall be dial type with broaden tube element of SS 316. The gauges shall be of reputed make. The dial size shall be 150mm dia. and scale division shall be in metric units marked clearly in back on a white dial. Installed

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on the discharge side of each pump. The range of pressure gauge shall be 0 to 14 k g/cm².

All pressure gauges shall be completed with snubber isolation cock, nipples tail pipes etc.

3.07.02 PRESSURE SWITCHES:

The pressure switch shall be industrial type single pole double throw electric pressure switch designed for starting or stopping of equipment when the pressure in the system drops or exceeds the pre-set limits. It shall comprise of a single pole change-over switch, below element assembly and differential spindle.

All the pressure switches shall have ¼" B.S.P (F) inlet connection and screwed cable entry for fixing cable gland.

The electrical rating of switch shall be as under:

TYPE OF SUPPLY VOLTAGE	NON-INDUCTIVE	INDUCTIVE
A.C.	110-380	10Amp. 6 Amps.
D.C.	24-250	12 Watts. 12 Watts.

3.08 FOOT VALVE:

The foot valve as per standard IS codes shall be installed on the beginning of suction line of all three pumps as per sizes mentioned in schedule of quantities. The material of item shall be bronze. A strainer shall also fitted at the bottom side of valve.

3.09 . EXTERNAL HYDRANTS VALVES:

- 1 External yard hydrants shall be of "Stand Post" type & comprise stand post of 80mm MS pipe riser & single headed gunmetal valve conforming to IS: 5290-1983. The outlet shall be angled towards ground of with instantaneous spring lock type gunmetal female coupling of 53mm dia. for connecting of hose pipe. A cap with chain will be provided on one head of the outlet which will have instantaneous pattern female coupling for connecting to the hose pipe.
- 2 Contractor shall install orifice plate flanges on all hydrants having excessive pressure (more than 7 kg/cm²). Orifice plates shall be fabricated from 6 mm thick stainless steel plates. **The bore of the orifice shall be designed by the contractor & calculations shall be submitted to the Engineer – In charge for approval.**
- 3 Instantaneous outlets for fire Hydrants shall be of standard approved pattern and suitable for Fire Brigade canvas hose of 63 mm with coupling conforming to IS: 903
- 4 Except where impracticable, all hydrant outlets shall be situated 1 m above ground level.
- .5 All components of the hydrant system shall be of a type make approved by the Tariff Advisory Committee.

3.10 OUTDOOR HOSE CABINET:

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The hose cabinet shall be fabricated from GI sheet of 16 SWG. The size shall be as to accommodate 01 no. branch pipe & 02 No. 15 mtr. RRL hoses. The box front shall be glass door with centre locking/ opening arrangements. The cabinet should be painted with synthetic enamel fire red colour. The scope of work includes provision of masonry or steel frame structure, as specified for installation. The items shall be of most reputed makes & as per modest industry standards.

3.11 . HOSE PIPE

Hose pipes shall be of non-percolating flexible canvas & 63 inner dia. & shall be confirming to IS: 636, type – A. The hose shall be sufficiently flexible & capable of being rolled. Each hose pipe shall be complete with necessary coupling at the both ends to match with the hydrant valve & branch pipe or with another run of hose pipe. The coupling shall be of instantaneous spring loaded type. Couplings shall be confirming to IS: 903. The qty. of hose pipe shall be supplied in two lengths only i.e. 7.5. meter & 15 Meter as per schedule of items & quantities. Working & test pressure of hose pipe shall be 15 kg/cm².

3.12. BRANCH PIPE

The Item shall be confirming to IS: 903. The item shall be made up of gunmetal, 63 mm dia. Complete with male inlet, externally threaded to receive the nozzle. The nozzle shall be made up of gunmetal & 20 mm internal dia. The screw threads at the inlet connection shall match with the threading on the branch pipe. The inlet shall have hexagonal head to facilities screwing of the nozzle on the branch pipe.

3.13 . FOUR WAY FIRE BRIGADE CONNECTION:

The contractor shall provide gun-metal fire brigade collecting head with three 63 mm dia. Instantaneous pipe inlets with built in check – valves & 150mm dia. flanged outlet connection. The collecting heads shall be connected to underground fire water tank & also to fire water main header for the use of local fire brigade. The item supplied shall be as per IS: 904.

3.14 . FIRE BRIGADE INLET CONNECTION (Three- way):

The Contractor shall provide gun-metal fire brigade collecting head with three 63mm dia. Instantaneous pipe inlets with built in check-valves & 150mm dia. flanged outlet connection. The collecting heads shall be connected to the 150mm riser at the stilt floor for drawing pressurized water from fire brigade in case hydrant pumps are not in working situation. The item supplied shall be as per IS: 904

3.15. 2X 1.5 MM² COPPER CONDUCTOR CABLE:

All cables to be used for the system shall be laid in existing conduit/ M.S. conduit insulated copper conductor cable conforming to relevant Indian Standard Specification.

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The cables used in wiring shall conform to the relevant Indian Standard Specifications. PVC insulated copper conductor cable conforming to IS: 1653: 1964. Joints in the cables shall be avoided. Where joints are unavoidable, they shall be enclosed in suitable and accessible junction boxes marked FIRE ALARM alternatively all visible areas of the junction boxes shall be painted signal red. Before connecting, insulated test should be conducted on the cable and the insulation should not less than 1 mega ohm when conducted with a 500 V megger for any particular section of wiring.

MAINTENANCE MANUAL

On completion of the entire work and successful commissioning, contractor shall handed-over four copies of maintenance manual of all equipment installed by him.

Maintenance manual shall include information relating to make, model no., Year of manufacturer and guarantee coded for all electrical and mechanical equipments with names of local suppliers or manufacturer's agents. Demonstration & Training at site for proper & efficient operation of system after commissioning shall be given by the contractor. There training session at site shall be arranged by the contractor during guarantee/warranty period to make familiar all the operational staff with the system.

STANDARDS & CODES

The Following IS : Codes and standards & their subsequent modification cover the design, manufacture, shop testing, and erection, fabrication at site, testing and trial operation of piping Valves and specification requirement.

IS: 1648-1961	: Codes of practice for fire safety of building (general) Fire Fighting equipment and maintenance
IS: 1239& IS 3589	: Mild steel pipes and fitting (Medium Class).
IS: 325	: Induction motors
IS: 12469:1988	: Specification for fire fighting pumps
IS: 15309:2003	: Code of practice for installation & maintenance of Pumps.
IS: 14846	: Sluice Valve
IS 5312	: reflux valve
IS 4038	: Foot valve
IS 14845	: AIR Valve
IS: 5290:1983	: fire hydrant
IS 903	: Branch pipe
IS: 903:1984	: Fire hose delivery coupling, branch pipe & nozzle
IS: 5090	: Landing Valve.
IS: 10211	: Anti corrosion treatment for underground M.S. pipes.
IS: 3589	: Mild Steel pipes and fitting (Medium Class)

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SPECIFICATIONS FOR FIRE HYDRANT /DOWN COMER SYSTEM

1. Scope of work:-

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install Down Comer fire hydrant system as required by the drawings and specified herein after or given in this schedule or BOQ.

Without restricting to the generality of the foregoing, the fire hydrant system shall include the following:-

- a) Mild steel mains including valves, hydrants and all other accessories.
- b) Mild Steel pipe fire risers within the building.
- c) Landing valves, canvas hose pipes, hose reels, hose cabinets, fire brigade connections, connection to pumps, appliances and pressure reducing devices.
- d) Excavation, anchor blocks and valve chambers.

2. General Requirements:-

2.1 All materials shall be of the best quality conforming to the specifications and subject to the approval of the Engineer-in-charge.

2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and Maintenance and shall not cause obstruction in shafts, passages etc.

2.4 Pipes shall be securely fixed to walls and ceilings, if required, by suitable clamps at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceilings and walls.

2.5 Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

3. Pipes and fittings: -

a) All pipes within the building in exposed locations and shafts including connections Buried under floor shall be ERW mild steel tubes as specified in BOQ with screwed or welded joints as specified by the Engineer-in-charge.

b) Fittings of 50 mm or below may be G.I of approved make .For 65 mm and above shall be M.S with butt weld ends.

4. Jointing:-

(See Technical Specifications)

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5. Excavation:-

Excavations for pipe line shall be in open trenches to levels and grades shown on the Drawings or as required at site. Pipe lines shall be buried to required depth as described in approved drawings.

Contractor shall support all trenches or adjoining structures with adequate supports to prevent landslides wherever required.

On completion of testing and painting, trenches shall be refilled with excavated earth in 15 Cm layers and compacted.

Contractor shall dispose of all surplus earth as specified by BHEL.

6. Anchor Blocks:-

Contractor shall provide suitable cement concrete anchor blocks as may be necessary for overcoming pressure thrusts in underground / external pipes. Anchor blocks shall be of cement concrete 1:2:4 mix and reinforced if necessary.

7. Valves:-

Butterfly valves 65 mm dia and above shall be cast iron double flanged with lever type or as specified in BOQ.

Butterfly valves shall conform to and marked IS: 13095-1991 780 Class PN- 1.6 tested to 20 kg./sq.cm. Valves on MS pipe 50 mm and below shall be heavy pattern gun –metal gate valves (with Cast iron wheel)/ Ball Valve with lever type tested to 20 kg /sq .cm pressure. Valves shall conform to and marked IS: 778.

Check valves shall be cast iron double flanged conforming to IS 5312-1975 with cast iron Steel body and stainless steel internal trims.

8. Internal Hydrants:-

Contractor shall provide on each landing and other locations as shown on the drawings one signal headed gunmetal landing valve with 63 mm dia outlets and 80 mm inlet (I.S 5290-1969) with individual shut off valves and cast iron wheels. Landing valves shall have flanged inlet and instantaneous type outlet as shown on the drawings/ BOQ.

Instantaneous outlets for fire hydrants shall be of standard pattern approved and suitable for fire brigade hoses. Contractor shall provide for each internal fire hydrant station two numbers of 63mm dia 15 meter long reinforced rubber lined hose pipes with gunmetal male and female instantaneous type coupling machine wound with G.I wire (hose to IS 636 type A and couplings to IS: 903 with I.S certification), fire hose reel, gunmetal branch pipe with nozzle IS: 903 fireman's axe as shown on the drawings/ BOQ.

Each hose box shall be, after thorough cleaning of surface, painted as per section "PAINTING" described in General Technical Specifications. Contractor shall paint words "FIRE HOSE" on the inner face of the hose box's glass.

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9. First Aid Hose Reels:-

Contractor shall provide standard fire hose reels with 20 mm dia high pressure rubber hose of 36 meters length with gunmetal nozzle with 6 mm bore , and control valve , shut of nozzle connected wall mounted on circular hose reel of heavy duty mild steel construction and cast iron brackets.

Hose reel shall conform to I.S 884 – 1969.

The hose reel shall be connected directly to the MS pipe rise through an independent connection as shown on the drawings/ BOQ.

10. Pressure Gauges:-

All pressure gauges shall be of dial type with bourdon tube element of IS: 316. The gauge shall be of reputed make. The dial size shall be 150 mm dia (or as specified in BOQ) and scale division shall be in metric units marked clearly in black on a white dial. The range of pressure gauge shall be 0 to 10 kg/ sq.cm.

All pressure gauges shall be complete with isolation cock, nipples, tail pipes etc.

11. Pressure switches:-

The pressure switch shall be industrial type single pole double throw electric pressure switch designed for starting or stopping of equipment when the pressure in the system drops or exceeds the pre- set limits. It shall comprise of a single pole change – over switch, below element assembly and differential spindle.

All the pressure switches shall have 1/4” B.S P (f) inlet connection and screwed cable entry for fixing cable gland.

