

TENDER

(TENDER No. HERP/CIVIL/CAP./45/11-12)

**Construction of new Production Shop, Open Gantry,
Material Gate, Extension of existing Production
Bays & Laying of Rail Track for
Battery Trolley etc.
at BHEL, HERP, VARANASI (U.P.)**



**MAINTENANCE DEPARTMENT
BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
VARANASI – 221003 (U.P.)**

Name & Signature of Bidder

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TENDER NOTICE NO. HERP/ CIVIL/ CAP/ 45/ 11-12

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(Separate envelope)**

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(Separate envelope)

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**BHARAT HEAVY ELECTRICALS LTD.
HEAVY EQUIPMENT REPAIR PLANT
VARANASI - 221003**

Phone No. 0542 – 6545324
Fax. No 0542-2282241,2282239
e-mail: ashuani@bhel.in

Date : 04/05/2011

From :
Senior Manager (Maint.)
BHEL, HERP
Tarna, Shivpur
Varanasi (U.P.) -221003

To : M/s _____

Dear Sir,

SUB: Construction of Production Shop, Open Gantry, Material Gate, extension of existing three Production Bays, Laying of Rail Track for Battery Trolley etc.

Sealed Tenders in two parts (i) Techno-Commercial bid & (ii) Price Bid are invited for the work mentioned above from bidders (who fulfill the qualifying criteria) as mentioned below:

Nature of work	Time of completion	Estimated tender Value	Earnest money deposit (in Rs)	Last date of issue of Tender date & time	Tender submission date & time	Tender opening (Part 1) date & time
Construction of Production Shop (200m x 20m), Open Gantry (200m x 20m), Material Gate, extension of existing three Production Bays by additional 48m, Laying of Rail Track (110m long) for Battery Operated Trolley-20T, Development of supporting services including offices, toilets, drainage, sewage etc.	12 Months	Total estimated Cost of Structural & Civil Works (excluding Cost of Cement & Steel) – Rs.9.00 Crores approx.	Rs.2 Lakhs (2,00,000) To be accompanied with techno-comm. bid (Part 1)	02/06/2011 Till 4:00PM	03/06/2011 by 1:30 PM	03/06/2011 at 2:30 PM

Cost of tender documents: **Rs.1000/-**

Name & Signature of Bidder

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Address for submission & opening of Tender:

If through courier;

Office of Senior Manager (Maint.)
BHEL, HERP, Tarna, Shivpur
Varanasi-221003(UP)
Fax : 0542- 2282239

If delivered in tender box;

Tender Box Provided At
Administrative Building
M.M. Department,
BHEL- Varanasi- 221003(UP)

The tender document can be downloaded from our website www.bhelherp.com or www.bhel.com. Bidders downloading the tender document may enclose the cost of tender along-with the techno-commercial bid in form of DD (preferably from SBI) drawn in favour of "BHEL" payable at Varanasi. Tender document can be obtained in person by contacting office of the Senior Manager (MAINT.) along-with request letter and tender cost. Your offer is to be submitted in two parts in two separate sealed envelopes properly marked "Part-I Techno-Commercial Bid, TENDER No. HERP/CIVIL/ CAP./45/11-12" & "Part-II Price Bid, TENDER No. HERP/CIVIL/ CAP./45/11-12" respectively and these two envelopes to be put in third sealed envelope properly marked:

"Tender for Construction of production shop, open gantry, material gate, extension of existing three production bays, laying of rail track for battery trolley etc. TENDER No. HERP/CIVIL/ CAP./45/11-12 dated: 04/05/2011 **Due date: "03/06/2011"**."

Part-I Techno-Commercial bid:

Techno-commercial bid must be accompanied with requisite earnest money deposit. Part-I of the sealed tenders alone will be opened by BHEL 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 (/).

NOTE: Contractor has to submit bar chart/ pert chart (L1 Chart) along with techno- commercial bid.

Part-II Price bid:

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

All Errata / Addendum / Extension etc. shall be published in the above web page only.

IMPORTANT NOTE: Bidders who have deposited Earnest Money of Rs 2.00 Lacs against our earlier Tender Notice No. HERP/CIVIL/ CAP./41/11-12 dated: 23.02.2011 and are desirous to participate against this tender, need not deposit Earnest Money Amount again. Such bidders may submit a request letter for considering the EMD amount deposited against this tender.

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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



Brief Description of the Project

The scheme is conceived to create a new Fabrication Shop to accommodate existing fabrication facilities after shifting them from existing machine shop and to facilitate storage & handling of MS plates, Bars etc. An open gantry is conceived for storage & handling of other input material including some finished items. Extension of all the existing three production bays by additional 48 meters to be completed to create additional space for assembly area and for shipping activities. Other infrastructural development relates to development of New Material Gate along with security room and laying of Rail Track for operation of Battery operated Trolley capacity 20T along with other supporting services. Brief description of the works is given below. The description is indicative but not exhaustive. Actual design, drawings, specifications and Bill of Quantity (BOQ)-preparation are already entrusted to a qualified consultant. The details mentioned below may change after the consultant submits the same. **The Schedule of quantities attached along-with this tender is tentative and may change during execution of the project.** The scope of work may increase or decrease depending on the circumstances and the performance during the progress of the works.

01. **Production (Fabrication) Shop:**

The shop shall be of steel structures resting on RCC Foundations with provision of EOT cranes.

- (i) Size: 200 M(L) x 20M(W) X 15M(H) Approx. (Centre to Centre dimension).
- (ii) EOT Crane rail height from finished floor level- 7-8 meters (approx.).
- (iii) EOT Crane payload- 1 x 30 Tons+ 1 x 10 Tons.
- (iv) Cable Trench
- (v) Office, Toilets & Drainage.
- (vi) Rail track for linking Open Gantry.

02. **Open Gantry:**

The Open Gantry shall be of steel structures resting on RCC Foundations with provision of EOT cranes in the gantry. The Open Gantry & Fabrication shop is having common structural columns at one side.

- (i) Size: 200 M(L) x 20M(W) X 8 M(Height of the rail) (Centre to Centre dimension).
- (ii) EOT Crane rail height from finished floor level – 8 meters (approx)
- (iii) EOT Crane payload- 2 x 10 Tons.
- (iv) Drainage.
- (v) Concrete Flooring.

03. **Extension of the existing three Production bays:**

The extended bays will be similar to the existing one and shall be of steel structures resting on RCC Foundations with provision of EOT cranes.

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Bay-I:

- (i) Size: 48 M(L) x 17.5 M(W) X 14M(H) Approx. (Centre to Centre dimension).
- (ii) EOT Crane rail height from finished floor level- 7-8 meters (approx.).
- (iii) EOT Crane payload- 2 x 10 Tons + 1 x 5 Tons.
- (iv) Cable Trench

Bay-II:

- (i) Size: 48 M(L) x 18 M(W) X 16.5 M(H) Approx. (Centre to Centre dimension).
- (ii) EOT Crane rail height from finished floor level- 8-9 meters (approx.).
- (iii) EOT Crane payload- 1 x 20 Tons+ 1 x 2 Tons.
- (iv) Cable Trench

Bay-III:

- (i) Size: 48 M(L) x 24M(W) X 20.5 M(H) Approx. (Centre to Centre dimension).
- (ii) EOT Crane rail height from finished floor level- 13 meters (approx.).
- (iii) EOT Crane payload- 1 x 75 Tons + 2 x 10 Tons.
- (iv) Cable Trench

04. Material Gate:

The Material Gate shall be constructed with provision of Security Room.

- (i) Boundary wall Size: 2.1 M x 60M (Approx. Long alongwith fencing).
- (ii) Approach area Concrete Platform.
- (iii) Waiting Platform for trucks.
- (iv) Development of approach road from highway.

05. Rail Track:

The Rail Track shall be constructed for the operation of Battery Operated Transfer Trolley Capacity 20 T. The Rail Track to be constructed between Production (Fabrication) shop and Main Stores platform.

- (i) Length of Rail Track: 110 meters approx.
- (ii) Gauge of Rail Track: 1.67 meters (Broad Gauge).

Any other allied rooms / sheds / structures & allied services like roads, drainage, water supply lines, water supply line for fire fighting, rail line, rain water harvesting structures etc. which are necessary to complete the project inside / outside the shops.

The above description is only brief to give the tenderers an insight into the broad scope of the work. This description cannot be used by the successful contractor to refuse any other work but not stated explicitly. The scope of work may increase or decrease depending on the details submitted by our consultant, actual circumstances, BHEL management decisions and the performance of contractor during the progress of the works.

QUALIFYING CRITERIA

Qualifying Criteria from sl no (1) to (3) as mentioned below has to be fulfilled for technical suitability of the offers submitted by bidders:

- (1) The Bidder should have an Average Annual financial turnover during the last 3 years, ending 31st March 2011 not less than Rs.270 Lakhs as per audited accounts. In case the accounts of 2010-11 remains unaudited, then the turnover of 2009-10 & two years prior to that, which have been audited shall be considered for averaging the last three years turnover.
- (2) The bidder should have the experience of successfully completing similar works during the last seven years ending 30.04.2011 with either of the following.
 - a) Three similar completed works costing not less than the amount equal to Rs.360 Lakhs (excluding cost of Cement & Steel) each.

Or
 - b) Two similar completed works costing not less than the amount equal to Rs.450 Lakhs (excluding cost of Cement & Steel) each.

Or
 - c) One similar completed work costing not less than the amount equal to Rs 720 Lakhs (excluding cost of Cement & Steel).
- (3) Bidder must have executed at least one contract during last seven years ending 31st March 2011 comprising not less than 600 MT of Steel fabrication & 3000 Cubic Meter (Cu.M) of Concrete Work (PCC + RCC)

Definition of similar work(s): Only the following will constitute similar works:
Industrial sheds and workshops made of RCC/Steel Columns/Beams.