The electric rating of the switch shall be as under:-

Type of Supply Voltage Non – Inductive

A. C. 110-380 10 Amp 6 Amp.

D.C. 24-250 12 Watts 12 Watts

12. Fire Brigade Connection:-

The contractor shall provide gunmetal four way collecting head with 63mm dia instantaneous type inlets with built in check valve of 100/150 mm dia. outlet connection to the fire main grid and for tank filling, collecting head shall conform to IS 904-1965.

13. Valve chambers:-

Contractor shall provide suitable brick masonry chambers in cement mortar as specified in BOQ on Plain/Reinforced cement concrete foundations as shown in drawing or approved by Engineer-in-charge along with cement plaster inside and outside finished with a floating coat of neat cement inside as approved by Engineer-in-charge/Local fire authority.

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14 Pipe Protection:-

See clause "PAINTING" and "COATING/WRAPPING" under General Technical Specifications.

15. Pipe Supports:-

All Pipes shall be adequately supported from ceiling or walls by means of anchor fasteners by drilling holes with electrical drill in an approved manner as recommended by manufacturer of the fasteners.

All supports / clamps fabricated from MS Structural e.g. rods, channels, angles and flats shall be painted as described in specifications for "painting" under General Technical Specifications.

Where inserts are not provided the contractor shall provide anchor fasteners. Anchor Fasteners shall be fixed to walls and ceilings by drilling holes with electrical drill in an approved manner as recommended by the manufacturer of the fasteners.

16. Testing:-

All piping in the system shall be tested to required hydrostatic pressure of 11.0 kg/sqm without drop in pressure for at least 2 hours.

Contractor shall rectify all leakages, make adjustments and reset as required and directed by Engineer-in-charge.

17 Hose Box/Cabinets:-

Hose box/cabinets for hydrants should be fabricated from 16 Gauge M.S sheet with double glass front door and locking arrangement, with breakable glass key access arrangement, duly painted red as per specifications and fixed to wall/floor as per site conditions and as mentioned in BOQ.

The cabinet shall have a separate chamber to stave a key with breakable glass as per approved design/BOQ.

Hose cabinets shall be hinged double door partially glazed with locking arrangement, painted as per specifications with "FIRE HOSE" written on it prominently. Samples of hose cabinet for indoor and outdoor works shall be got approved from Engineer-in-charge before production delivery at site.

18. Measurement:-

All items shall be measured as per unit described in BOQ. In case of any dispute/ambiguity in measurement's dimension/unit, decision of Engineer-in-charge shall be final and binding to the contractor. Payment to the contractor shall be made on the basis of actual executed work only.

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SPECIFICATIONS FOR PUMPS AND ANCILLIARY EQUIPMENT

1. Scope of work:-

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install electrically operated pumps for fire hydrant installations as required by the drawings and specified hereinafter or given in the BOQ without restricting to the generality of the foregoing the pumps and the ancillary equipment and shall include the following:

- Electrically/Diesel operated pumps with motors, base plate and accessories as per items mentioned in BOQ.
- Pumps suction and delivery headers, valves, air vessel and connections.
- Pressure gauges / pressures switch.
- Electrical switchboard, wiring, cabling, cables, tray, control panel and property connecting to earthing system of the factory as per item/works described in BOQ.

2. General Requirements:-

Pumps shall be installed true to level on suitable concrete foundations. Base plate shall be firmly fixed by foundation bolts properly grouted in the concrete foundations.

Pumps and motors shall be truly aligned with suitable instruments.

All pumps connections shall be standard flanged type with appropriate number of bolts.

Manufacturer's instructions regarding installation connections and commissioning shall be followed with respect to all pumps, switch gear and accessories.

3. Fire Pumps & accessories:-

- All pump sets should be supplied as described in BOQ.
- The pump and its prime mover (Electric motor or Diesel Engine) shall comply with all the requirements of the Rules of Tariff Advisory Committee.
- Wet Riser (Hydrant) System/Down Comer hydrant system shall be pressurized through a set of pumps driven by electric motors. Desired pressure shall be created and maintained in the systems by means of Terrace pump sets.
- Pumps and motors shall be mounted on a common structural base plate and installed as per manufactures instructions.
- The contractor shall provide on all suction and delivery lines double flanged reinforced Neoprene flexible pipe connectors should be suitable for a working pressure of each pump and tested to the test pressure given in the relevant head. Length of the test connector shall be as per manufacturer details.

4. Cubicle type switch boards / L.T panel:-

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L. T. Panel and components shall conform to the requirements of the latest revision including amendments of the relevant IS codes and standards and suitable for operation of all fire pumps/motors as described in BOQ with safety controls as approved by Engineer-in-charge.

The L. T. Panel shall be metal enclosed, indoor type floor mounted free standing type and as mentioned in BOQ. The panel shall be designed for a degree of protection of IP-52.

The panel height shall not exceed 2350 mm including horizontal main bus bar at top 1750 mm from finish floor.

40 mm clear Space shall be left throughout the panel at bottom. The cold rolled sheet steel will be as per BOQ.

All cut –outs and covers shall be provided with synthetic rubber gasket (Preferably neoprene).

5. Moulded case circuit breaker (MCCB):-

MCCB shall conform to the latest IS: 13947-1993/IEC 947-1989. The service short circuit Breaking capacity (ICS at 415 VAC) should be as per BOQ.

MCCB shall be current limiting and comprise of quick make – break switching mechanism Preferably double break contact systems are extinguishing device and the tripping unit Contained in a compact, high strength , heat resistant , flame retardant , insulating moulded Case with high withstand capability against thermal and mechanical stresses .All MCCBs shall Be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above Shall have adjustable Magnetic short circuit pick up. The handle position shall give positive indication of 'ON' , 'OFF' or ' Tripped' thus qualifying to disconnection as per the IS/ IEC indicating the true position of all the contacts .In case of 4 pole MCCB the neutral shall be defined and capable of offering protection.

The general purpose control switch shall be provided for ON / OFF Auto / Manual. The switch shall be provided with engraving plates on the front with the complete inscription.

6. Motor and starters for fire pumps:-

The Motors and its starters shall as per BOQ.

7. Wiring:-

Control and protective wiring shall be done with copper conductor PVC insulated 1100 volts grade multistrand flexible wire of 2.5 sq. mm two cross section. The colour coding shall be as per latest edition of IS: 375. Each wire shall be identified by Plastic ferrule. All wire termination shall be made with type connection.

8. Earthing:-

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The earthing pit would be provided by the contractor as per BOQ & relevant IS with latest amendment. Fire fighting contractors shall have to provide earthing strips (G.I 25 x 3 mm) or earthing wires (G.I. 8 SWG) as may be required for proper earthing of the equipments supplied by him.

9. Commissioning:-

Commissioning of the systems shall commence only after:-

- All pipes, accessories, pumping set, fire alarms, etc. have been completely installed and tested.
- The electrical connection has been made and direction of motors rotation checked.
- Related civil works has been completed as per satisfaction of Engineer-in-charge.
- Water supply is available in adequate quantity in the underground tank.
- On completion of all related works described in para above, start pumping sets and develop desired pressure in both the systems.
- Open one hydrant and test if pumps starts at desired drop in pressure and the alarm operates. If required make adjustments and reset.

10. Maintenance Manual:-

On completion of the entire work and successful commissioning, contractor shall handover two copies of maintenance manuals of all equipment installed by him. Maintenance manuals shall include information relating to make, model number year of Manufacture for all electrical and mechanical equipment with names of suppliers or manufacturer's agents.

11. Measurements:-

All items shall be measured as per unit described in BOQ. In case of any dispute/ambiguity in measurement's dimension/unit, decision of Engineer-in-charge shall be final and binding to the contractor. Payment to the contractor shall be made on the basis of actual executed work only.

COMMISSIONING OF FIRE FIGHTING SYSTEM

1. Scope of work:-

Work under this section shall consist of pre-commissioning, commissioning testing and providing guarantees for all equipment, appliances and accessories supplied and installed by the contractor under this contract.

2. General Requirements:-

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.

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Contractor shall provide all tools, equipment, metering and testing devices required for the purpose.

All inspection and testing for gauging the efficacy of all equipments would be as per the TAC regulations.

3. Pre- commissioning:-

On completion of the installation of all pumps, piping, valves, pipe connections, electrical wiring motor control panels and water level controlling devices the contractor shall proceed as follows:

A. Fire protection system:-

(a) Check all hydrant valves and close if any valves are open. Check that all suction and delivery connections are properly made.

(b) Test run and check rotation of each motor and correct the same if required.

B. Pipe work:-

(a) Check all clamp, supports and hangers provided for the pipes.

(b) Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specifications and rectify leakage (if any) and reset the pipes.

C. Fire Hydrant System

(a) Pressurize the fire hydrant system by running the Terrace fire pump and after attaining the required pressure shutoff the pump.

(b) When the fire pumps have been checked for satisfactory working on automatic controls, open fire hydrant simultaneously and allow the hose pipe to discharge water.

(c) The electrically driven pump should run continuously for eight hours so that its performance can be checked.

(d) 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.

4. Commissioning, Testing and Handing over:-

(a) All commissioning and testing shall be done by the contractor to the complete satisfaction of the Engineer-in-charge and the job handed over to the client.

(b) Contractor shall also hand over to the client all maintenance and operation manuals and all items as per the terms of the contract.

Welding:-

The welding procedure, types of electrodes etc. shall be in accordance with the following IS Specifications.

Welding Procedures IS: 823

Welding Electrodes IS: 814, but of approved makes only.

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TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

Testing of Welders IS: 817

Only welders fulfilling the requirements of IS: 817 and approved by the Engineer-in-charge shall be employed by the contractor.

Jointing of pipes:-

Pipes and fittings shall be joined with electrical resistance welding in approved manner. Gasket, for use in between flanged joints, to be of CAF as per IS: 2712, thickness as Specified in SOQ/ BOQ.

Painting:-

All grounded pipes, pipe fittings, hose cabinets structural steel work pipe supports etc. shall be painted as per specifications/instructions mentioned hereunder:-

- a). Painting shall be done only after completion of fabrication work and testing.
- b). The instructions of paint manufacture shall be followed as far as possible otherwise the work is to be done as directed by the Engineer-in-charge.
- c). All cleaning materials, brushes, tools and tackles, painting, material etc. shall be arranged by the contractor at site in sufficient quantity.
- d). All rust, dust shall be scales, welding slag or any other foreign materials shall be removed fully so that a clean and dry surface is obtained prior to painting. Any other oily containment shall be removed by use of a solvent prior to surface cleaning.
- e). First coat of primer paint must be applied by brush on dry clean surface immediately or in any case within 3 hours of such cleaning.
- f). Primer paint – one coat (minimum thickness 100 microns) self – priming epoxy mastic.
- g). Finishing coats: - For production areas – 2 coats (thickness minimum 50 microns each) of epoxy paint, fire Red shade as per IS: 5. For other than production areas – 2 coats of synthetic enamel paint, fire red shade as per IS: 5.

Coating wrapping for underground pipes

All underground piping shall be protected by coating and wrapping as per the following Procedure:-

- a). The materials and workmanship shall in general confirm to IS: 10221 or as directed by the Engineer-in-charge.
- b). Cleaning – The pipes shall be thoroughly cleaned by dust, rust with scales, oil, grease etc. by stiff wire brush and scrappers. The surface shall be coated with the primer immediately after cleaning.
- c). Priming – The primer shall be approved by Engineer-in-charge before its application.
- d). The manufacturers recommended procedure would be followed for applying the primer.