Notes:

- (A) The Bidder must submit their documentary proof in support of each of the above conditions along with the techno commercial bid Part-I, failing which BHEL reserves the right to reject the offer.
- (B) Bidder may attend Pre-Bid discussion on 18th & 19th May'2011 from 10 a.m. to 3 p.m. with prior appointment in their own interest. Any doubts will be clarified during the pre-bid discussions and guidelines will be given to the bidder for specialized works.
- (C) Complete tender specifications along-with schedule of work is available in BHEL web site www.bhelherp.com and www.bhel.com.
- (D) No conditional tender will be accepted.
- (E) Evaluation and finalization of lowest bidder will ordinarily be done on overall lowest cost basis jointly for scheduled and non-scheduled items of total work.
- (F) While quoting percentage (%) premium over total amount of scheduled items for Civil Works in the Price Bid, parties may take a note that the cement & reinforcement steel is free supply by BHEL.



TIME SCHEDULE OF COMPLETION

The completion of various activities of the project will be as follows.

Sl.No	Description of Activities	From the 15 th date of LOI
1	Site clearance, Layout of production shops & allied utilities, Excavation of column foundations etc.	1.5 months
2	Casting of all column foundations.	4.0 months
3	Fabrication of all major structural components like columns, girders and trusses.	5.0 months
4	Erection of all structures.	7.5 months
5	Roof sheeting and cladding.	8.5 months
6	Balance works like brick work, electrification & plumbing, plastering, down-take pipe & floorings.	10.5 months
7	Completion of supporting services viz: material gate, offices, approach roads, restoration of boundary walls, laying of rail track, water supply, drainage, final painting of structure & building etc.	12.0 months

Note: Bidder should submit their Bar-chart/PERT chart (L-I Chart) along with Techno-Commercial bid.

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SPECIAL TERMS & CONDITIONS

- (1) Interested bidders are advised to visit the site of work before submission of tender for which advance intimation shall be given to Sr. Manager (Maint.).
- (2) **REVERSE AUCTION (RA)**
 - (2.1) BHEL may go for Reverse Auction (on line bidding on Internet) in addition to the submitted sealed price bid. The decision to go for Reverse Auction will be taken after techno-commercial evaluation. Information and general terms and conditions governing RA are given below.
 - (2.2) For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
 - (2.3) BHEL will engage the services of a Service Provider who will provide all necessary training and assistance/ demonstration before commencement of on line bidding (Reverse Auction) on internet.
 - (2.4) BHEL will inform the Contractors in writing the details of Service Provider to enable them to contact for training/ demonstration.
 - (2.5) Business rules like event date, time, start price, bid decrement, extensions etc. also will be communicated through Service Provider for compliance.
 - (2.6) Contractors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse Auction. Without this, the contractors will not be eligible to participate in the event.
 - (2.7) BHEL will provide the calculation sheet which will help the Contractors to arrive at "Total Cost to BHEL" by including items like Taxes and Duties and loading factors (for non-compliance to BHEL Commercial terms & conditions, if any) for each of the Contractors to enable them to fill-in the price and keep it ready for keying in during the Auction.
 - (2.8) Reverse auction will be conducted on a scheduled date & time.
 - (2.9) At the end of Reverse Auction event, the lowest bid value will be known on the network.
 - (2.10) The lowest bidder has to fax the duly signed filled-in prescribed format as provided to BHEL through Service Provider within 24 hours of Auction without fail.
 - (2.11) The initial on-line bid value must be equal to or lower than the amount mentioned in the Price Bid. The tenderer may be disqualified on their failure to comply the above stipulation.
 - (2.12) In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids already submitted and available with BHEL shall be opened as per BHEL's standard practice.
- (3) **The contractors are required to confirm/ submit the following along-with Part-I bid for each of the following :-**
 - (3.1) Capability to deploy man power and infrastructure to undertake at least 200 MT of steel fabrication per month and at least 1000 Cu. Mtr. of RCC work per month.
 - (3.2) Details of manpower, machinery, equipment and infrastructure including batch mixing plant, excavators, cranes, hydra, dumpers, transport vehicles, trucks etc to complete the work as per the above mentioned schedule.
 - (3.3) Submit detailed bar chart of activity schedule for completion of the project as per the specified time schedule. Adherence to time schedule for each activity being of prime importance.
 - (3.4) Project manager (having Civil Engineering graduation with sound knowledge of fabrication and erection of steel structure) 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-I bid. The technical team of the contractor should have knowledge to handle the fabrication steel structure if required to modify at site for betterment of work.

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- (3.5) In view of the urgency for completion of work the contractor must ensure daily work for at least 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.
- (3.6) Construct 2 nos. water proof sheds for accommodating at least 1000 cement bags each. The flooring and storage of cement bags shall be such that ingress of moisture from floors shall be prevented.
- (3.7) Field laboratory with test equipment necessary shall be established. Concrete cubes (12 nos.), slump test apparatus, sieves, DP test materials, level checking instrument etc. shall be arranged at site by the contractor, before start of appropriate work.
- (3.8) As the construction site is inside BHEL premises under security, contractor shall have to 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.
- (4) The bidders have the option to have pre-bid tie-up with firms having competence in respective fields to complete the work within specified time frame maintaining quality standards. The lead partner must meet the average annual financial turnover requirements mentioned in (1) of qualifying criteria. He should undertake project management, monitoring & technological inputs. The lead partner shall be responsible for coordination with his tie-up partner/suppliers, assessment of their quality of workmanship and their payments, ensuring timely completion of work and submission of bills to BHEL. The qualifying criteria No.(2) will have to be met by the other partner alone. The tie-up agreement will have to be submitted along with techno-commercial bid. The other partner cannot be changed during the period of contract without the written consent of BHEL.
- (5) The successful bidder will be required to comply with all the rules & regulations of U.P. Categorical confirmation is required that contractor will fulfill all the requirements applicable to this type of work in U.P including any new registrations etc.



INSTRUCTIONS TO TENDERERS

1.0 The **Techno-Commercial bid** comprising (i) all its sections, (ii) all enclosures in support of various clauses and requirements and (iii) EMD, shall be duly signed and sent in a sealed envelope boldly super-scribing **“PART-I TECHNO-COMMERCIAL BID FOR”**. Similarly the **Price-Bid** must be duly signed, sealed and sent in a sealed envelope boldly super-scribing **“PART-II PRICE BID FOR Construction of Production Shop, Open Gantry, Material Gate, extension of existing three Production Bays, laying of Rail Track for Battery Trolley etc.”**. Both these envelopes shall be placed inside 3rd sealed envelope super-scribing” duly signed, sealed and sent in a sealed envelope boldly super-scribing **“Construction of Production Shop, Open Gantry, Material Gate, extension of existing three Production Bays, laying of Rail Track for Battery Trolley etc.”**.

2.0 The tender shall be addressed to as follows :

**Senior Manager (Maint.)
BHEL, HERP,
Tarna, Shivpur,
Varanasi - 221003**

Sealed Tenders can be submitted (i) personally, (ii) by Courier, or (iii) by post.

If through courier or post;
Office of Senior Manager (Maint.)
BHEL, HERP
Tarna, Shivpur,
Varanasi
U.P.-221003
Tel: 0512-6545326/6545324,
Fax: 0542- 2282239

If delivered in tender box;
Administrative Building, M.M. Deptt.
BHEL, HERP
Tarna, Shivpur,
Varanasi
U.P.-221003

- 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.
- 3.0 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.
- 4.0 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 and obtain clarification during the pre bid meeting.
- 5.0 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 labour. No claim will be entertained later on grounds of lack of knowledge after submission of the tender.
- 6.0 Tenderer must fill the schedules and 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.
- 7.0 The tenderer may 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

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- 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.
- 8.0 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.
- 9.0 **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 Status 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 (/).
- 9.3 **PREVIOUS EXPERIENCE:**
A statement giving particulars (duly supported by documentary evidence) of the various job executed /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 the Engineer and other personnel present at senior level in the roll of the company as on 30.04.2011.
9.4.2. Details of construction 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/ CEO of company/ partner in case of proprietorship firm 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 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 given formats only (in the form of separate sheets) failing which the tender may be considered as

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- incomplete and is liable for rejection. Documentary, proofs wherever necessary also need to be enclosed.*
- 9.13 Workman's compensation insurance policy copy covering injury and life risk of the worker while at work must be attached.
- 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: Cheques, Money Orders or Postal Orders will not be accepted.)
- 10.1 **Cash:** The amount should be tendered by the party to the Cashier of Bharat Heavy Electricals Limited VARANASI and cash receipt issued by him shall be enclosed along with the tender as permissible under **IT, Act. OR**
- 10.2 Demand Draft from any Nationalized Bank in favour of Bharat Heavy Electricals Limited, VARANASI.
- 10.3 Tenders received without Earnest Money in full in the manner prescribed above will not be considered.
- 10.4 The Earnest Money Deposit of the successful tenderer shall be converted & adjusted against security deposit.
- 10.5 In the case of unsuccessful tenderers, the Earnest Money will be refunded to them after finalization of the tender.
- 10.6 BHEL reserves the right of forfeiture of Earnest Money in case the tenderer:
- 10.6.1 Submits false information.
- 10.6.2 After opening of Tender, revokes/withdraws his tender within the validity period or revises/alters his earlier quoted rates/conditions.
- 10.6.3 Fails to commence the work within fifteen days from the date of issue of 'letter of intent'.
- 10.6.4 Fails to submit 50% of the total security deposit amount before start of work.
- 10.6.5 Fails to start the work as may be indicated in the Letter of Intent.
- 10.7 EMD to be submitted along with techno commercial bid only and not with price bid.
- 10.8 No adjustment of earlier EMD/Security deposit available with BHEL, Varanasi, if any, shall be permitted.
- 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 6 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 and payable against documentary proof.
- 12.2 The quantities mentioned are tentative and liable to change after submission of the same by our consultant, and in the course of actual execution.
- 12.3 Payment under this contract shall be released as per General Condition of Contract(GCC) BHEL, Varanasi as per schedule of activities on their satisfactory completion against the invoices supported by necessary documents after effecting due deductions.
- 12.4 Schedule A is divided into two; Section A and Section B. **Section 'A' is the list of CPWD, DSR 2007 (Reprint 2010) scheduled items. Section 'B' is the list of Non-Schedule items which are not in CPWD, DSR 2007. For scheduled items covered under section 'A', percentage (%) premium/At Par/ discount over DSR 2007 rates is to be quoted by the party. For Non-Schedule items covered under section 'B', item rates are to be quoted against each item in Indian Rupees by the parties. No item should be left blank.**

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- 12.5 **The lowest bidder will be evaluated on overall lowest cost basis taking section A & section B together.**
- 12.6 No advance payments will be made.
- 12.7 Rates should be kept valid for 6 months.
- 13.0 **EXECUTION OF CONTRACT:**
The successful Tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent by Bharat Heavy Electricals Limited. The successful tenderer shall be required to execute a contract in the 'Prescribed form' as per G.C.C. with BHEL within 15 days 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, if necessary 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 Security Deposit will be deposited within 15 days from the date of issue of letter of intent but before start of work in any one of the following forms.
- 14.1.1 The total Security Deposit as indicated in the Letter of Intent has to be submitted in cash or as per clause 14.1.2 stated as under :
- 14.1.2 The rate of Security Deposit will be as below:
a)Rs 4 lakhs + 5% of the contract amount exceeding Rs 50 Lakhs.
b)The security deposit will be collected before start of the work by the contractor.
c)Security deposit may be furnished in any of the following forms:
(i) Cash (as permissible under the Income Tax Act)
(ii) Pay Order, Demand Draft in favour 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 subject to maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security mentioned in c(i) to c(iv). 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 Sl No (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour 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.
- 14.1.3 The validity of the Bank Guarantee furnished towards Security Deposit under 14.1.2 above shall be up to the date of completion of work as stipulated in the Letter of Intent plus three months claim period.
- 14.2 If the value of the work done at any time exceeds the contract 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.