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

- e). Paste Application – only approved paste shall be applied to fill up uneven surfaces in order to ensure smoothness for subsequent wrapping with multi – layer tape.
- f). Tape wrapping – the tape is to wrapped while the second coat of primer is still tacky.
- g). Winding is to be done with 50% overlap so that the total thickness of 2.0 mm tape would become 4.0 mm. It should be ensured while wrapping that air bubbles are trapped. The ends of tape shall be secured with nylon binding to ensure that the tape doesn't get loosened while handling.
- h). The total thickness including 2 coats of primer, 50% overlap of tape etc. should not be less than 4.5 mm or as per manufacturer recommendations.
- i). The 'Holiday Test' is to be conducted for detecting any entrapped air or any other defect .The contractor is to arrange for the Holiday Test and to rectify the defects if found any.

Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

LIST OF APPROVED MAKES OF MATERIALS FOR FIRE PROTECTION WORKS

Note: The tenderer shall quote his rates on the basis of price of brand/ make stipulated in the item of works as described in BOQ specification and furnished in technical data. The tenderer shall consider the first make of material from the list of Approved make while quoting tender. The BHEL reserves the right to select any of the brand indicated in the "List of approved makes/ Agencies".

1. Black Steel (M.S) Pipes/ G.I Pipes: - Jindal, TATA.
2. G.I. fittings: - Zoloto, Unco.
3. Gate Valves/Globe valves/Ball Valves: - CIM, Zoloto, Unco, Leader.
4. CI butterfly valves, Check valves, Y strainer: - SKS, CIM, Audco, Kirloskar.
5. Alarm Valve: - HD, Gem, Reliable.
6. Sprinkler Head: - Spraysafe, ASCOA, Safex
7. Fire Hydrants, Fire Hose reel, GM Collecting Head, Fire hose couplings, Branch pipe and nozzles:- Superex, Minimax, Newage.
8. Canvas Hose (RRL):- Jayashree, Indian Rayon
9. Fire Extinguishers: - Superex, Minimax, Firex
10. Rubber hose pipe: - Dunlop or eq.appd. make
11. Pumps: - Kirloskar, KSB, Mather & Platt, Lubi, CRI
12. Motors: - Kirloskar, Crompton greeves, Siemens, ABB
13. Diesel Engine: - Kirloskar, Cummins, Greaves Cotton, Ashok Leyland, Mahindra & Mahindra, Volvo India, TATA Motors
14. Electrical Switch gear: - L&T, Siemens, Schneider
15. Cables: - CCI, Universal, ICC, Gloster, Havells , KEI, Delton, Polycab
16. Wiring: - National, Grandlay, Skytone, Ecko, Anchor, Havells, Finolax, Delton, Polycab, KEI
17. AMP Meter & Volt meter: - AE, Schneider, Rishabh.
18. Moulded circuit breaker: - Siemens, L&T, Schneider.
19. Battery & Battery Charger:- Exide, Standard Furukawa, Amco, Mahindra
20. Flow Switch: - Indfos or eq. Appd. Make
21. Pressure Gauge: - Fiebig, H Guru
22. Level Indicator: - Phoenix or eq. Appd. Make
23. Level Controller: - Morbey or eq. Appd. Make
24. Water flow meter: - Kent or eq. Appd. Make

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

**IMPORTANT INFORMATION FROM CONTRACTOR FOR
MAKE/SPECIFICATION**

GUARANTEED TECHNICAL PARTICULAR		
S. No.	ITEM DESCRIPTION/ DETAILED REQUIRED	DETAILS FURNISHED BY THE CONTRACTOR
01	Main electric Fire Pump Manufacturer of pump	
1	IS Standard to which it conforms?	
2	Quantity	
3	Type of pump	
4	Pump Model	
5	Pump Speed	
6	Pump Rated Head	
a)	Suction Head	
b)	Delivery Head	
7	Pump Specified Discharge	
8	Pump Specified Gravity	
9	Liquid to be handled by the pump	
10	Pump Efficiency	
11	Pump HP	
12	Size (Suction/Delivery)	
13	Motor HP	
14	Motor Speed	
15	Make Motor	
16	Supply rating (Volts/phase/frequency)	
17	Model of motor	
18	Efficiency of motor	
19	Type of motor	
20	Type of enclosure of motor	
21	Pump Casing type & Material	
22	Pump Impeller Material	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

23	Pump Shaft Material	
24	Pump shaft sleeve material	
25	Pump Wearing ring Material	
26	Pump Type of coupling	
27	Pump Stuffing box	
28	Pump Mechanical Seal	
29	No. of vibration pads	
30	Frame size & material	
31	Foundation Size	
32	Place of installation	

02	Jockey Electric Fire Pump	
1	Manufacturer of Pump	
2	IS Standard to which it conform?	
3	Quantity	
4	Type of Pump	
5	Pump Model	
6	Pump Speed	
7	Pump Rated Head	
a)	Suction Head	
b)	Delivery Head	
8	Pump Rated Discharge	
9	Pump Specified	
10	Liquid to be handled by the pump	
11	Pump Efficiency	
12	Pump HP	
13	Size (Suction/Delivery)	
14	Motor HP	
15	Motor Speed	
16	Make of Motor	
17	Supply rating (volts/phase/frequency)	
18	Model of Motor	
19	Efficiency of motor	
20	Type of Motor	
21	Type of enclosure of Motor	
22	Pump casing type & Material	
23	Pump Impeller Material	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

24	Pump Shaft Material	
25	Pump Shaft Sleeve Material	
26	Pump Wearing ring Material	
27	Pump Type of coupling	
28	Pump Stuffing box	
29	Pump Mechanical Seal	
30	No. of vibration pads	
31	Frame size & material	
32	Foundation Size	
33	Place of Installation	

03	TERRACE/BOOSTER ELECTRIC FIRE PUMP	
1	IS Standard to which it confirm	
2	Quantity	
3	Type of Pump	
4	Pump Model	
5	Pump Speed	
6	Pump Rated Head	
a)	Suction Head	
b)	Delivery Head	
7	Pump Rated Discharge	
8	Pump Specified Gravity	
9	Liquid to be handled by the pump	
10	Pump Efficiency	
11	Pump HP	
12	Size (Suction/Delivery)	
13	Motor HP	
14	Motor Speed	
15	Make of Motor	
16	Supply rating (volts/phase/frequency)	
17	Efficiency of motor	
18	Type of Motor	
19	Type of enclosure of Motor	
20	Pump casing type & Material	
21	Pump Impeller Material	
22	Pump Shaft Material	
23	Pump Shaft Sleeve Material	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

24	Pump Wearing ring Material	
25	Pump Type of coupling	
26	Pump Mechanical Seal	
27	No. of vibration pads	
28	Frame size & material	
29	Foundation Size	
30	Place of Installation	

04	MAIN DIESEL FIRE PUMP	
1	Manufacturer of Pump	
2	IS Standard to which it confirm	
3	Quantity	
4	Type of Pump	
5	Pump Model	
6	Pump Speed	
7	Pump Rated Head	
a)	Suction Head	
b)	Delivery Head	
8	Pump Rated Discharge	
9	Pump Specified Gravity	
10	Liquid to be handled by the pump	
11	Pump Efficiency	
12	Pump HP	
13	Size (Suction/Delivery)	
14	Pump Casing type & Material	
15	Pump Impeller Material	
16	Pump Shaft Material	
17	Pump Shaft Sleeve Material	
18	Pump Wearing ring Material	
19	Pump Type of coupling	
20	Pump Stuffing box	
21	Pump Mechanical Seal	

	Engine Details	
1	Manufacture of Engine	
2	Make of Engine	
3	IS standard to which of conform?	
4	Model of engine	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

5	Engine Horse Power	
6	Engine RPM	
7	Efficiency of Engine	
8	Mechanical Efficiency	
9	Thermal Efficiency	
10	Stroke	
11	No. of cylinders	
12	Cylinder Arrangement	
13	Type of ignition	
14	Size (l x b x h)	
15	Fuel Consumption on full load (100%)	
16	Fuel consumption on no-load/idle condition	
17	Type of governor	
18	Type of fuel injection	
19	Type of fuel filter	
20	Fuel tank capacity	
21	Type of lube oil	
22	Lube oil consumption at full load	
23	Lube oil capacity	
24	Method of Engine cooling	
25	Type of silencer	
26	Aspiration	
27	Type of cooling arrangements	
28	Vol. of water in the Engine	
29	No. & type of Engine safeties	
30	Oil Pressure (Min-Max)	
31	Water temp. (Min-Max)	
32	Oil temp. (Min-Max)	
33	Engine tripping temp	
34	Engine tripping speed	
35	Cooling arrangements of lube oil	
36	Exhaust temp. at full load rating	
37	Exhaust temp. at no load	
38	Starting Arrangement	
39	Approx. Life of Engine	
40	Type & rating of batteries	
41	No. of batteries	
42	Type of battery charger	
43	Make of Battery Charger	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

44	No. of battery Charger	
45	Place of Installation of battery charger	
46	Life of Battery Charger	
47	No. & type of vibration pads	
48	Frame size & material	
49	Foundation size	
50	Place of Installation	
51	Noise level at full load	

05	CC PANEL OF FIRE PUMPS	
1	Name of Manufacturer	
2	Floor/wall mounted	
3	Suitability for bottom cable entry	
4	Size of panel (lxbxh)	
5	No. of Panel	
6	No. of compartments	
7	Material of sheet	
8	Gauge of sheet	
9	Fire resistance temp.	
10	Type of hinges on backside & front	
11	No. & type of alarms	

	INCOMING SECTION	
1	No. type & rating of MCCB	
2	No. type & rating of CT's	
3	No. type & rating of ammeter	
4	Nos., Type & rating of voltmeter	
5	Nos.	
6	Nos.	
7	No.	

	OUTGOING SECTION	
1	No. type & rating of MCCB	
2	IS code of panel	
3	Fault level	

Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

Name of work:- Establishment of Fire Fighting Network in Factory Area

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4	No. type & rating of MCCB	
5	No. type & rating of CT's	
6	No. type & rating of ammeter	
7	Nos., Type & rating of voltmeter	
8	Type, no & rating of starter for	
9	Type & nos. of indication lamps	
10	Type & nos. of selector switches	
11	Type & nos. of ON-OFF trip	
a)	Main Pump	
b)	Jockey Pump	
c)	Booster Pump	
12	Type no., rating of overload relay	
13	Type no., rating of under voltage relay	
14	Type no., rating of earth fault relay	
15	Type & no., of contractors	
16	Whether SPP (Single phase prevented)	
17	Feature provided?	