- 14.3 **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.
- 14.4 Adjustment of Earnest Money Deposit towards part of Security Deposit shall be done as per clause 10.4 above.
- 14.5 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 of their claims relating to the contract, or due from the contractor.
- 14.6 **RETURN OF SECURITY DEPOSIT:**
After 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 returns properties belonging to BHEL taken, borrowed or hired by him/ them 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 the amount of security deposit will be released only after 'defect liability period' of 12 months and on submission of proof of discharge of liabilities under PF, ESI, Service Tax under Finance Act 1994, workman compensation Act and other labour laws etc. In case Bank Guarantee has been submitted towards 50% Security Deposit, the same only will be released retaining the security deposit received in cash or cash equivalent for the above defect liability period. This security deposit portion retained in cash or cash equivalent may also be released provided Bank Guarantee from Nationalized Bank for equivalent amount is submitted by the contractor for the duration of defect liability period plus three months claim period.
- 15.0 No interest shall be payable by BHEL on Earnest Money, Security Deposit or on any money due to the Contractor by BHEL.
- 16.0 **REJECTION OF TENDER AND OTHER CONDITIONS:**
The acceptance or other wise 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.
- 16.1.1 To reject any or all of the tenders.
- 16.1.2 To modify the time for completion suitably.
- 16.2 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.
- 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,

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- 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 should not sub-contract part or complete work detailed in the tender specification without written permission of BHEL. The tenderer is solely responsible to BHEL for the work awarded to him.
- 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 authorised Officers or its Engineer or other employees authorised 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 'instructions and terms & conditions' mentioned in pages 12-62, the latter shall prevail. Where-ever the latter is silent; the former shall be referred to.
- 17.5.1 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 letter of Intent. The responsibility of the contractor commences from the date of issue of this letter of Intent and all the terms and conditions of contract are applicable from this date.
- 17.5.2 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 are found acceptable by the Engineer being of required standard and conforming to the specifications of the contract.
- 17.6 '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.
- 17.7 APPROVED', 'DIRECTED' or 'INSTRUCTED' shall mean approved, directed or instructed by BHEL.
- 17.8 'WORK' or 'CONTRACT WORK' shall mean and include supply of all categories of labour, 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).**

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- 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 and 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 Bank 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 book.
- 20.3 All recoveries due from the contractor for the month/period shall be effected in full from corresponding running bills unless specific approval from competent authority is obtained to the contrary. The recoveries could be I.Tax, VAT, Water, Electricity charges etc. and loss to BHEL Plant & Properties and third party losses.
- 20.4 Measurement shall be restricted to that quantity for which it is required to ascertain the financial liability of BHEL under this contract.
- 20.5 The contractor shall bear the expenditure involved if any, in conducting measurement of the job done. The contractor shall, provide all the assistance with appliances and other thing necessary for measurement or re-measurement.
- 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 45 days for the final bill 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 mobilization, 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 management, 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 date 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
- 21.3.3 Corrupt act of the contractor.
- 21.3.4 Insolvency of the contractor
- 21.3.5 Persistent 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 withdraw 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.
- 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.



24.0 **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 contract work as may be required. 50% of the Security Deposit calculated as per BHEL Policy, shall be retained by BHEL during passing of final bill against the performance guarantee during the defect liability period plus three months of claim period.

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, extend the time for making the award. Work under the contract shall 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.

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TERMS & CONDITIONS OF THE TENDER

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.
 - 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. The Contractor shall obtain license from the appropriate Labour Commissioner's office, of appropriate Government if he engages 20 (Twenty) or more workmen only.
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. Contractor shall obtain complete bio-data of the labour, employment certificate and Antecedent verification in the prescribed form for each labour and supervisor engaged by him and shall submit the same to the HR Department / IR section through the contract executing officers before commencement of the work.
6. The Entry permits are to be issued to the Contract Labour by BHEL Security, based on the requisition submitted by Contract Executing Officer and forwarded by Head (HR).
7. Every contractor shall submit a notice regarding commencement and completion, of work in form – VI A&B [Rule 25 (VIII) & 81 (3)] to HR Department, IR section through his contract executing officer, for forwarding the same to State Labour Department.
8. The contractor shall make himself or his representative available at the work spot everyday during execution of work, for effective supervision.
9. 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.

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10. Non – compliance of any provisions under any Act/ rule/ instructions/ guidelines shall make the contractor liable for penal action including termination of contract.
11. 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.
12. 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 before entering into the contract. 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.
13. 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.
14. 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.
15. 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.
16. The contractor shall give all notices required by the applicable laws, regulations, bye-laws 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 as part of judicial proceedings are made against materials or work forming part of the contract 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,
17. 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 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.
18. 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.
19. No work shall be done on Sundays or on other declared holidays of the company without the written permission of the company officer incharge of the work. The contractor shall comply with the provisions of the Factories Act Rules framed there-under if the same are applicable.
20. The contractor shall keep his work place clean and safe to avoid injuries to men and damage to finished products/ equipments.
21. 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 incharge of the work.

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22. 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.
23. The contractor shall ensure adherence to all statutory requirements applicable to BHARAT HEAVY ELECTRICALS LIMITED, VARANASI.
24. 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.
25. The contractor shall comply with provident Fund Act either through PF code allotted to him or by the code provided by PF Department to work centers in the Civil Deptt. of B.H.E.L. Varanasi.
26. 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.
27. The contractor should engage only those labours who shall be more than 18 (eighteen) years of age.
28. The contractor shall not resort to sub-contracting under any circumstances. If found sub-contracting at a later date, BHEL reserves the right to take whatever action it deems fit, including cancellation of the contract.
29. The contractor shall provide the required safety equipment to labours engaged by him.
30. Contractor shall issue "Employment Card" as per statute to all the labour and supervisors covered under the job work contract.
31. The contractor shall be responsible to settle any grievances of the labour deployed by him/ her.
32. 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.
33. The quantities mentioned in the agreement schedule are worked out from the relevant drawings in the company and may not be the actuals required for execution. The BOQ attached with this tender is tentative and may change after submission of the same by the consultant.
34. 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.
35. 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.
36. For all modifications, omissions or additions to the approved drawings and specifications, the company shall issue revised plans or written instructions.
37. The company shall have the privilege of ordering modifications, omissions, or additions at any time before completion of the work.
38. 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.
39. Sample of materials shall be furnished by the contractor at his expense to the company when called for before execution of any work.

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40. 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 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.
41. 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.
42. The decision of BHEL(HERP) in respect of the rate of progress and the quality of work or material shall be final.
43. Contractors 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.
44. If at any time, during the progress of work, methods or equipment employed by the contractor 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 take appropriate action so as to ensure the desired progress and/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 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.
45. 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/ deposit the charges that may be fixed or determined by the company for any such articles or machinery lent or given on hire to the contractor. See schedule "C".
46. Any electric power required for contractors' lighting/ machinery for the purpose of work 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 free of cost. If it is observed that power 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 applicable for industrial consumption in U.P.
47. The contractor shall conform 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.
48. 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.
49. 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.
50. 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.
51. 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.
52. In case of any suit or other legal proceeding arising under this contract, the courts at Varanasi (UP) only shall have the Jurisdiction.



53. The company reserves the right to enter into parallel agreement with one or more contractor(s) at its discretion.
54. Disputes, grievances between the contractor and his labour, will have to be settled by the contractor himself/ herself.
55. The labour 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 labours 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.
56. Wherever, BHEL/ COMPANY standards are mentioned, same shall be strictly followed.
57. 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.
58. The works have to be carried out as per CPWD Specifications 1977, Wherever CPWD specifications are silent, the work shall be carried out as per BIS specifications. In case of any defect, 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.
59. 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. The empty cement bags shall be stocked at one place and at least 90 % of them shall be returned to BHEL at BHEL stores in good condition without any payment therefore. If total quantity of 90% empty cement bags is not returned by the contractor, the same will be recovered at the rate of Rs 3/- per bag from the bills.
60. All recoveries due from the contractor for the months /period shall be effected in full from running bills and other dues of the contractor unless specific approval from competent authority is obtained to the contrary. The recoveries interalia will be I.Tax, WCT and other statutory levies at applicable rates, Water & Electricity charges etc. and any other levies statutory or non statutory paid/ incurred by BHEL on account of the contractor.

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

II) Special Instructions:

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. Time is the essence of the Contract. Therefore the Contract must be completed within the stipulated contract period.
3. The rates quoted by the contractor shall remain firm for the contract period.



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 (As per audited account). Year 1 Year 2 Year 3	Rs. Rs. Rs.
3.	Value of fixed Assets of the business in last three years. Year 1 Year 2 Year 3	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 (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:	

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

Name & Signature of Bidder

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ANALYSIS OF SIMILAR JOBS EXECUTED/IN PROGRESS

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

Name & Signature of Bidder

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TENDER NOTICE NO. HERP/ CIVIL/ CAP/ 45/ 11-12

DECLARATION SHEET

I,on behalf of M/s.....
..... hereby certify that, all the information and data furnished by us
with regard to this Tender No. HERP/CIVIL/ CAP./45/11-12 is 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.