	CABLING	
1	Name of Manufacture	
2	Type of insulation	
3	Voltage rating	
4	Cross sectional area	
5	IS: code to which they conform	

	UNDERGROUND PIPES	
1	Name Manufacturer	
2	Type of Material, class, IS standard of pipes	
3	Diameter and Thickness of Pipes	
4	Method of Fabrication/Type of joints	
5	Type of supporting	
6	Details of wrapping & protective painting against	
7	Corrosion with standard to which it confirms.	
8	Design Pressure	
9	Working Pressure	
10	Test Pressure	

	ABOVE GROUND PIPES	
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Sign, Date & Seal of contractor



BHARAT HEAVY ELECTRICALS LIMITED , VARANASI MAINTENANCE DEPARTMENT

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

1	Name of Manufacturer	
2	Type of Material, class, IS standard of pipes	
3	Diameter and Thickness of Pipes	
a)		
b)		
c)		
4	Method of Fabrication/Type of joint	
5	Type of Supporting	
6	Details of protective painting against corrosion with	
7	Standard to which it confirms	
8	Design pressure	
9	Working Pressure	
10	Test Pressure	

	BUTTERFLY VALVE	
1	Type of valve	
2	Name of manufacture	
3	Type of material of different parts	
a)	Body & disc	
b)	Shaft	
c)	Bearing	
d)	Seat	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Relevant IS Code	
8	Type of Actuation	
9	Working temp. range	
	GATE VALVE	
1	Type of valve	
2	Name of Manufacturer	
3	Type of material of different parts	
a)	Body & disc.	
b)	Shaft	
c)	Spindle	
d)	Seat	
e)	Yoke	

Sign, Date & Seal of contractor



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4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Relevant IS code	
8	Type of Actuation	
	CHECK VALVE/NON-RETURN VALVE	
1	Type of valve	
2	Name of Manufacturer	
3	Type of material of different parts	
a.	Body & disc.	
b.	Shaft	
c.	Spindle	
d.	Seat	
e.	Yoke	
F.	Plug/ball	
G.	Bolts	
H.	Gaskets	
i.	Gland Packing	
j.	Counter flange	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Relevant IS code	
8	Type of Actuation	
9	Testing Standard	
	PRESSURE GAUGE	
1	Type of gauge	
2	Name of Manufacturer	
3	Diameter of dial gauge	
4	Range of pressure	
5	IS standard	
6	Size inlet pipe	

	PRESSURE SWITCH	
1	No & Type	
2	Manufacturer	
3	Set Point	
4	Whether set point adjustable	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

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5	Over range (if yes, indicate range)	
6	Mounting Style	
7	Conduit Connection	
8	Body rating	
9	Flange material	
10	Contact Number – NO & NC	
11	Contact rating	
a)	A.C.	
b)	D.C.	
	FOOT VALVE	
1	Type of valve	
2	Name of Manufacturer	
3	Type of material of different parts	
a.	Body & disc.	
b.	Strainer	
c.	Housing	
d.	Seat	
E	Disc Plate	
f.	Disc Face	
g.	Disc Pin	
h.	Gaskets	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Relevant IS code	
8	Type of Actuation	
9	Testing Standard	
	HYDRANT VALVE	
1	Type of valve	
2	Name of Manufacturer	
3	Type of material of different parts	
a.	Body	
b.	Valve	
c.	Valve Set	
d.	Spindle	
E	Wheel	
F	Washer Gaskets	
g.	Cap & Chain	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
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h.	Orifice Plate	
i.	Spring	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Relevant IS code	
8	Type of Actuation	
9	Testing Standard	
10	Type of coupling	
11	Size inlet/outlet	
	15 meter long Hose with coupling	
1	Type	
2	Name of Manufacturer	
3	Type of material of different parts	
A	Hose Material	
B	Hose dia	
C	Coupling size & Material	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	
7	Burst Pressure	
8	Relevant IS code	
9	Type of Actuation	
10	Testing Standard	
11	Change in size due to pressure built up	
a)	Diameter mm	
b)	Extn. In length (mm)	
	BRANCH PIPE WITH NOZZLE	
1	Type	
2	Name of Manufacturer	
3	Type of material of different parts	
a.	Branch Nozzle	
b.	Nozzle	
c.	Size of nozzle in let	
d.	Size of nozzle in outlet	
4	Design Pressure	
5	Test Pressure	
6	Working Pressure	

Sign, Date & Seal of contractor



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7	Burst Pressure	
8	Relevant IS code	
9	Type of Actuation	
10	Testing Standard	
11	Change in size due to pressure built up	
a.	Diameter mm	
b.	Extn. In length (mm)	
	FOUR WAY FIRE BRIGADE CONNECTION	
1	Type	
2	Name of Manufacturer	
3	Type of material of different parts	
a.	Body	
b.	Valve	
c.	Flange Coupling	
4	Size of stand post Pipe	
5	Dia of Valve	
6	No. of Valve	
7	Design Pressure	
8	Test Pressure	
9	Working Pressure	
10	Relevant IS: code	
11	Type of Actuation	
12	Testing Standard	
13	Size inlet/outlet	

Sign, Date & Seal of contractor



**BHARAT HEAVY ELECTRICALS LIMITED , VARANASI
MAINTENANCE DEPARTMENT**

Name of work:- Establishment of Fire Fighting Network in Factory Area

TENDER NOTICE NO:- HERP/CIVIL/CAP/86/14-15, Dated:- 11/07/2014

SCHEDULE 'B'

MATERIALS FOR ISSUE TO THE CONTRACTOR

-----NIL-----

SCHEDULE 'C'


TOOLS & PLANT TO BE HIRED TO THE CONTRACTOR

Sl.No.	T & P	Rates
1.	Jack (Demolition) Hammer (only if working & available in civil deptt)	Rs.20/- per hour
2.	Crane (only if working and free from shop/stores work)	Rs.1000/- per hour

Important condition: Work cannot be delayed on the pretext that BHEL has not been able to provide the above equipment. Contractor will have to make his own arrangement if the above T& P is not available.

Sign, Date & Seal of contractor

BLANK PRICE BID (TO be submitted with Techno-commercial Bid)

		BHARAT HEAVY ELECTRICALS LTD.				
		TARNA, SHIVPUR, VARANASI Phone:- 0542-6545323/24				
		Tender Notice No - HERP/CIVIL/CAP/86/14-15, Date-11.07.2014				
Name of Work:-Establishment of Fire Fighting Network Within Factory Area at HERP.						
Section- A:- FIRE FIGHTING WORK						
Party/Contractor is required to quote their rates for Non-Scheduled items at Sl. No- 1 to 52						
Sl. No	NSI Code	Description of work	Qty	Unit	Rate	Amount
(a) Design & Drawing						
1	NSI-1	Design of fire fighting system as per latest rules & codes and development of working drawing in consultation with BHEL and incorporating all inputs received from the Fire's No Objection Certificate (NOC) sanctioning authorities. Sanction of NOC from concerned fire authority shall be in the scope of party. Plant Layout is attached for ready reference.	Lot	1		
						Sub Total (a)
(b) Fire Fighting System						
2	NSI-2	Supply, Installation, Testing & Commissioning (SITC) of: Single headed, Gun-metal ISI marked oblique pattern hydrant landing valve with 80 mm dia flanged inlet and 63 mm dia. instantaneous type female outlet complete with gunmetal cap and G.I. chain, twist release type plug and all accessories as per 13:5290-1983 (Type 'A')	No	30		
3	NSI-3	SITC of First-Aid Fire Hose Reel wall mounting swinging type complete with drum, bracket, and 20 mm dia.x 30 M long high pressure Hose Reel tubing as per IS:444 with Gun-Metal shut-off nozzle having 5 mm dia.orifice. The Hose Reel shall strictly confirm to IS:884-1985.	No	30		
4	NSI-4	SITC of Non-percolating flexible hose (RRL type-'A') ISI marked (IS:636) 63 mm dia x 15 M long complete with instantaneous type gunmetal 63 mm dia. IS marked Male and female couplings (IS:903) bound and rivetted to hose pipe with copper rivets and 1.5 mm copper wire.	No	60		
5	NSI-5	SITC of Gun-metal 63mm dia short size branch pipes with 20 mm dia nozzles with 63mm instantaneous coupling ISI marked (IS: 903).	No	30		



BHARAT HEAVY ELECTRICALS LTD.

TARNA, SHIVPUR, VARANASI Phone:- 0542-6545323/24

Tender Notice No - HERP/CIVIL/CAP/86/14-15, Date-11.07.2014

Name of Work:-Establishment of Fire Fighting Network Within Factory Area at HERP.

6	NSI-6	SITC of M.S. fire hose cabinet fabricated from 16 gauge M.S. sheet of fully welded construction with hinged double front door with locking arrangement, full glass door 4 mm thick approved by local fire authority, painted with one coat of primer, stove enamelled fire red finished, "Fire Hose" written on front, suitable to accommodate 2 nos.15 m long 63 mm dia. hose,1-branch pipe, 1 fire-man's axe, including suitably mounted on a raised masonry platform as required.	No	30		
7	NSI-7	SITC of Gun-Metal Fire Brigade connection (Suction collecting head) consisting of 63 mm dia. instantaneous type male coupling with built-in check valves and 150 mm dia.flanged outlet complete with bolts, nuts and rubber insertions as required as per IS:904-1983:- Four Way .	No	1		
8	NSI-8	SITC of Gun-metal Fire Brigade Suction Hose coupling (Draw-out Connection) with nut for female coupling as per IS:902- 1974 complete. Foot valve flanged (to be connected to static water tank)				
	(a)	150 mm dia	No	2		
	(b)	100 mm dia	No	1		
9	NSI-9	SITC of M.S. cabinet (to enclose Draw-out/ Fire brigade inlet connections) fabricated from 16 gauge sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx.0.6 M x 0.6 M x 0.45 M).	No	1		
10	NSI-10	SUPPLY, INSTALLATION, TESTING & COMMISSIONING of Mild Steel pipe (IS:1239 Part-I) 'B' class including cutting, threading, welding etc. bends, elbows reducers, unions, flanges, rubber gasket clamps, G.I. nuts bolts washer, hangers etc., including all necessary pipe support, cutting to size, drilling, welding/ fixing and welding insert plates in RCC structural members wherever required fixing the pipe on wall/ floor /ceiling using anchor fastners, G.I. pipe sleeves of higher dia shall be provided wherever the pipes are crossing the wall or floors and sealing the sleeve with glass wool and fire sealent, cutting holes in brick or RCC walls/ slabs and making good the same complete including painting with one coat of primer and two or more coats of synthetic enamel paint as per IS:536 of approved make and shade including, as directed by Engineer-in-Charge.				
	(a)	200 mm dia.	Rmt	25		
	(b)	150 mm dia.	Rmt	650		
	(c)	100 mm dia.	Rmt	150		
	(d)	80 mm dia.	Rmt	250		
11	NSI-11	SITC of anti-corrosive treatment of burried pipeline	Rmt	800		



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Name of Work:-Establishment of Fire Fighting Network Within Factory Area at HERP.

12	NSI-12	Supply Installation and testing slim seal Butterfly valves B190 Class (PN 1.6) complete with 2 Nos matching flanges rubber insertion, nuts, bolts and washer etc. of following sizes:				
	(a)	200 mm dia nominal bore.	No	2		
	(b)	150 mm dia nominal bore.	No	5		
	(c)	100 mm dia nominal bore.	No	3		
	(d)	80 mm dia nominal bore.	No	30		
13	NSI-13	Providing and fixing forged brass Ball valve with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plated centre handle with female BSP threads suitable for 15 kg./ sq. cm. complete in all respects:				
	(a)	25 mm dia. nominal bore.	No	30		
14	NSI-14	Providing and fixing dial type pressure gauge with ball valve and pipe at hydrant station, complete in all respects. Dial dia 100 mm, calibration 0-15 kg/sq cm. Valve shall be paid separately:- 100 mm dia. nominal bore.	No	5		
15	NSI-15	SITC of NRV complete with all flanges rubber insertion, nuts, bolts and washer etc. of following sizes:				
	(a)	200 mm dia nominal bore.	No	2		
	(b)	150 mm dia nominal bore.	No	4		
	(c)	100 mm dia nominal bore.	No	3		
	(d)	80 mm dia nominal bore.	No	1		
16	NSI-16	SITC of Air cushion tank 250 mm dia. x 1.5 M high with dished top, made of minimum 6 mm thick M.S. pipe/ plate complete with 25 mm dia. Brass Air Valve (Ball valve, pressure gauge type), 25 mm dia. Stop with brass stop cock, nipple, tees, elbow and all accessories as required incl. fixing brackets.	No	3		
17	NSI-17	Providing and fixing pressure switch including cost of pressure switch mounted on air vessel complete in all respects.	No	5		
					Sub Total (b)	
(c) Fire Pumps & Accessories						



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18	NSI-18	SITC of Electrical Motor Driven Fire Pumping set suitable for automatic operation consisting of the following as per the specifications. a) Horizontally mounted, centrifugal type single stage fire pump having cast iron body, bronze impeller, stainless steel shaft & capable of delivering 2280 LPM against a total head of 70 M complete with necessary 'Y' strainer on the suction side and pressure gauge with GM cocks on the delivery side including bypass arrangement (with 50 valve and up to 5 M G.I. Medium pipes) for periodical testing of the working of the testing of the working of the pumping set as per TAC rules. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15%, 3 phase, 50 HZ A.C. supply of suitable capacity (approx. 45 KW ,60 HP) for the above pump coupled with flexible coupling including earthling as per relevant Indian Standard & specifications. c) Common bed plate for mounting Pump and Motor fabricated of Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 6 no Dunlop (cushy foot) heavy duty Anti-vibration mounting pads.	Set	1		
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19	NSI-19	SITC of Electrical Motor Driven Automatic pressurisation (Jockey) pumping set consisting of the following as per specifications. Horizontally mounted centrifugal type single/multi-stage fire pump for building pressure loss due to any leakage in the system and capable to deliver approx. 180 LPM against a total head of 70 M having cast iron body, bronze impeller, stainless steel shaft and complete with Pressure Gauge with stop G.M. Stop Valve etc. on the delivery side the delivery side including bypass arrangement (with 25 mm dia. G.M. Stop Valve and up to 5 M. G.I. Medium pipes) for periodical testing of the working of the pumping set. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity 12.5 HP for the above pump with synchronous speed of 2900 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 4 No Dunlop Anti-vibration (cushy foot) heavy duty mounting pads.	Set	1		
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20	NSI-20	<p>SITC of Electrical Motor Driven Automatic pressurisation (Jockey) pumping set consisting of the following as per specifications. Horizontally mounted centrifugal type single/multi-stage fire pump for building pressure loss due to any leakage in the system and capable to deliver approx. 180 LPM against a total head of 70 M having cast iron body, bronze impeller, stainless steel shaft and complete with Pressure Gauge with stop G.M. Stop Valve etc. on the delivery side the delivery side including bypass arrangement (with 25 mm dia. G.M. Stop Valve and upto 5 M. G.I. Medium pipes) for periodical testing of the working of the pumping set. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity 12.5 HP for the above pump with synchronous speed of 2900 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 4 Nos Dunlop Anti-vibration (cushy foot) heavy duty mounting pads.</p>	Set	1		
21	NSI-21	<p>Providing and fixing double flanged vertical air vessel fabricated shell from 8 mm thick & dished ends 10 mm thick M.S. plate, 450 mm dia and 2.0 m high common for fire and jockey pumps complete with three pressure switches to operate jockey and main pumps at drop of pressure.</p>	No	3		
22	NSI-22	<p>Supply, Installation, Testing & Commissioning of cubical type floor mounted Fire Pump Control Panel fabricated from 14 gauge M.S. Sheet duly powder coated finish of approved shade and comprising of :</p>				
		<p>INCOMING:</p>				
		<p>a) One 250 Amp. TP +NL M.C.C.B. with rotary handle of beaking capacity 35KA.</p>				
		<p>b) One-Volt Meter (0-500 V) with selector switch.</p>				
		<p>c) One Set indicating lamps.</p>				
		<p>BUS BARS OUTGOING</p>				
		<p>a) 300 Amp TPN BUS BAR (Aluminium).</p>				
		<p>b) One - 220 Amp. TP + NL M.C.C.B. with rotary handle of beaking capacity 35KA.</p>				
		<p>c) One - 63 Amp.TP +NL M.C.C.B.with rotary handle of beaking capacity 35KA.</p>				



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		d) One Fully Automatac Star-Delta starters suitable for 45 KW Pump Motor with over load relay timer push buttons and Auto/Manual selector switch.	SET	1		
		e) One Fully Automatic D.O.L Starter suitable for Jockey Pump Motor with over load relay, timer push buttons and Auto/Manual selector switch.				
		f) Four panel type Amp. meters one for each motor with ASS. CTS etc.				
		g) Four sets of On/Off - neon indicating lamp.				
		h) Fully Automatic Diesel engine starting system 12V complet with battery charger hooter, indicating lights, transformer, rectifier, timer, voltmeter ammeter, selector switches, push buttons, auxilliary relay etc. complete as required as per TAC rules.				
		i) All interconnecting power & control wires/ cables of suitable size within the panel and from panel to motors diesel engine, pressure switches, level switches,cable Tray, pipes etc. including brass glands termination within fire pump house and earthing as per specifications.				
23	NSI-23	Providing and fixing reselient rubber neoprene lined single arch vibration eliminators suitable for raw water upto 45 deg. C. temperature working pressure 7 kg and test pressure 14 kg per sq. cm.				
	(a)	80 mm dia .	No	2		
	(b)	150 mm dia.	No	4		
24	NSI-24	Fabricating & installing following size of perforated M.S. cable tray including horizontal and vertical bends, reducers, tees, cross members and other accessories as required and duly suspended from the cabling with M.S. suspenders and including painting etc. as required.				
	(a)	300 mm width x 50 mm depth x 2 mm thickness.	Rmt	50		
	(b)	150 mm width x 50 mm depth x 2 mm thickness.	Rmt	50		
25	NSI-25	Fixing heavy duty copper armored cables 1.1 KV grade including termination necessary support clamps at ceiling level and connection legs and double compression glands, complete in all respects.				
	(a)	Control cable 2 core x 1.5 Sq. mm.	Rmt	120		
26	NSI-26	Laying of following 1.1 KV grade aluminium conductor armoured cables having outer sheath of fire retardent extruded (FRLS) compound as per specification in cable tray, hume pipe, cable trenches over a bed of sand, clamped to wall with suitable clamps, saddles complete in all respects.				
	(a)	Power cable 3 core x 16 Sq.mm	Rmt	30		
	(b)	Power cable 3 core x 50 Sq.mm	Rmt	50		
Sub Total (c)						
(d) Automatic Fire/ Smoke Detection System						



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27	NSI-27	SITC of 6 Zone conventional Micro Processor based fire alarm panel "AGNI" make. The Panel shall be fully modular in construction with test facility on the front for testing entire circulatory of panel. It shall have glass door locking facility. The Control Panel shall be compact & lightweight and shall made out of M.S. sheet dully powder coated The control panel shall be with 24 volt battery and battery backup arrangement. The control panel shall be having battery charging arrangement. The control panel Modular Design Integrate Solid State Circuiting /Inter Lock Switch/Zone fault Latch Option /Zone relay/ Zone alarm facility, Low battery/ Power fault/ Zone fault/ Zone fire/ Charging Indicators.	No	2		
28	NSI-28	Smoke detector Optical type, Series-65, SYSTEM SANSER" MAKE, Detector shall respond to rapid rise in density of smoke. The detector shall be fixed in a changeable base so as to be replaced by heat detector, whenever required.	No	80		
29	NSI-29	SITC of heat detector.	No	5		
30	NSI-30	Supply of Manual Call Box with chain & hammer with L&T Micro switch 4"x5"x4"size	No	16		
31	NSI-31	Supply, installation, testing and commissioning of Electronic Hooter.	No	6		
32	NSI-32	Supply, Installation, Testing & Commissioning of: Manual Call Box, Housing MS, red painted, 120mm X 90mm X 55mm size. With chain & hammer facility and LED blinking. Manual call point complete all respect IS: 2189.	No	16		
33	NSI-33	Supply, Installation, Testing & Commissioning of: Electric Hooter, tasted by ERTL as per IS: 2189. Extra Hi-intensive sound. Housing MS, red painted, 180mm X225mm X 90mm size. 24 volt DC.	No	4		
34	NSI-34	Supply, installation, testing and commissioning of 1.5mm X 2 core cables with PVC conduit.	Rmt	1100		
						Sub Total (d)
(e) Fire Extinguisher						
35	NSI-35	SUPPLY & FIXING OF ABC type fire extinguishers (Mono ammonium phosphate) conforming to IS: 15683, ABC fire extinguisher covers A, B, C class of fires. The fire extinguisher finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge. Fire extinguisher throw of jet 4mt. minimum period to discharges at least 90% of contests 16 sec. Fire extinguisher confirming fire rating 2A, 21B.The fire extinguisher working pressure 15kgf/cm2, hydro pressure 35kgf/cm2 & bursting pressure 55kgf/cm2. capacity: 6.0 kg	No	10		



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36	NSI-36	SUPPLY & FIXING OF CO ₂ type flat base including valve, discharge hose of not less than 10 mm dia. 1m long & complete in all respect including initial fill with CO ₂ gas confirming IS: 307-1966 filled to a filling ratio of not more than 0.667. Fire extinguishers conforming to IS: 15683, finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge capacity: 4.5 kg.	No	5		
37	NSI-37	SITC of CO ₂ type Fire extinguishers conforming to IS: 15683, finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge capacity: 9 kg.	No	5		
38	NSI-38	SITC of mech foam, Capacity:- 9Ltr	No	2		
Sub Total (e)						
(f) Automatic Sprinkler System						
39	NSI-39	Installation, testing and commissioning of MS Pipe class 'C' (Heavy Class) conforming to IS:1239/3589 including all accessories such as screwed/welded joints, flanges, tees, reducers, structural steel supports and clamps etc. including lift to all heights, welding, jointing, painting and inserted rubber gaskets, nuts, bolts etc. as required. Pipes shall be painted with two coats of primer & two coats of post office red synthetic enamel paint over two coats of red oxide zinc chromate primer. Prior to application of primer surface to be cleaned including painting of legends both direction arrow as per approval of Project Manager and shall be fixed in ceiling, walls, columns for all heights with hangers/supports and fasteners.				
	a)	100 mm dia	110	Mtr		
	b)	80 mm dia	60	Mtr		
	c)	25 mm dia	60	Mtr		
40	NSI-40	Providing & fixing brass quartzoid sprinklers (UL Listed) of 15 mm dia size, suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :- Pendent / Upright sprinkler (68°)	78	Each		
41	NSI-41	Supply Installation and testing S.S. Flexible fitting for Sprinkler head 1000mm. long, 20mm.size for sprinkler head	78	Each		
42	NSI-42	Fixing M.S cabinet of size 900 x 600 x 150 mm fabricated from 2 mm thick MS sheet with full front glass door and locking arrangement with suitable shelves for keeping 10 spare sprinklers and one spanner properly fixed in the shelves and cabinet painted fire red with stove enamelled of	1	Each		
43	NSI-43	Fixing C.I horizontal dual plate wafer type non return valves PN 1.6 including washer, nuts, bolts, 1.5 mm thick compressed asbestos gasket companion flanges as per table "E" complete in all respects.- 100 mm dia	1	Each		



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44	NSI-44	Providing & fixing stainless steel fire brigade inlet connection with 63 mm dia instantaneous type inlet and 150 mm dia flanged outlet with built in check valve for fire brigade connection to underground tanks and fire risers (IS : 904-1965) tested for 20 kg/cm ² pressure with companion flanges, nuts, bolts, gaskets, etc. complete in all respects.- Two way (For Sprinkler System)	1	Each		
45	NSI-45	Terrace Pump Electrical Motor Driven pressurization pumping set consisting of the following as per specifications: (a) Horizontally mounted centrifugal type single/multi-stage fire (Terrace) pump for building pressure loss due to any leakage in the system and capable to deliver approx 450 LPM having cast iron body. Bronze impeller, stainless steel shaft complete in all respect. (b) Squirrel cage induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity (approx 4 HP/3.2 KW or as required) for the above pump with synchronous speed of 1500/3000 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. (c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations.	1	Each		
46	NSI-46	Fire pump control panel fully automatic star delta starter/auto manual selector switch, for motor pump as mentioned in item no-7 above, star delta starter suitable for pump, fully automatic starting system, indicating light on/off switch, volt meter, ammeter, selector switch, auxiliary relay, complete in all respect including 3 phase indicator, push button and MCB etc.	1	Each		
47	NSI-47	Fixing heavy duty copper cables 1.1 KV grade including Termination necessary support clamps at ceiling level and connection legs and double compression glands, complete in all respects.				
	a)	Control cable 4 core x 6 Sq.mm	30	Metre		
	b)	Laying 2 core x 1.5 sqm copper control cable between pressure switches and panel.	30	Metre		
48	NSI-48	Providing and fixing pressure switch complete in all respects.	1	Each		
49	NSI-49	Gun metal single acting Air release valve rated for 20kg/sq.cm pressure rating with ball valve.	1	Each		
50	NSI-50	Providing and fixing dial type pressure gauge with ball valve complete in all respects. Dial diameter 100 mm, calibration 0-15 kg/sq cm.100 mm dia nominal bore	1	Each		