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

Date

Name & signature of the bidder
(Seal)

Name & Signature of Bidder

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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 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 EMD submitted (By cash/ Bank 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 labour license no. & date	
18.	Blank price-bid, clause 9.2	
19.	Bar chart/ PERT Chart (Time schedule)	

Name & Signature of Bidder

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CONTRACT

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

THIS AGREEMENT MADE THIS..... DAY OF
20.... 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, annexures, 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.

The Contractor has furnished a Guarantee bearing No..... Dated for a sum of Rs..... (Rupees.....) executed by Bank 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.....

Name & Signature of Bidder

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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.

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
 - (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.



(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 - 221003 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

1. 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, 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 ir-respectable 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, form 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 form 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

Name & Signature of Bidder

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conditions of the Contract have been fully and properly carried out by the contract 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 force 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 the 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)

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 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 first 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 non-judicial stamp.

Name & Signature of Bidder

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TENDER NOTICE NO. HERP/ CIVIL/ CAP/ 45/ 11-12

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.....dated _____but 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) 1976 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

.....



BHARAT HEAVY ELECTRICALS LIMITED-VARANASI
(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 dismantling of brick work is carried out at height more than 1.80 M.
4. Reinforced cement concrete slab should be dismantled parallel to the main reinforcement, each piece not exceeding 300mm wide. Under no circumstances the supporting wall shall be cut or removed until the supporting slab is demolished.
5. The contractor shall keep supply all safety equipment like safety boots, goggles, helmets and safety belts, to all the workers.
6. The contractor shall keep a supervisor always at work site.
7. Power shut down shall be taken before commencement of the work wherever power cables are running.
8. Proper and necessary scaffolding and ladders are to be used for carrying out all types of works.
9. 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.
10. 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.
11. 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.

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.

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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:

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.

Name & Signature of Bidder

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7. Ladder should not be placed on loose bricks or loose packing.
8. Except when there is an adequate handled, ladder must rise to a height of a 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 held.
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 upright 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.
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.

LIFTING TACKLES/CRANES

Lifting roof trusses should be undertaken after discussing the procedure with BHEL taking all necessary care to prevent accidents.

MATERIAL HANDLING AND STORAGE

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

ACCOUNTING

Proper method of accounting of steel, tore steel, cement & scrap material be followed. The books of such accounting be 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.

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.

Incase 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.

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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. 360 – 1973: Method of testing fusion welded joints & weld (Or latest) metal in steel.
6. I.S.102 – 1992: Ready missed paint, brushing red lead non-silting (Or latest) priming.
7. I.S.1363 –1957: Black hexagonal bolts, nuts, etc. (Or latest).
8. I.S. 813 –1961: Scheme of symbol for welding (Or latest).
9. I.S. 1161 : MS Tubes Roof covering:
10. I.S. 3007–1964: Code of practice for laying of corrugated sheets (Or latest).

II. Design codes:

1. I.S. 800 – 1975 (Or latest)
2. I.S. 875 – 1964 (Or latest)
3. I.S. 456 – 1978 (Or latest)

III. Any relevant I.S. code of practices.

IV. CPWD & NBC standard for building.

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SPECIFICATIONS FOR EXECUTION OF WORK

1. The work under this contract comprises of fabrication of steel work, testing, transporting and erection of steel work over prepared foundations, painting of steel work and erection of cloaking items as detailed in Price Schedule 'A'.
2. Fabrication of steel work shall be done in accordance with shop working drawings on the basis of drawings furnished by Bharat Heavy Electricals Limited.
3. Further particulars relating to design and fabrication or clarifications, if any, may be obtained on reference to the Sr. Manager (Maint.).
4. Fabrication shall generally be in accordance with IS 800-1962 entitled "Code of practice for use of structural steel in general building construction". Welding shall be in accordance with IS 816-1956 entitled "Code of practice for use of metal arc welding for general construction in mild steel". Any specification not covered by the relevant Indian Standards Codes of practice shall be in accordance with the relevant B.S.S. **or in its absence in accordance with well-established Standards Engineering Practices.**
5. As the designs inclusive extensive welded fabrication, it is essential that the fabricator should have a well equipped workshop and equipment such as Automatic and Semi-automatic welding sets etc., and also qualified welders possessing operator qualification as required by I.S. 817-1957.
6. All Fabricated steel work shall be given a coat of Red Oxide paint as per relevant I.S. specifications before dispatch if assembled at shop or after assembly at site as the case may be.
7. The contractor shall stack all items of fabricated steel work at approved locating with due regard to the sequence of erection with consultation of the Engineer-in-charge.

SPECIAL CONDITIONS OF CONTRACT FOR FABRICATION AND ERECTION OF STRUCTURES

1. (a) PLACE OF FABRICATION.
The fabrication is to be carried out within the Bharat Heavy Electricals Limited premises earmarked for the purpose.
(b) SCOPE OF FABRICATION
For all structure steel construction the general specification of BHEL shall be followed.
Structural Steels only shall be provided by BHEL at Free of cost. All other items are in the scope of Contractor.
2. ACCEPTING OF FABRICATED STEEL FOR DISPATCH:
When all the tests to be performed in the Contractor's or other premises under the terms of this contract have been successfully carried out the material / structure will be accepted, forthwith and the Inspecting Engineer or his duly authorized representative will issue an acceptance certificate, upon receipt of which the material / structure shall be taken out for erection.
3. TESTS AT SITE
In all cases where the contract provides for tests at site, the contractor, except where otherwise specified, shall provide, free of charge, such labour, materials, apparatus and instruments as may be required from time to time, and as may reasonable be demanded to carry out such tests on the materials or workmanship in accordance the contract.
4. TESTS ON COMPLETION:
Where ever possible, all tests shall be carried out before hand. All tests shall be done in compliance with relevant IS codes at the contractor's cost. However, should it become necessary for the final tests (to assess the performance and guarantees to be held over, until the structures are erected at site), they shall be carried out in the presence of the contractor's representatives, within one month of the completion of erection or such

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time as may be considered reasonable by Bharat Heavy Electricals Limited. Should the result of these tests not come within the margin specified, the test shall if required, be repeated, within one month from the date of the structure is again ready for test, and the contractor shall repay the Bharat Heavy Electrical Limited all reasonable expenses which may be put to by such re-tests. Trial assemblies shall be conducted at the site as and when required.

5. ERECTION OF DEFECTIVES STRUCTURE OR PORTION THEREOF

- a. If the completed structure, or any portion thereof, before it is taken under clause below, be found defective or fails to fulfill the requirements of the contract, the Engineer-in-charge shall give the Contractor notice setting forth particulars of such defects or failure, and the Contractor shall forthwith make the defective portions good, or alter the same to make it comply with the requirements of the Contract. Should be fail to do so within a reasonable time, Bharat Heavy Electricals Limited may reject and replace at the risk and cost of the, Contractor the whole or any portion of the structure, as the case may be, which is defective or fails to fulfill the requirements of the contract.
- b. In the event of such rejection, Bharat Heavy Electricals Limited shall be entitled to the use of the structure in a reasonable and proper manner for a time reasonably sufficient to enable them to obtain other replacement of structure.
Nothing in this clause shall be deemed to deprive of Bharat Heavy Electricals Limited, or effect in any way their rights under the contract which they may otherwise have in respect of such defects or deficiencies or in any way relieve the Contractor of his obligations under the Contract.

6. 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.

7. 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 final taking over by the Bharat Heavy Electricals Limited, Varanasi. During this period, the Contractor's liability shall be limited to the replacement immediately, or any of defective parts that may develop in structures or part of a structure of his own manufacturer those of his subcontractors under the conditions provided for by the Contract, and arising solely from structural detailing, workmanship or improper packing provided always that such defective parts as are not repairable at site, and not essential in the meantime in the use of the structure, are returned to the contractor's works unless otherwise arranged.
- 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.

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- 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. 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, but without prejudice to any other rights which Bharat Heavy Electricals Limited may have against the Contractor in respect of such defects.
- e. If the replacements or 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 Engineer-in-charge shall have previously given notice of the contractor to rectify.
8. CERTIFICATE OF THE ENGINEER:
- a. Every application to the Engineer-in-charge. For his certificate for payment, 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.
9. 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 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.
10. 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.

11. TIME AND PROGRESS CHART AND PROGRESS REPORTS

The contractor shall submit the Bar chart/PERT Chart before starting the work. Weekly monitoring of the project is to be carried out. Contractor has to submit the weekly progress reports and any delay should be sorted out so that project should be carried out as per Bar Chart/PERT Chart.

12. 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 reasonable 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.

13. WORK AND SERVICES TO BE PROVIDED BY THE CONTRACTOR FOR ERECTION

The following major items of work and services shall be included in the work to be provided for by the contractor:

- a. All erection work of the structure including site bolts, nuts, rivets etc., final paintings, testing and putting into commission.
- b. Providing of all erection tools and tackle.
- c. Necessary supervisory personnel, tradesman, and unskilled labor.
- d. All consumables materials required for erection such as Electrodes, oil, kerosene, packing etc.
- e. All ladders platforms, temporary supports, safety belts, etc., required for erection, and
- f. All other works and services necessary for the due fulfillment of the contract.

14. 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.

15. WORK AT SITE:

- a. 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.
- b. 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.

16. 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.

17. WITH HOLDING PAYMENT:

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

- a. Defective work not remedied or guarantees not met,
- b. Claims filed against the Contractor.
- c. Failure by the Contractor to make due payment for materials or labor employed him.
- d. Damage to another contractor.

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Then the grounds withholding payments are removed, payments of the amount due to the contractor shall however be made by B.H.E.L.

18. LIENS:

Final payment to the contractor shall not be made until the Contractor shall deliver to BHE LTD, a complete release of all liens 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 money that the latter may be completed to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

19. TIME AND DATE:

The time and date stipulated for progress and completion of the work and the rate of fabrication and erection according to the required sequence and be deemed to be the essence of the contract.

20. SUPPLY OF RAW STRUCTURAL & REINFORCEMENT STEEL:

The raw structural steel sections referred to in Price Schedule 'A' will be supplied at the premises of the Bharat Heavy Electricals Limited, VARANASI. The contractors will take delivery within the time specified by the Engineer-in-charge and arrange for safe loading, transporting the steel sections and unloading and stacking them at their fabrication yard, all at their own cost. The point of supply of steel sections to the contractors will be within a lead of 1 km., from the contractor's fabrication yard.

21. It shall be the sole responsibility of the contractor to ensure accuracy of alignment of steel work before grouting the columns and commencing clocking.

22. ERECTION OF CLOAKING ITEMS.

a. **Roofing sheets, North light curves etc., shall be measured based on actual area covered in roof sides, Gables and Louvers.**

b. Measurement in respect of glazing stated to in Schedule 'A' shall include both wired glass and Aluminium glazing bars with accessories and shall be based.

23. The structural steel has been planned in suitable sizes. Any splicing that may be required due to non-supply of steel in required lengths/sizes shall be done so that requirements as per IS 800-1962 are met with. The contractor shall prepare separate drawings for the same and get it approved by the Engineer-in-charge. Material should be judiciously utilized by the contractor so that minimum scrap is generated. For that matter the contractor shall obtain prior approval of fabrication planning before commencement of work.

24. The quantity of steel indented, covers extra that will usually be involved in cutting and fabrication. In addition there will be extras to cover minor alternations, if any, and also extras arising out of accepting standard lengths in some cases and arising out of accepting minimum to (i.e. minimum of one wagon load) in some cases. The contractor shall arrange to receive all these steel supplied, account for it and keep it in safe custody. The surplus steel, which is represented by the difference between the quantities, received and the sum of quantities in the DODL (Details of dimensional list) shall be returned to Bharat Heavy Electricals Limited on completion of the work.

a. Cut pieces and surplus i.e. RSJ, Channels, angles reinforcement and plates not shorter than half a meter and M.S. plates not smaller than 600 sq.cm.

b. Scrap i.e. RSJ Channels, angles, reinforcement shorter than half a meter and M.S. plates smaller than 600 sq.cm.

The cut pieces and surplus shall be set apart to be returned as "actual". The scrap shall be returned in equivalent weight on actual area of glazing.

25. All materials issued by Bharat Heavy Electricals Limited either as free issues or on cost recovery basis should be returned in kind and in good condition as detailed in respective Clauses.

26. While erecting the structural steel, painting etc., and the contractor should take precautions against any damage to the existing sheeting structure, machinery,

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- equipment services etc., any damage for the same shall be made good by the contractor at his own cost or compensated by him as per the assessment made by the Engineer-in-charge, which is final and binding on the contractor.
27. No extra claim or condition in regard to wages or materials escalation will be entertained and any tender containing such stipulation will be rejected.
28. 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.
29. The quantities indicated in the Schedule 'A' are approximate and liable for variation.
30. The CPWD standard specifications, I.S. specifications for all schedule Items and technical specification for non-schedule items are required to be followed.

SPECIAL CONDITIONS

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. 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 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. A tentative sketch/ drawing of the work is available in the office, which is intended to give a general idea of the work to be executed and is liable for modifications during the actual execution based on the designs prepared and approved by the Competent authority. The detailed drawings shall be provided after obtaining from the consultants.
6. The quantities shown above are approximate and liable for variations and no rate variation is acceptable on this account.
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 (Red oxide) 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 Price Schedule 'A'. 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 @ **Re. 1 per thousand 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 Schedule A, may be finalized as per CPWD Specifications with same premium as finalized in contract agreement or at mutually decided rates.
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.
NOTE: FOR EXECUTION OF ALL SCHEDULED ITEMS CPWD SPECIFICATIONS AND RELEVANT IS CODES ARE TO BE FOLLOWED. FOR EXECUTION OF NON-SCHEDULED ITEMS SPECIFICATIONS ENCLOSED WITH THIS TENDER ARE TO BE FOLLOWED.
25. Inside shops, Rails are required to be fixed in concrete as per the direction of Engineer-in-charge.
26. Inserts are required to be fixed in concrete as per the requirement and direction of Engineer-in-charge.
27. Specialized works are to be executed by specialized agency with the approval of BHEL.
28. Test Certificates are to be supplied for all bought-out items as required by the Engineer-in-charge.
29. Any electric power required for contractors' lighting/machinery for the purpose of work 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 free of cost. If it is observed that power 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 applicable for industrial consumption in U.P.

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



INSTRUCTIONS FOR RAIL JOINTS BY ARC WELDING

Sub: Jointing of rails by arc welding process.

Statement: Generally rails are joined by Thermit welding, but sometimes, it can also be joined by arc welding process with satisfactory results. For this some precautions should be taken during welding which are stated below:

1. For jointing new rails the procedure should be followed which are stated below except grinding.
2. For jointing new rails and used rails the under mentioned procedure should be followed.
3. If longitudinal cracks develop on the surface of the rail, it is advisable to remove at least 2 M from the part and join both ends by arc welding process as shown in the sketch.

Base metal: Rail steel has the following composition:

C = 0.4 to 0.65 % Mn = 0.9 to 1.2 %

Tensile strength = 80 kg/mm²

Filler metal: The electrode (a) Universe or (b) Ferron-5 (low hydrogen) (a) manufactured by M/s. Advani Oerlikon, (b) manufactured by Indian Oxygen is suitable for buffer layer and (a) eltorail – 1 (b) duroid – 1 (Rutile type) of the above mentioned manufactures is suitable for topping.

Action:

1. The grooves have to be marked according to the sketch and prepared machine or by gas cutting torch. If by gas cutting, remove all gas cut burns by a hard steel wire brush, and then the surface of the groove should be cleaned by grinding.
2. Electrode (low hydrogen type) should be dried at a temperature of approximately 180⁰ C – 300⁰ C and the temperature should be maintained during welding.
3. The parts should be pre-heated each sides of the joint by 250 mm to a temperature of 250⁰C – 300⁰C and the temperature should be maintained during welding.
4. Welding should be started with the thinnest rod at the base say 10 SWG (3, 2.5 mm) and gradually used thickest electrode upto 6 SWG (5 mm). Use cattails or upto 5 mm to 8 mm on the top.
5. (a). The groove 1a & 1b to be welded in rotation till top and jobs joined fully,
(b). Groove 2a & 2b at the bottom to be welded with penetration
(c). After wards rail top 3a & 3b to be welded.
6. All slags remaining on any head of welding shall be removed before laying the next host.
7. Current condition DC (+) current range for universe 100-140 for 3, 2.5 mm, 140-190 for 4 mm, 190-250 for 5 mm And 250-330 for 6 mm thickness.

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TECHNICAL SPECIFICATIONS

FOR

CIVIL WORK



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

1.1 Cement

1.1.1 **Standard:**

Cement to be used in the Works shall conform to the following standards:

33 Grade Ordinary Portland Cement	IS: 269
43 Grade Ordinary Portland Cement	IS: 8112
53 Grade Ordinary Portland Cement	IS: 12269
Rapid Hardening Portland Cement	IS: 8041
Portland Slag Cement	IS: 455
Portland Pozzolana Cement(fly ash based)	IS: 1489 (Part 1)
Portland Pozzolana Cement (Calcinated clay based)	IS: 1489 (Part 2)
Low heat Portland cement	IS: 12600
Hydrophobic Cement	IS: 8043
Sulphate resistant Portland cement	IS 12330
Other relevant standards are as follows:	
Method of Sampling Hydraulic Cement	IS: 3535
Methods of Physical Tests for Hydraulic Cement	IS: 4031(Part 1 to 15)
Methods of Chemical Analysis of Hydraulic Cement	IS: 4032

1.1.2 **Supply:**

The cement to be used for the Works shall be Pozzolana Portland Cement (PPC). Supply for cement for the Works shall be arranged by BHEL as per the provisions of the tender. Unless otherwise specified, OPC or PPC shall be supplied in bags containing 50kg each. The storage cement bags should be provided by the Contractor at the site of Works at his own cost, considering IS specifications for storage.

The CONTRACTOR, if asked by the Owner or his representative to provide double locking arrangement, shall do so at his cost. If such an arrangement is made, the key of one lock shall be with the CONTRACTOR and the key of the other lock shall be with the Engineer-in-charge or his representative.

1.1.3 **Tests:**

Cement shall be kept, at all times, in covered storage in an approved manner. No cement shall be kept on the site longer than three months before use. Any cement, which is stored onsite in excess of 28 days, shall be tested in accordance with relevant Standard prior to use.

Sufficient cement for one week's consumption shall at all times be available. Cement shall be consumed in the sequence in which it is received at the store.

The cement store for bagged cement shall be a weatherproof building or shed, ventilated, lit and free of dampness. The size will be sufficient to hold enough cement

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for continuous execution of the works. Bags for cement shall be lined in polythene or other damp-proof material.

Exposed Concrete: Concrete in parts of the Works which remain exposed to view, shall be made from the same batch of cement to ensure that surfaces have a consistent tint or shading.

1.2 COARSE AGGREGATE

1.2.1 STANDARD

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.

Coarse aggregate shall have a specific gravity as per mix design report. Aggregate below this specific gravity shall not be used without the special permission of the Engineer.

Coarse aggregate shall consist of natural or crushed stone, angular in shape with granular or crystalline surfaces or approved river shingle or gravel, rounded in shape. All aggregate shall be clean and free from elongated, friable, flaky or laminated pieces, adherent coatings, clay lumps, mica, organic matter and any other deleterious matter that may cause corrosion of reinforcement or impair the strength and / or durability of concrete. It shall be chemically inert, hard, strong, dense, and durable against weathering.

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".

1.2.2 SOURCE

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

1.2.3 STORAGE

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.

1.2.4 USAGE

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.

1.2.5 **TRANSPORTATION**

During transportation to the site, all aggregates are to be protected from wind-borne contaminants. Should these contaminants be present at the time of delivery to site, then the aggregates shall be washed with water meeting the requirements of the above clauses/gradation. Transport vehicles shall be cleaned from possible contamination due to previous use.

Note: When aggregates have been approved, the entire supply of each type shall be secured from the approved source. Testing shall be carried out at the frequently specified below to ensure that the same quality and grading of the material is being maintained.