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51	NSI-51	Fixing CI 'Y' strainer with bronze perforated sheet basket including rubber gaskets, flanges, nuts, bolts and washers etc. complete as required.- 100 mm dia	1	Each		
52	NSI-52	Fixing wafer type butterfly valves of complete with bolts, nuts, 3 mm thick compressed asbestos gasket, companion flanges as per table 'E' complete in all respects				
	a)	80 mm dia	2	Each		
	b)	100 mm dia	3	Each		
Sub Total (f)						
Total for Fire Fighting Works (a+b+c+d+e+f)						

Section- B:- CIVIL WORKS

Sl. No	DSR'13 code	Description of work	Qty	Unit	Rate	Amount
1		Carriage of material up to 1 km lead by Mechanical transport including, loading, unloading & stacking of -				
(i)	1.1.1	Lime, Moorum, Building rubbish	9	cum	81.02	729.18
(ii)	1.1.2	Earth	153	cum	101.27	15494.31
2	2.6.1	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed:- All kinds of soil.	228	cum	146.50	33402.00
3	2.25	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations, etc. in layers not exceeding 20 cm in depth : consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m	76	cum	101.50	7714.00
4	2.26.1	Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials:- All kinds of soil:- Depth 1.5 m to 3.0 m	75.00	cum	41.75	3131.25
5	2.26.1	Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials:- All kinds of soil:- Depth 3.0 m to 4.5 m	45.00	cum	83.50	3757.50
6	2.27	Supplying and filling in plinth with Ganga sand under floors including watering, ramming, consolidating and dressing complete.	14	cum	843.65	11811.10



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7	2.28.1	Surface dressing of the ground including removing vegetation and inequalities not exceeding 15 cm deep and disposal of rubbish, lead upto 50 m and lift upto 1.5 m:- All	2	100 Sqm	1124.60	2249.20
8		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:-				
(i)	4.1.3	1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	7	cum	4921.70	34451.90
(ii)	4.1.9	1:4:8 (1 cement : 4 Fine sand : 8 graded stone aggregate 40 mm nominal size).	8	cum	3664.10	29312.80
10	4.11	Providing and laying damp-proof course 50 mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	9	sqm	283.80	2554.20
11	4.12	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification.	344	Per 50 kg of cement	44.36	15259.84
12		Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centering, shuttering, finishing and reinforcement - All work up to				
(i)	5.1.2	1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size).	20	cum	5552.25	111045.00
(ii)	5.1.3	1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	9	cum	5156.20	46405.80
13	5.2.3	Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up to floor five level excluding cost of centering, shuttering, finishing and reinforcement : 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	3	cum	5923.15	17769.45
14	5.3	Reinforced cement concrete work in beams, suspended floors, roofs having slope up to 15° landings, balconies, shelves, chajjas, lintels, bands, plain window sills, staircases and spiral stair cases up to floor five level excluding the cost of centering, shuttering, finishing and reinforcement with 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	11	cum	6107.15	67178.65
15		Centering and shuttering including strutting, propping, etc. and removal of form for:				
(i)	5.9.1	Foundations, footings, bases of columns, etc. for mass concrete.	50	sqm	186.40	9320.00



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(ii)	5.9.2	Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	160	sqm	334.50	53520.00
(iii)	5.9.3	Suspended floors, roofs, landings, balconies and access platform.	107	sqm	371.80	39782.60
(iv)	5.9.5	Lintels, beams, plinth beams, girders, bressumers and cantilevers.	34	sqm	309.80	10533.20
(v)	5.9.6	Columns, Pillars, Piers, Abutments, Posts and Struts.	20	sqm	423.00	8460.00
(v)	5.9.16.1	Edges of slabs and breaks in floors and walls:- Under 20 c.m wide	45	Metre	111.70	5026.50
16	5.22.6	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete:- Thermo Mechanically Treated bars	3600	kg	66.50	239400.00
17	5.24	Extra for rendering smooth the top of suspended floors, landings and staircases (treads and risers) with cement mortar 1:2 (1 cement : 2 coarse sand), including a floating coat of neat cement and protecting the surface with a layer of 7.5 cm of earth laid over 15 mm of fine sand in case of suspended floor and bricks laid in mud mortar in case of landings and steps, including subsequent removal and cleaning of the same.	70	sqm	79.60	5572.00
18	6.1.2	Brickwork with F.P.S. bricks of class designation 75 in foundation and plinth in-cement mortar 1:6(1 cement:6 coarse sand).	2	cum	4646.50	9293.00
19	6.4.2	Brickwork with F.P.S. bricks of class designation 75 in superstructure above plinth level up to floor V level in all shapes & sizes in :cement mortar 1:6(1 cement: 6 coarse sand).	23	cum	5325.10	122477.30
20	10.25.2	Steel work welded in built up sections/framed work including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. In gratings, frames, guard bar, ladders, railings, brackets, gates and similar works.	820	kg	86.50	70930.00
21	12.41.2	Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion Single socketed pipes:- 110 mm diameter	10	Metre	218.60	2186.00



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22		Providing and fixing on wall face unplasticised-PVC moulded fittings/accessories for unplasticised - Rigid PVC rain water pipes conforming to IS : 13592 Type A including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion:				
(i)	12.42.3.2	Single tee with door.- 110x110x110 mm.	3	Each	305.35	916.05
(ii)	12.42.5.	Bend 87.5 degree:- 110 mm bend	3	Each	160.25	480.75
23	12.43.2	Providing and fixing unplasticised -P.V.C. pipe clips of approved design to unplasticised -P.V.C. rain water pipes by means of 50x50x50 mm hard wood plugs, screw with M.S. screws of required length including cutting brick work and fixing in cement mortar 1:4 (1 cement:4 coarse sand) and making good the wall etc. complete.110 mm	9	Each	173.75	1563.75
24	12.44	Providing and fixing to the inlet mouth of rain water pipe cast iron grating 15 cm diameter and weighing not less than 440 grams.	3	Each	37.25	111.75
25	13.1.2	12 mm cement plaster of mix:- 1 : 6 (1 cement : 6 Fine sand)	80	sqm	133.85	10708.00
26	13.2.2	15 mm cement plaster on rough side of single or half brick wall of mix: 1 : 6 (1 cement : 6 Fine sand).	245	sqm	154.70	37901.50
27	13.7.2	12mm cement plaster finished with a floating coat of neat cement of mix : 1:4 (1 cement :4 fine sand).	130	sqm	180.60	23478.00
28	13.26	Providing and applying plaster of paris putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete.	135	sqm	100.95	13628.25
29	13.40	Distemping with dry distemper of approved brand and manufacture (two or more coats) of required shade on new work, over and including water thinnable priming coat to give an even shade.	135	sqm	61.80	8343.00
30	13.44.1	Finishing walls with water proofing cement paint of required shade : New work (Two or more coats applied @ 3.84 kg/10 sqm)	245	sqm	54.40	13328.00
31	13.61.1	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade :- Two or more coats on new work	23	Sqm	63.05	1450.15
32	14.5.1	Renewing glass panes ,with putty and nails wherever necessary:- Float glass panes of thickness 4 mm.	5	Sqm	651.40	3257.00
33	15.2.1	Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer-in-charge:- 1:3:6 or richer mix.	4	cum	806.35	3225.40



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34	15.7.4	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. In cement mortar.	5	cum	681.00	3405.00
35	18.48	Providing and placing on terrace (at all floor levels) polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.	10000	Per Litre	6.30	63000.00
Total on Scheduled Items						1163563.38

(a) I/We hereby quote.....% above/ at par/ below on DSR'2013 rates on all above civil works items mentioned at Sl. No-1 to 35

(b) In Words:

Service Tax (Please Tick <input type="checkbox"/> whichever is applicable)	Extra	Inclusive
Service Tax (In Words):-		

PRICE BID (Duly filled to be submitted in a separate envelope)

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		Tender Notice No - HERP/CIVIL/CAP/86/14-15, Date-11.07.2014				
Name of Work:-Establishment of Fire Fighting Network Within Factory Area at HERP.						
Section- A:- FIRE FIGHTING WORK						
Party/Contractor is required to quote their rates for Non-Scheduled items at Sl. No- 1 to 52						
Sl. No	NSI Code	Description of work	Qty	Unit	Rate	Amount
(a) Design & Drawing						
1	NSI-1	Design of fire fighting system as per latest rules & codes and development of working drawing in consultation with BHEL and incorporating all inputs received from the Fire's No Objection Certificate (NOC) sanctioning authorities. Sanction of NOC from concerned fire authority shall be in the scope of party. Plant Layout is attached for ready reference.	Lot	1		
						Sub Total (a)
(b) Fire Fighting System						
2	NSI-2	Supply, Installation, Testing & Commissioning (SITC) of: Single headed, Gun-metal ISI marked oblique pattern hydrant landing valve with 80 mm dia flanged inlet and 63 mm dia. instantaneous type female outlet complete with gunmetal cap and G.I. chain, twist release type plug and all accessories as per 13:5290-1983 (Type 'A')	No	30		
3	NSI-3	SITC of First-Aid Fire Hose Reel wall mounting swinging type complete with drum, bracket, and 20 mm dia.x 30 M long high pressure Hose Reel tubing as per IS:444 with Gun-Metal shut-off nozzle having 5 mm dia.orifice. The Hose Reel shall strictly confirm to IS:884-1985.	No	30		
4	NSI-4	SITC of Non-percolating flexible hose (RRL type-'A') ISI marked (IS:636) 63 mm dia x 15 M long complete with instantaneous type gunmetal 63 mm dia. IS marked Male and female couplings (IS:903) bound and rivetted to hose pipe with copper rivets and 1.5 mm copper wire.	No	60		
5	NSI-5	SITC of Gun-metal 63mm dia short size branch pipes with 20 mm dia nozzles with 63mm instantaneous coupling ISI marked (IS: 903).	No	30		



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6	NSI-6	SITC of M.S. fire hose cabinet fabricated from 16 gauge M.S. sheet of fully welded construction with hinged double front door with locking arrangement, full glass door 4 mm thick approved by local fire authority, painted with one coat of primer, stove enamelled fire red finished, "Fire Hose" written on front, suitable to accommodate 2 nos.15 m long 63 mm dia. hose,1-branch pipe, 1 fire-man's axe, including suitably mounted on a raised masonry platform as required.	No	30		
7	NSI-7	SITC of Gun-Metal Fire Brigade connection (Suction collecting head) consisting of 63 mm dia. instantaneous type male coupling with built-in check valves and 150 mm dia.flanged outlet complete with bolts, nuts and rubber insertions as required as per IS:904-1983:- Four Way .	No	1		
8	NSI-8	SITC of Gun-metal Fire Brigade Suction Hose coupling (Draw-out Connection) with nut for female coupling as per IS:902- 1974 complete. Foot valve flanged (to be connected to static water tank)				
	(a)	150 mm dia	No	2		
	(b)	100 mm dia	No	1		
9	NSI-9	SITC of M.S. cabinet (to enclose Draw-out/ Fire brigade inlet connections) fabricated from 16 gauge sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx.0.6 M x 0.6 M x 0.45 M).	No	1		
10	NSI-10	SUPPLY, INSTALLATION, TESTING & COMMISSIONING of Mild Steel pipe (IS:1239 Part-I) 'B' class including cutting, threading, welding etc. bends, elbows reducers, unions, flanges, rubber gasket clamps, G.I. nuts bolts washer, hangers etc., including all necessary pipe support, cutting to size, drilling, welding/ fixing and welding insert plates in RCC structural members wherever required fixing the pipe on wall/ floor /ceiling using anchor fastners, G.I. pipe sleeves of higher dia shall be provided wherever the pipes are crossing the wall or floors and sealing the sleeve with glass wool and fire sealent, cutting holes in brick or RCC walls/ slabs and making good the same complete including painting with one coat of primer and two or more coats of synthetic enamel paint as per IS:536 of approved make and shade including, as directed by Engineer-in-Charge.				
	(a)	200 mm dia.	Rmt	25		
	(b)	150 mm dia.	Rmt	650		
	(c)	100 mm dia.	Rmt	150		
	(d)	80 mm dia.	Rmt	250		
11	NSI-11	SITC of anti-corrosive treatment of burried pipeline	Rmt	800		