Tests shall be carried out at the following frequency:

Tests for clay, silt and dust, moisture content and sieve analysis shall be carried out on every 20 tonnes of fine aggregates and 40 tones of coarse aggregates or as directed by Engineer-in-charge.

Chemical analysis shall be carried out on every 100 tonnes.

1.3 **FINE AGGREGATE**

1.3.1 **STANDARD**

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.

1.3.2 **SOURCE**

Once a specific source of supply of fine 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.

1.3.3 **STORAGE**

Fine aggregates shall be stored at site in adequate quantity on clean and well-maintained hard floor and areas not liable to flooding. Contamination with foreign matter and earth, during storage and while heaping the materials, shall be avoided.

1.3.4 **USAGE**

Fine aggregate shall be thoroughly washed at site with clean fresh water such that the percentage of all deleterious matter is within the permissible limits as laid down in IS 2386 (Part-II).

Screening of sand shall be done, if necessary and as directed by the Engineer-in-charge, to remove all objectionable foreign matter and affecting any grading.

1.4 WATER

1.4.1 STANDARD

Water supplied shall conform to the various provisions detailed under Clause 5.4 of IS 456:2000. Broadly stated, water used for mixing and curing as also for cooling/ washing of aggregates shall be clean and fresh, free from oils, acids, alkalies, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. Sea water or water from excavation shall not be used. And also, this water can be used for mixing grouts, rinsing aggregates.

Potable water is generally considered satisfactory for mixing concrete. As a guide, the following concentration represents the maximum permissible values:

To neutralise 100ml sample of water, using phenolphthalein as an indicator, it should not require more than 5ml of 0.02N NaOH. The test shall be conducted as detailed in Cl. 8.1 of IS3025 (Part 22).

To neutralise 100ml sample of water, using mixed indicator, it should not require more than 25 ml of 0.02N H₂So₄. The test shall be conducted as detailed in Cl. 8.1 of IS 3025 (Part22).The test shall be conducted as given in Cl. 8 of IS 3025 (Part 23).

Permissible limits for solids shall be as given in the table below:

No.	Type	Tested as per	Permissible max. limit
1.	Organic	IS 3025 (Part 18)	200 mg/L
2.	Inorganic	IS 3025 (Part 18)	3000 mg/L
3.	Sulphates (as SO ₃)	IS 3025 (Part 24)	400 mg/L
4	Chlorides(as Cl)	IS 3025 (Part 32)	2000 mg/L for concrete not consisting of embedded steel and 500 mg/L for reinforced concrete work
5.	Suspended matters	IS 3025 (Part 17)	2000 mg/L

1.4.2 STORAGE

Water shall be so stored that it remains free from all deleterious matter as mentioned above.

1.4.3 TESTS

No water shall be used until tested for its chemical and other impurities in accordance with IS 3025 to ascertain its suitability. Tests shall be conducted whenever the source is changed or during seasonal variation.

1.5 STEEL REINFORCEMENT

1.5.1 STANDARD

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.

1.5.2 **SUPPLY**

All reinforcement steel (excluding binding wire) shall be issued by BHEL free of cost as per the provisions of the tender.

1.5.3 **STORAGE**

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.

2.1.1. **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-in-charge.

2.1.2. **CONSTRUCTIONAL PLANT**

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 to be made available.

2.1.3. **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.

2.1.4. **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.

2.2. **CONCRETE – PLAN AND REINFORCED**

2.2.1. **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.

2.2.2. **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 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 Codes:	Reference	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)

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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

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:

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.

2.2.2.09 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):

Cement (1 bag, sealed)

Sand (2 bags, dry)

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

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

Superplasticizer (if proposed) (1 Lts, with product literature)

Compressive Strength achieved for 3, 7 and 28 days

Superplasticizer 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 superplasticizer)

Note:

1. The use of plasticizer/superplasticizer may not be allowed by the Owner/Consultant.
2. The base material of plasticizer/superplasticizer may be specified by the Owner/Consultant.
3. If superplasticizer 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 superplasticizer it shall be minimum 25 to 30%.

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4. For the approval of superplasticizer, 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/Superplasticizer".

2.2.2.010

Acceptance criteria of mix design and approval of plasticizer / superplasticizer:

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 authorisation 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.
Strength Requirement	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. 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. No allowance shall be paid for difference of cement content from the actual consumption of the base cement content used for the analysis. The variation in cement content with the assumed cement content (taken for analysis) will be applicable after the approval of mix design.
Workability	Initial Slump: 75-80mm After 60 minutes: 25-30mm. If the retention is not obtained, the Contractor may propose the use of superplasticizer.
Plasticizers/Superplasticizers	The trials for the performance check of plasticizers/ superplasticizers will be conducted. The other requirements will be the same as mentioned above, but the numbers of trials are restricted to three different doses. For any approval of any mix, the two additional confirmatory trials will be required (of same mix and dose).

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Responsibility	The responsibility to prepare mix design and submission for approval shall be of the Contractor and no reminders will be given by the Owner. Irrespective of the approval, the Contractor 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.
Review of Mix Design	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.

2.2.3. NOMINAL MIX CONCRETE

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.

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	-

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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	-	-	-	-

2.2.4. **QUALITY ASSURANCE MEASURES**

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 fulfill the requirements detailed under Clause no. 10.1 of IS 456-2000.

2.2.5. **PROPORTIONING AND BATCHING**

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
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

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Fine Aggregate:

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

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 2 and Zone 3.
- Fineness modulus of sand shall be between 2.5 and 3.25.

Sand for Plaster shall comply with IS 1542

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

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 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 superplasticizer 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
<p>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 IS 456:2000 shall be followed in such case.</p>		



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 so fitted 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.

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, plasticisers and superplasticisers shall be restricted to 0.5, 1.0, and 2.0 percent respectively by weight of cementitious materials, unless a higher value is permitted by the Engineer-in-charge. Actual doses shall be worked out after trials.

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

2.2.6. 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 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 shoveling.

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.

In vertical members like walls, columns, 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.

2.2.7. **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, Roding 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.

2.2.8. **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.

2.2.9. **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".

2.2.10. **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.

2.2.11. **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.

2.2.12. CONSTRUCTION KEYS AND JOINTS

Concrete shall be placed without interruption until completion of the part of the work between predetermined constructions 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 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 condition when fresh concrete is placed, against it. Fresh concrete should be thoroughly vibrated near construction joint so that mortar from new concrete flows between large aggregates and develop proper bond with old concrete.



2.2.13. 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 1 to 0.1 1	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 will the following:

Quality of concrete in the Work, m ³	Number of samples
1 – 5	1
6-15	2
16-30	3
31-50	4
51 and above	4 plus one additional sample for each additional 50 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.

2.2.14. **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.

2.2.15. **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 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-in-charge. All fillings shall be tightly bonded to the concrete and shall be sound, free from cracks after the fillings have been cured and dried.

2.2.16. **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:

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 leveled 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 smoothed 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 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.

2.3. **FORMWORK**

2.3.1. **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.

2.3.2. **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.

2.3.3. **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/re-doing the work, etc., shall be made to the Contractor's account. For details regarding design, detailing, etc., reference may be made to IS 14687.

2.3.4. **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.

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.

2.3.5. **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.

2.3.6. **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.

2.3.7. 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.

2.3.8. 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.

2.3.9. WALL TIES

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

2.3.10. 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.

2.3.11. 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 therefrom.

In no circumstance shall forms be struck off until the concrete reaches 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 off formwork.

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

Type of formwork	Period
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



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

2.3.12. **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:

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 max. 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).

2.3.13. **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.

2.3.14. **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 require 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.

2.4. **REINFORCEMENT**

2.4.1. **FABRICATION**

Bar bending schedule shall be prepared by the CONTRACTOR and approved by consultants/ 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

Name & Signature of Bidder

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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.

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

2.4.2. **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.

2.4.3. **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.

2.4.4. **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.

2.4.5. **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.

2.4.6. 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	½" to 1"	10 3.25 mm. (0.128)	} As specified by the manufacture of Electrodes
25 to 32	1" to 1 ¼" Double bevel	8 4.06 mm. (0.160)	
		10 3.25 mm. (0.128)	
32 to 50	1 ¼" 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:

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 soft 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.

2.5. **STRUCTURAL STEEL**

2.5.1. **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 architects or 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.

2.5.2. **GENERAL**

Full facilities shall be provided to enable the architect or 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.

2.5.3. **MATERIAL**

All raw materials are to be supplied as per schedule- B by BHEL.

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 Architects or 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.

2.5.4. **TESTING AND INSPECTION**

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

2.5.5. **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 architect and 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 centers 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 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.

2.5.6. **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 & flatter 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 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 girders and rails requiring higher accuracy wile 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 leveling, 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.

2.5.7. **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)

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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 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 at least 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.

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.

2.5.8. **ANTI-CORROSIVE TREATMENT**

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 coverage of 80-90 sq.ft./ltr. for single coat. For 2 coats it will be 40-45 sq.ft./ltr. Apply two coats at an interval of 16-20 hrs.

Note: In execution of civil works CPWD latest specification is to be followed first : if CPWD specification does not provide details of specification of any item of work then best of the other specification to be followed.