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12	NSI-12	Supply Installation and testing slim seal Butterfly valves B190 Class (PN 1.6) complete with 2 Nos matching flanges rubber insertion, nuts, bolts and washer etc. of following sizes:				
	(a)	200 mm dia nominal bore.	No	2		
	(b)	150 mm dia nominal bore.	No	5		
	(c)	100 mm dia nominal bore.	No	3		
	(d)	80 mm dia nominal bore.	No	30		
13	NSI-13	Providing and fixing forged brass Ball valve with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plated centre handle with female BSP threads suitable for 15 kg./ sq. cm. complete in all respects:				
	(a)	25 mm dia. nominal bore.	No	30		
14	NSI-14	Providing and fixing dial type pressure gauge with ball valve and pipe at hydrant station, complete in all respects. Dial dia 100 mm, calibration 0-15 kg/sq cm. Valve shall be paid separately:- 100 mm dia. nominal bore.	No	5		
15	NSI-15	SITC of NRV complete with all flanges rubber insertion, nuts, bolts and washer etc. of following sizes:				
	(a)	200 mm dia nominal bore.	No	2		
	(b)	150 mm dia nominal bore.	No	4		
	(c)	100 mm dia nominal bore.	No	3		
	(d)	80 mm dia nominal bore.	No	1		
16	NSI-16	SITC of Air cushion tank 250 mm dia. x 1.5 M high with dished top, made of minimum 6 mm thick M.S. pipe/ plate complete with 25 mm dia. Brass Air Valve (Ball valve, pressure gauge type), 25 mm dia. Stop with brass stop cock, nipple, tees, elbow and all accessories as required incl. fixing brackets.	No	3		
17	NSI-17	Providing and fixing pressure switch including cost of pressure switch mounted on air vessel complete in all respects.	No	5		
Sub Total (b)						
(c) Fire Pumps & Accessories						



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18	NSI-18	SITC of Electrical Motor Driven Fire Pumping set suitable for automatic operation consisting of the following as per the specifications. a) Horizontally mounted, centrifugal type single stage fire pump having cast iron body, bronze impeller, stainless steel shaft & capable of delivering 2280 LPM against a total head of 70 M complete with necessary 'Y' strainer on the suction side and pressure gauge with GM cocks on the delivery side including bypass arrangement (with 50 valve and up to 5 M G.I. Medium pipes) for periodical testing of the working of the testing of the working of the pumping set as per TAC rules. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15%, 3 phase, 50 HZ A.C. supply of suitable capacity (approx. 45 KW ,60 HP) for the above pump coupled with flexible coupling including earthing as per relevant Indian Standard & specifications. c) Common bed plate for mounting Pump and Motor fabricated of Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 6 no Dunlop (cushy foot) heavy duty Anti-vibration mounting pads.	Set	1		
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19	NSI-19	SITC of Electrical Motor Driven Automatic pressurisation (Jockey) pumping set consisting of the following as per specifications. Horizontally mounted centrifugal type single/multi-stage fire pump for building pressure loss due to any leakage in the system and capable to deliver approx. 180 LPM against a total head of 70 M having cast iron body, bronze impeller, stainless steel shaft and complete with Pressure Gauge with stop G.M. Stop Valve etc. on the delivery side the delivery side including bypass arrangement (with 25 mm dia. G.M. Stop Valve and up to 5 M. G.I. Medium pipes) for periodical testing of the working of the pumping set. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity 12.5 HP for the above pump with synchronous speed of 2900 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 4 No Dunlop Anti-vibration (cushy foot) heavy duty mounting pads.	Set	1		
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20	NSI-20	SITC of Electrical Motor Driven Automatic pressurisation (Jockey) pumping set consisting of the following as per specifications. Horizontally mounted centrifugal type single/multi-stage fire pump for building pressure loss due to any leakage in the system and capable to deliver approx. 180 LPM against a total head of 70 M having cast iron body, bronze impeller, stainless steel shaft and complete with Pressure Gauge with stop G.M. Stop Valve etc. on the delivery side the delivery side including bypass arrangement (with 25 mm dia. G.M. Stop Valve and upto 5 M. G.I. Medium pipes) for periodical testing of the working of the pumping set. b) Squirrel cage TEFC induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity 12.5 HP for the above pump with synchronous speed of 2900 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations. d) 4 Nos Dunlop Anti-vibration (cushy foot) heavy duty mounting pads.	Set	1		
21	NSI-21	Providing and fixing double flanged vertical air vessel fabricated shell from 8 mm thick & dished ends 10 mm thick M.S. plate, 450 mm dia and 2.0 m high common for fire and jockey pumps complete with three pressure switches to operate jockey and main pumps at drop of pressure.	No	3		
22	NSI-22	Supply, Installation, Testing & Commissioning of cubical type floor mounted Fire Pump Control Panel fabricated from 14 gauge M.S. Sheet duly powder coated finish of approved shade and comprising of :				
		INCOMING:				
		a) One 250 Amp. TP +NL M.C.C.B. with rotary handle of beaking capacity 35KA.				
		b) One-Volt Meter (0-500 V) with selector switch.				
		c) One Set indicating lamps.				
		BUS BARS OUTGOING				
		a) 300 Amp TPN BUS BAR (Aluminium).				
		b) One - 220 Amp. TP + NL M.C.C.B. with rotary handle of beaking capacity 35KA.				
		c) One - 63 Amp.TP +NL M.C.C.B.with rotary handle of beaking capacity 35KA.				



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		d) One Fully Automatac Star-Delta starters suitable for 45 KW Pump Motor with over load relay timer push buttons and Auto/Manual selector switch.	SET	1		
		e) One Fully Automatic D.O.L Starter suitable for Jockey Pump Motor with over load relay, timer push buttons and Auto/Manual selector switch.				
		f) Four panel type Amp. meters one for each motor with ASS. CTS etc.				
		g) Four sets of On/Off - neon indicating lamp.				
		h) Fully Automatic Diesel engine starting system 12V complet with battery charger hooter, indicating lights, transformer, rectifier, timer, voltmeter ammeter, selector switches, push buttons, auxilliary relay etc. complete as required as per TAC rules.				
		i) All interconnecting power & control wires/ cables of suitable size within the panel and from panel to motors diesel engine, pressure switches, level switches,cable Tray, pipes etc. including brass glands termination within fire pump house and earthing as per specifications.				
23	NSI-23	Providing and fixing reselient rubber neoprene lined single arch vibration eliminators suitable for raw water upto 45 deg. C. temperature working pressure 7 kg and test pressure 14 kg per sq. cm.				
	(a)	80 mm dia .	No	2		
	(b)	150 mm dia.	No	4		
24	NSI-24	Fabricating & installing following size of perforated M.S. cable tray including horizontal and vertical bends, reducers, tees, cross members and other accessories as required and duly suspended from the cabling with M.S. suspenders and including painting etc. as required.				
	(a)	300 mm width x 50 mm depth x 2 mm thickness.	Rmt	50		
	(b)	150 mm width x 50 mm depth x 2 mm thickness.	Rmt	50		
25	NSI-25	Fixing heavy duty copper armored cables 1.1 KV grade including termination necessary support clamps at ceiling level and connection legs and double compression glands, complete in all respects.				
	(a)	Control cable 2 core x 1.5 Sq. mm.	Rmt	120		
26	NSI-26	Laying of following 1.1 KV grade aluminium conductor armoured cables having outer sheath of fire retardent extruded (FRLS) compound as per specification in cable tray, hume pipe, cable trenches over a bed of sand, clamped to wall with suitable clamps, saddles complete in all respects.				
	(a)	Power cable 3 core x 16 Sq.mm	Rmt	30		
	(b)	Power cable 3 core x 50 Sq.mm	Rmt	50		
Sub Total (c)						
(d) Automatic Fire/ Smoke Detection System						



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27	NSI-27	SITC of 6 Zone conventional Micro Processor based fire alarm panel "AGNI" make. The Panel shall be fully modular in construction with test facility on the front for testing entire circulatory of panel. It shall have glass door locking facility. The Control Panel shall be compact & lightweight and shall be made out of M.S. sheet dully powder coated The control panel shall be with 24 volt battery and battery backup arrangement. The control panel shall be having battery charging arrangement. The control panel Modular Design Integrate Solid State Circuiting /Inter Lock Switch/Zone fault Latch Option /Zone relay/ Zone alarm facility, Low battery/ Power fault/ Zone fault/ Zone fire/ Charging Indicators.	No	2		
28	NSI-28	Smoke detector Optical type, Series-65, SYSTEM SANSER" MAKE, Detector shall respond to rapid rise in density of smoke. The detector shall be fixed in a changeable base so as to be replaced by heat detector, whenever required.	No	80		
29	NSI-29	SITC of heat detector.	No	5		
30	NSI-30	Supply of Manual Call Box with chain & hammer with L&T Micro switch 4"x5"x4"size	No	16		
31	NSI-31	Supply, installation, testing and commissioning of Electronic Hooter.	No	6		
32	NSI-32	Supply, Installation, Testing & Commissioning of: Manual Call Box, Housing MS, red painted, 120mm X 90mm X 55mm size. With chain & hammer facility and LED blinking. Manual call point complete all respect IS: 2189.	No	16		
33	NSI-33	Supply, Installation, Testing & Commissioning of: Electric Hooter, tasted by ERTL as per IS: 2189. Extra Hi-intensive sound. Housing MS, red painted, 180mm X225mm X 90mm size. 24 volt DC.	No	4		
34	NSI-34	Supply, installation, testing and commissioning of 1.5mm X 2 core cables with PVC conduit.	Rmt	1100		
						Sub Total (d)
(e) Fire Extinguisher						
35	NSI-35	SUPPLY & FIXING OF ABC type fire extinguishers (Mono ammonium phosphate) conforming to IS: 15683, ABC fire extinguisher covers A, B, C class of fires. The fire extinguisher finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge. Fire extinguisher throw of jet 4mt. minimum period to discharges at least 90% of contests 16 sec. Fire extinguisher confirming fire rating 2A, 21B.The fire extinguisher working pressure 15kgf/cm2, hydro pressure 35kgf/cm2 & bursting pressure 55kgf/cm2. capacity: 6.0 kg	No	10		



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36	NSI-36	SUPPLY & FIXING OF CO ₂ type flat base including valve, discharge hose of not less than 10 mm dia. 1m long & complete in all respect including initial fill with CO ₂ gas confirming IS: 307-1966 filled to a filling ratio of not more than 0.667. Fire extinguishers conforming to IS: 15683, finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge capacity: 4.5 kg.	No	5		
37	NSI-37	SITC of CO ₂ type Fire extinguishers conforming to IS: 15683, finished externally with red enamel paint and fixed to wall with brackets, complete, with internal charge capacity: 9 kg.	No	5		
38	NSI-38	SITC of mech foam, Capacity:- 9Ltr	No	2		
Sub Total (e)						
(f) Automatic Sprinkler System						
39	NSI-39	Installation, testing and commissioning of MS Pipe class 'C' (Heavy Class) conforming to IS:1239/3589 including all accessories such as screwed/welded joints, flanges, tees, reducers, structural steel supports and clamps etc. including lift to all heights, welding, jointing, painting and inserted rubber gaskets, nuts, bolts etc. as required. Pipes shall be painted with two coats of primer & two coats of post office red synthetic enamel paint over two coats of red oxide zinc chromate primer. Prior to application of primer surface to be cleaned including painting of legends both direction arrow as per approval of Project Manager and shall be fixed in ceiling, walls, columns for all heights with hangers/supports and fasteners.				
	a)	100 mm dia	110	Mtr		
	b)	80 mm dia	60	Mtr		
	c)	25 mm dia	60	Mtr		
40	NSI-40	Providing & fixing brass quartzoid sprinklers (UL Listed) of 15 mm dia size, suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :- Pendent / Upright sprinkler (68°)	78	Each		
41	NSI-41	Supply Installation and testing S.S. Flexible fitting for Sprinkler head 1000mm. long, 20mm.size for sprinkler head	78	Each		
42	NSI-42	Fixing M.S cabinet of size 900 x 600 x 150 mm fabricated from 2 mm thick MS sheet with full front glass door and locking arrangement with suitable shelves for keeping 10 spare sprinklers and one spanner properly fixed in the shelves and cabinet painted fire red with stove enamelled of	1	Each		
43	NSI-43	Fixing C.I horizontal dual plate wafer type non return valves PN 1.6 including washer, nuts, bolts, 1.5 mm thick compressed asbestos gasket companion flanges as per table "E" complete in all respects.- 100 mm dia	1	Each		



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44	NSI-44	Providing & fixing stainless steel fire brigade inlet connection with 63 mm dia instantaneous type inlet and 150 mm dia flanged outlet with built in check valve for fire brigade connection to underground tanks and fire risers (IS : 904-1965) tested for 20 kg/cm ² pressure with companion flanges, nuts, bolts, gaskets, etc. complete in all respects.- Two way (For Sprinkler System)	1	Each		
45	NSI-45	Terrace Pump Electrical Motor Driven pressurization pumping set consisting of the following as per specifications: (a) Horizontally mounted centrifugal type single/multi-stage fire (Terrace) pump for building pressure loss due to any leakage in the system and capable to deliver approx 450 LPM having cast iron body. Bronze impeller, stainless steel shaft complete in all respect. (b) Squirrel cage induction motor totally enclosed fan cooled type suitable for 415 Volts +_ 15% 3 phase. 50 HZ A.C. supply of suitable capacity (approx 4 HP/3.2 KW or as required) for the above pump with synchronous speed of 1500/3000 RPM confirming to IS: 325 & duly coupled with above pump coupled with flexible coupling including earthing as per relevant Indian Standard and specifications. (c) Common bed plate for mounting Pump and Motor fabricated of suitable M.S. Channel as per manufacturer's recommendations.	1	Each		
46	NSI-46	Fire pump control panel fully automatic star delta starter/auto manual selector switch, for motor pump as mentioned in item no-7 above, star delta starter suitable for pump, fully automatic starting system, indicating light on/off switch, volt meter, ammeter, selector switch, auxiliary relay, complete in all respect including 3 phase indicator, push button and MCB etc.	1	Each		
47	NSI-47	Fixing heavy duty copper cables 1.1 KV grade including Termination necessary support clamps at ceiling level and connection legs and double compression glands, complete in all respects.				
	a)	Control cable 4 core x 6 Sq.mm	30	Metre		
	b)	Laying 2 core x 1.5 sqm copper control cable between pressure switches and panel.	30	Metre		
48	NSI-48	Providing and fixing pressure switch complete in all respects.	1	Each		
49	NSI-49	Gun metal single acting Air release valve rated for 20kg/sq.cm pressure rating with ball valve.	1	Each		
50	NSI-50	Providing and fixing dial type pressure gauge with ball valve complete in all respects. Dial diameter 100 mm, calibration 0-15 kg/sq cm.100 mm dia nominal bore	1	Each		



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51	NSI-51	Fixing CI 'Y' strainer with bronze perforated sheet basket including rubber gaskets, flanges, nuts, bolts and washers etc. complete as required.- 100 mm dia	1	Each		
52	NSI-52	Fixing wafer type butterfly valves of complete with bolts, nuts, 3 mm thick compressed asbestos gasket, companion flanges as per table 'E' complete in all respects				
	a)	80 mm dia	2	Each		
	b)	100 mm dia	3	Each		
Sub Total (f)						
Total for Fire Fighting Works (a+b+c+d+e+f)						

Section- B:- CIVIL WORKS

Sl. No	DSR'13 code	Description of work	Qty	Unit	Rate	Amount
1		Carriage of material up to 1 km lead by Mechanical transport including, loading, unloading & stacking of -				
(i)	1.1.1	Lime, Moorum, Building rubbish	9	cum	81.02	729.18
(ii)	1.1.2	Earth	153	cum	101.27	15494.31
2	2.6.1	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed:- All kinds of soil.	228	cum	146.50	33402.00
3	2.25	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations, etc. in layers not exceeding 20 cm in depth : consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m	76	cum	101.50	7714.00
4	2.26.1	Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials:- All kinds of soil:- Depth 1.5 m to 3.0 m	75.00	cum	41.75	3131.25
5	2.26.1	Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials:- All kinds of soil:- Depth 3.0 m to 4.5 m	45.00	cum	83.50	3757.50
6	2.27	Supplying and filling in plinth with Ganga sand under floors including watering, ramming, consolidating and dressing complete.	14	cum	843.65	11811.10



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7	2.28.1	Surface dressing of the ground including removing vegetation and inequalities not exceeding 15 cm deep and disposal of rubbish, lead upto 50 m and lift upto 1.5 m:- All	2	100 Sqm	1124.60	2249.20
8		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:-				
(i)	4.1.3	1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	7	cum	4921.70	34451.90
(ii)	4.1.9	1:4:8 (1 cement : 4 Fine sand : 8 graded stone aggregate 40 mm nominal size).	8	cum	3664.10	29312.80
10	4.11	Providing and laying damp-proof course 50 mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	9	sqm	283.80	2554.20
11	4.12	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification.	344	Per 50 kg of cement	44.36	15259.84
12		Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centering, shuttering, finishing and reinforcement - All work up to				
(i)	5.1.2	1:1.5:3 (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size).	20	cum	5552.25	111045.00
(ii)	5.1.3	1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	9	cum	5156.20	46405.80
13	5.2.3	Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up to floor five level excluding cost of centering, shuttering, finishing and reinforcement : 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	3	cum	5923.15	17769.45
14	5.3	Reinforced cement concrete work in beams, suspended floors, roofs having slope up to 15° landings, balconies, shelves, chajjas, lintels, bands, plain window sills, staircases and spiral stair cases up to floor five level excluding the cost of centering, shuttering, finishing and reinforcement with 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	11	cum	6107.15	67178.65
15		Centering and shuttering including strutting, propping, etc. and removal of form for:				
(i)	5.9.1	Foundations, footings, bases of columns, etc. for mass concrete.	50	sqm	186.40	9320.00



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(ii)	5.9.2	Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	160	sqm	334.50	53520.00
(iii)	5.9.3	Suspended floors, roofs, landings, balconies and access platform.	107	sqm	371.80	39782.60
(iv)	5.9.5	Lintels, beams, plinth beams, girders, bressumers and cantilevers.	34	sqm	309.80	10533.20
(v)	5.9.6	Columns, Pillars, Piers, Abutments, Posts and Struts.	20	sqm	423.00	8460.00
(v)	5.9.16.1	Edges of slabs and breaks in floors and walls:- Under 20 c.m wide	45	Metre	111.70	5026.50
16	5.22.6	Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete:- Thermo Mechanically Treated bars	3600	kg	66.50	239400.00
17	5.24	Extra for rendering smooth the top of suspended floors, landings and staircases (treads and risers) with cement mortar 1:2 (1 cement : 2 coarse sand), including a floating coat of neat cement and protecting the surface with a layer of 7.5 cm of earth laid over 15 mm of fine sand in case of suspended floor and bricks laid in mud mortar in case of landings and steps, including subsequent removal and cleaning of the same.	70	sqm	79.60	5572.00
18	6.1.2	Brickwork with F.P.S. bricks of class designation 75 in foundation and plinth in-cement mortar 1:6(1 cement:6 coarse sand).	2	cum	4646.50	9293.00
19	6.4.2	Brickwork with F.P.S. bricks of class designation 75 in superstructure above plinth level up to floor V level in all shapes & sizes in :cement mortar 1:6(1 cement: 6 coarse sand).	23	cum	5325.10	122477.30
20	10.25.2	Steel work welded in built up sections/framed work including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. In gratings, frames, guard bar, ladders, railings, brackets, gates and similar works.	820	kg	86.50	70930.00
21	12.41.2	Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion Single socketed pipes:- 110 mm diameter	10	Metre	218.60	2186.00



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22		Providing and fixing on wall face unplasticised-PVC moulded fittings/accessories for unplasticised - Rigid PVC rain water pipes conforming to IS : 13592 Type A including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion:				
(i)	12.42.3.2	Single tee with door.- 110x110x110 mm.	3	Each	305.35	916.05
(ii)	12.42.5.	Bend 87.5 degree:- 110 mm bend	3	Each	160.25	480.75
23	12.43.2	Providing and fixing unplasticised -P.V.C. pipe clips of approved design to unplasticised -P.V.C. rain water pipes by means of 50x50x50 mm hard wood plugs, screw with M.S. screws of required length including cutting brick work and fixing in cement mortar 1:4 (1 cement:4 coarse sand) and making good the wall etc. complete.110 mm	9	Each	173.75	1563.75
24	12.44	Providing and fixing to the inlet mouth of rain water pipe cast iron grating 15 cm diameter and weighing not less than 440 grams.	3	Each	37.25	111.75
25	13.1.2	12 mm cement plaster of mix:- 1 : 6 (1 cement : 6 Fine sand)	80	sqm	133.85	10708.00
26	13.2.2	15 mm cement plaster on rough side of single or half brick wall of mix: 1 : 6 (1 cement : 6 Fine sand).	245	sqm	154.70	37901.50
27	13.7.2	12mm cement plaster finished with a floating coat of neat cement of mix : 1:4 (1 cement :4 fine sand).	130	sqm	180.60	23478.00
28	13.26	Providing and applying plaster of paris putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete.	135	sqm	100.95	13628.25
29	13.40	Distemping with dry distemper of approved brand and manufacture (two or more coats) of required shade on new work, over and including water thinnable priming coat to give an even shade.	135	sqm	61.80	8343.00
30	13.44.1	Finishing walls with water proofing cement paint of required shade : New work (Two or more coats applied @ 3.84 kg/10 sqm)	245	sqm	54.40	13328.00
31	13.61.1	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade :- Two or more coats on new work	23	Sqm	63.05	1450.15
32	14.5.1	Renewing glass panes ,with putty and nails wherever necessary:- Float glass panes of thickness 4 mm.	5	Sqm	651.40	3257.00
33	15.2.1	Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer-in-charge:- 1:3:6 or richer mix.	4	cum	806.35	3225.40



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34	15.7.4	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. In cement mortar.	5	cum	681.00	3405.00
35	18.48	Providing and placing on terrace (at all floor levels) polyethylene water storage tank, ISI : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.	10000	Per Litre	6.30	63000.00
Total on Scheduled Items						1163563.38

(a) I/We hereby quote.....% above/ at par/ below on DSR'2013 rates on all above civil works items mentioned at Sl. No-1 to 35

(b) In Words:

Service Tax (Please Tick <input type="checkbox"/> whichever is applicable)	Extra	Inclusive
Service Tax (In Words):-		