SCHEDULE 'B'

FREE ISSUE OF MATERIALS TO THE CONTRACTOR

Sl.No.	Materials	Rates
1.	CEMENT	FREE OF COST
2.	Structural steel	FREE OF COST
3.	Reinforcement steel	FREE OF COST
4.	M S Pipe 110 mm diameter	FREE OF COST

PUNITIVE RECOVERY RATE FOR FREE ISSUE MATERIALS:

Punitive rates will be at two times of the rates mentioned below:

SNO	ITEM OF STORES	UNIT	RATE Rs.	PALCE OF ISSUE	REMARKS
1.	Cement	Bag of 50 kg	254.00	BHEL Stores	Since cement, structural & reinforcement steel & M.S. Pipe are issued free of cost, the rates of steel and cement shown here are for the purpose of determining the punitive rates as per Clause 'I'
2	Structural steel & Reinforcement steel	MT	43730.00		
3.	M S Pipe 110 mm diameter	MT	43730.00		

- A. It will be responsibility of the contractor to submit his demand for stores in writing at least Ten days in advance of the actual requirement.
- B. Issue of all stores is subject to their availability at the place of issue noted above. The contractor shall not be entitled to any claim or compensation for non-supply of stores under any circumstance.
- C. The material will be issued only during working hours. The contractor shall have to transport them to the site of work at their own cost as soon as these are issued to them.
- D. Recovery of stores issued to the contractor will be made for the difference in gross quantity issued and net measured quantity of finished work.
- E. The materials if issued will be random sizes and length as stocked by BHEL & the cost of all cutting/ conversions & fabrications as well as wastage should be borne by the contractor.
- F. Wastage and off- cuts will be the property of BHEL and the Contractor will be responsible for their removal from the site of work from time to time. Wastage materials will not be allowed to accumulate at the site of work.
- G. All wastages shall have to be accounted for to the satisfaction of the Engineer Incharge.
- H. Contractor shall from time to time, render proper account of materials issued to him by BHEL. If he fails to do so, no further issue of materials will be made to him and shall be held responsible for any delay in execution of work, which may accrue, on this account.
- I. All surplus materials which are not returned in good conditions to BHEL Stores, shall be charged at punitive rates which shall be at two times of the rates mentioned above. The decision of the Engineer Incharge as to the excess of the actual requirement shall be final, conclusive and binding on the contractor.

Variations permissible on theoretical quantities of materials issued by BHEL:

S.No.	DESCRIPTION	PERMISSIBLE VARIATION
1.	Cement for works with estimated cost put to tender more than Rs. 5.0 lacs	3% plus / minus
2.	Steel reinforcements and structural steel sections for each diameter, section and category	3% plus only & nil on minus side.

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SCHEDULE 'C'

TOOLS & PLANT TO BE HIRED TO THE CONTRACTOR

Sl.No.	T & P	Rates
1.	Mobile Crane 12 T Capacity with operator (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.

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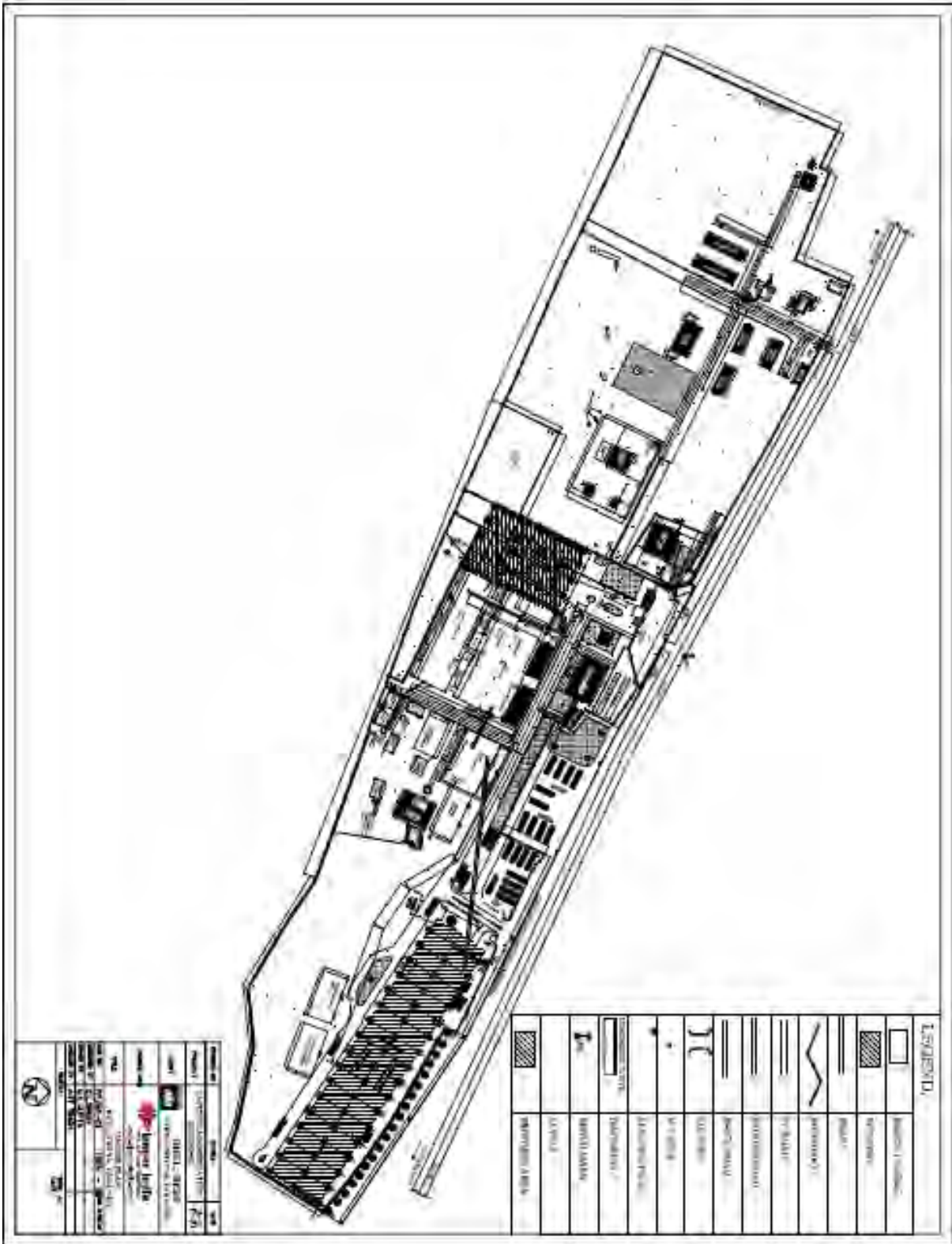
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**GENERAL CONDITIONS OF CONTRACT
(INTERPRETATION AND DEFINITIONS)**

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 AGM (Prod., Maint. & Mod.), 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;

[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 incharge 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 lightning 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.

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

4. **SCOPE AND PERFORMANCE**

Contract Documents:

The Contractor shall be furnished, free of charge, two 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.

- a. In the case of discrepancy between schedule of quantities the specifications and/ or the drawings, the following order of preference shall be observed:
 - i. Description in Schedule of Quantities.
 - ii. Particular Specification and Special Condition if any.
 - iii. Drawings.
 - iv. General Specifications.
- b. 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.
- c. 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.
- d. 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:
 - i. In the event of a discrepancy between description in words and figures quoted by a tenderer, the description in words shall prevail.
 - ii. 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.
 - iii. All error in totaling in the amount column and in carrying forward totals shall be corrected.
 - iv. 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:

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

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- 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 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 thereafter , 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:

- (i)** on account of any default on part of the contractor : or
- (ii)** for proper execution of the works or part thereof for reasons other than the defaults of the contractors : or
- (iii)** 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 (ii) in sub- para (a) above:
- (i) 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 of the essence of the contract. The execution of the work shall commence from the 15th day after the date on which the Engineer-in-charge issues written orders to commence the work or from the date of handing over of the site whichever is later. If the contractor commits default in commencing the execution of the work as aforesaid company/ corporation shall without prejudice to any other right or remedy be at liberty forfeit the earnest money absolutely.

1. As soon as possible after the contract is concluded, Engineer-in-charge and the contractor shall agree upon a time and progress a chart. The chart shall be prepared in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast of the dates commencement and completion of various trades or sections of the work and may be amended as necessary by agreement between the Engineer-in-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, the contractor shall in all cases in which the time allowed for any work exceeds one month (save for special job) complete 1/8th of the whole of the work before 1/4th of the whole time allowed in the contract has elapsed 3/8th before 3/4th of such time has elapsed.

2. If the works be delayed by

- (a) force majeure, or
(b) abnormally bad weather, or
(c) serious loss or damage by fire, or
(d) civil commotion, local combination of workmen strike or lockout, affecting any of the traders employed on the work, or
(e) delay in the part of other contractors or tradesmen engaged by company/corporation in executing work not forming part of the contract, or
(f) non- availability of stores which are the responsibility of company/ corporation to supply, or



- (g) non- availability or break down of tools and plant to be supplied by company/ corporation, or
- (h) any other cause which, in the absolute discretion of AGM (Prod., Maint. & Mod), 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.

3. 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.
4. In any such case Unit head (BHEL 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.
13. 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 except the item listed in schedule 'C' which will be given to him on hire by the company corporation at rates shown in that schedule. In case the contractor does not require some or all items of T & P. listed in schedule 'C' he will indicate his requirements at the time of submitting his tender. Company's – corporation's T. & P. hired to the contractor shall be conveyed by him at this expense from the place of issue to the site and back.
1. If the contractor requires any time of T & P on hire from the company corporation over & above the requirement indicated by him at the time of submitting his tender the company – corporation will, if such item is available hire it to the contractor at a rate to be fixed by the Engineer-in-charge.
2. 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.
3. The hire charges shall be reckoned as under:
- a) The first eight working hours (excluding a break of one hour)..... 1 working day.
- b) Every working hours, at the rate of 1/8th of the hire charges for a working day, provided however if the company-corporation has paid more than at the rate of 1/8th of the wages of the crew far over time under the minimum wages act or any other law for the time being in force, the excess over 1/8th of the wages shall also be charged to the contractor.
4. 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.
5. 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.
6. The hire charges shown in the schedule cover charges of crew, stores for maintenance and cleaning purposes and fuel for running a machine, engine oil, kerosene oil, etc, for working company's / corporation's T & P and all unskilled labour and water required for

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- servicing / wash out shall be borne by the contractor. The contractor shall permit the Engineer-in-charge to carry out periodical maintenance of company's / corporation's T & P in accordance with the provision thereof in the aforesaid schedule, and there will be no deduction in hire charges for the period spent on such maintenance. However the contractor shall be allowed to return the tools and plants (issued by the company's / corporation's) for purposes of repairs and for the duration of such repairs no hire charges shall be levied.
7. 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.
 8. 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.
 9. 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 whatsoever 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 event, however, a reasonable extension of time shall be given by the Engineer-in-charge.
 - iv) 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.
 14. a) 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.
 1. 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.
 2. 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.
 3. 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 confirm 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,

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- 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.
4. The contractor shall indemnify the company/ corporation or any agent servant or employee of the company/ corporation against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties 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.
 5. 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.
 6. 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.
 14. b) **Materials to be supplied by the company/ corporation:**

Materials to be supplied by the company/ corporation are shown in schedule B which also stipulates quantum, place of issue and rate (s) to be charged in respect thereof.

 1. If after acceptance of the tender the contractor desires the company/ corporation or supply any other materials, such materials may be supplied by the company/ corporation, if available, at rates to be fixed by the Engineer-in-charge.
 2. For the material listed in schedule B which the company / corporation have agreed to supply the contractor, he shall give a reasonable notice in writing of his requirements to the Engineer-in-charge in accordance with the agreed phased programme. Such materials shall be supplied for the purposes of the contract only and the value of materials so supplied at the rates specified in the aforesaid schedule shall be set off or deducted, as and when materials are consumed in items of work for which payment is being made to the contractor, from any sums then due or which may thereafter become due to the contractor, under the contract. At the time of submission of bills the contractor shall properly account for the materials issued to him to the satisfaction of the Engineer-in-charge, certify that balance of materials supplied is available at site.
 3. The contractor shall bear the cost of loading, transporting to site, unloading, storing under cover as required, assembling and joining the several parts together as necessary and incorporating or fixing materials in the works including all preparatory work of whatever description as may be required.
 4. All materials issued to the contractor by the company/ corporation for incorporation or fixing in the works (including preparatory work) shall, on completion or on foreclosure of the works, be returned by the contractor at his expense, at the place of issue, after making due allowance for actual consumption, reasonable wear and tear and/ or waste. If the contractor is required to deliver such materials a place other than the place, of issue, he shall do so and transportation charges from the site to such place, less the transportation charges which would have been incurred by the contractor had such

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- material been delivered at the place of issue. Shall be borne by the company/ corporation.
5. Surplus material returned by the contractor shall be credited to him by the Engineer-in-charge at rates not exceeding those at which those were originally issued to him after taking into consideration any deterioration or damage which may have been caused to the said materials while in the custody of the contractor.
 6. If on completion of works the contractors fails to return surplus materials out of those supplied by the company/ corporation, then in addition to any other liability which the contractor would incur the Engineer-in-charge may by a written notice to contractor, require him to pay within a fortnight of receipt of the notice for such unreturned surplus materials at double the issue rates.
 7. If cement is to be supplied by the company/ corporation every cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with the Engineer-in-charge or his representative and that of the other lock with the contractor's authorized agent at site of works so that cement is removed from the godown only according to daily requirements with the knowledge of both the parties.
14. c) **GENERAL**
- Materials required for the works, whether brought by the contractor or supplied by the company/ corporation 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.
1. 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 shall give such facilities as may be required for such inspection and examination.
 2. All materials brought to the site shall become and remains 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.
15. **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.
1. 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.
 2. 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.

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3. 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.
4. 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 from time to time.
- 4a. 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 employee's state insurance.
5. 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-fulfillment 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.
6. 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.
7. 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.

Model Rules for Labour Welfare:

15. 1/1. 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.
- 1/2. 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.



- (i) 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.
16. The contractor shall not be permitted to enter (other than for inspection purposes) or take possession of the site until instructed to do so by the Engineer-in-charge in writing. The portion of the site to be occupied by the contractor shall be defined and/ or marked on the site plan, falling which these shall be indicated by the Engineer-in-charge at site and the contractor shall on no account be allowed to extend his operation beyond these areas. In respect of any land allotted to the contractor for purposes of or in connection with the contract, the contractor shall be a licensee subject to the following and such other terms and conditions as may be imposed by the licensor :
- (i) That he shall pay a nominal license fee of Re.1 per year or part of year for use and occupation: in respect of each and every separate area of land allotted to him.
- (ii) That such use or occupation shall not confer any right of tenancy of the land to the contractor.
- (iii) That the contractor shall be liable to vacate the land on demand by the Engineer-in-charge.
- (iv) That the contractor shall have no right to any construction over this land without the written permission of the Engineer-in-charge. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.
17. 1. The contractor shall provide, if necessary of if required on the site all temporary access thereto and shall alter. Adapt and maintain the same as required from time to time and shall take up and clear them away as and when no longer required and when ordered by the Engineer-in-charge and make good all damage done to the site.
- 17. Setting out the works**
The Engineer-in-charge shall supplied dimensioned, 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 in setting out the works till end of the defects liability period unless the Engineer-in-charge directs their earlier removal.
- 18. 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.
- 19. 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:
Materials obtained from Excavation:

20. 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.
21. **Treasure Trove, Fossils etc.**
All fossils coins, articles of the value or antiquity and structures and other remains or thing of geological interest discovered on the site shall be the absolute property of the company/ corporation and the contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such articles or things and shall immediately upon discovery thereof and before removal acquaint the Engineer-in-charge's direction as to the disposal of the same at the expense of the company/ corporation.
22. **Protection of Trees**
Trees designated by the Engineer-in-charge shall be protected damage 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.
23. **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.
24. **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.
25. **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.
25. 1. 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 advices. The contractor accordingly attends 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.
25. 2. 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:
26. 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.
26. 1. 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.
26. 2. 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.
26. 3. 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.
- 27. Removal of Workmen**
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.
- 28. Uncovering and Making Good**
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.
- 29. Work during or on Sundays and Holidays**
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.
- 30. Completion Certificate**
(1) 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 which the works have 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 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, labeled 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 . 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, they may, at the expense of the contractor fulfill 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.

- 30.(2) 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 notwithstanding anything expressed or implied elsewhere in this contract :-
- (a) Within ten days of the date of completion of such items or grounds items or of possession of the relevant part the Engineer-in-charge shall issue completion certificate for the relevant part as in condition 30(1) above provided the contractor fulfills his obligations under that condition for the relevant part,
 - (b) 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.
 - (c) 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 these purposes only and for no other.
 - (d) 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 under condition 14 and actual date of completion as certified by the Engineer-in-charge under this condition.

31. LIQUIDATED DAMAGES

If the work is not completed within the specified period and any extension thereof, the contractor shall be liable to pay liquidated damages for delay in completion of work @ 0.5% of the value of contract for every week of delay or part thereof, subject to a maximum of 10% of the contract value without BHEL being required to establish and prove the actual loss/ damage suffered by BHEL on account of such delay.



32. 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 in 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.
33. 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.
- 33 (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 for payment, in respect of the re-execution of the works lost or damaged, 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.
- 33 (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.
- 33 (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.
- 33.(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.
- 33.(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.
- 33.(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.
- 33.(7) The aforesaid insurance policy – policies shall provide that they shall not be cancelled till the Engineer-in-charge has agreed to their cancellation.
- 33.(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.
- 33.(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.
- 33(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 due to contractor or recover the same as a debt due from the contractor.

34. Facilities to the Contractors

The contractor shall in accordance with the requirements of the Engineer-in-charge afford all reasonable facilities to other contractors engaged contemporaneously on separate contracts in connection with the works and for departmental labour and labour of any other properly-authorized-authority or statutory body which may be employed at the site on execution of any works not included in the contract or of any contract which the Company / Corporation may enter into in connection with or ancillary to the works.

35. Notice to Local Bodies

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.

- 35.1 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

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- government instrument, rule or order and any regulations or laws of any local authority in respect of the works, Sub Contracts:
36. The contractor shall not sublet any portion of the contract without the prior written approval of Authority.
- 37. Instruction and notice**
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.
- 37.1 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
- 37.2 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.
- 37.3. 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 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 instruction (s).
Foreclosure of contract in Full or in part (due to Abandonment) or reduction in scope of work
38. 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.
- 38.1 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 does 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 the prescribed percentage of wastage shall be returned by the contractor to the Company/Corporation. Failure to do so will entail recovery at rates indicated in Schedule-B.
- (d) Reasonable compensation for transfer of T & P from site to contractor's permanent stores or to his other works, whichever is less. If T& P are not transported to either of the said places, no cost of the transportation shall be payable.
- 38(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.

39. Termination of Contract for Death

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 cannot 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.

40. Cancellation of contract in full or in part

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 within 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 not 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 benefit of his creditors or purport so to do or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors; 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 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 contract.

40.1 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.

40.2 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.

40.3 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.

40.4 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 contractor's unused materials, constructional plant implements, buildings etc. and apply the proceeds of sale thereof 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.

40.5 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.

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

If the contractor or his workman or employees shall injury or damage 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

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shall happen to the work while in progress the contractor shall upon receipt of a notice 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 of improper materials or workmanship, the contractor shall upon receipt of a notice in writing in that behalf from the , 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 in his notice aforesaid, the 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.

41.1 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.

42. Urgent Works

If any urgent work (in respect where of the decision of 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.

43. 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 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 ensure as provided for in the said condition 41.

44. Training of Apprentices:

The contractor shall during the currency of the contract when called upon by the 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 . 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.



VALUATION AND PAYMENT

45. Records and Measurement

- The Engineer-in-charge shall accept as otherwise stated ascertain and determine the measurement, the value in accordance with the contract for work done in accordance therewith.
- 45.1 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.
- 45.2 Measurement shall be taken jointly by the Engineer-in-charge or his authorized representative and by the contractor or his authorized representative.
- 45.3 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.
- 45.4 The contractor shall, without extra charge, provide assistance with every appliance, labour and other things necessary for measurement.
- 45.5 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.

46. 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.

47. 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.
- 47.1 Payment on account for amount admissible shall be made on the 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.
- 47.2 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 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.
- 47.3 Pending consideration of extension of date of completion interim payments shall continue to be made as herein provided.

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48 **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 , shall be made within the period specified hereunder, the period being reckoned from the date of receipt of the bill by the .

- (a) Contract amount not exceeding Rs 5 Lakhs.... Three months
- (b) Contract amount exceeding Rs 5 Lakhs Four months

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.

49. **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.

49.1 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 arbitrator appointed under condition 50 of this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award:

49.2 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.

49.3 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.

49.4 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

50. Arbitration

Except where otherwise provided for in the contract all questions and disputes relating to the meaning of the specifications; design, drawings and instructions herein before mentioned as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, design, drawings, specifications, estimates instructions, orders or these conditions or otherwise concerning the works, or the execution of failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the sole arbitration of the General Manager, Chief Project Manager/ Manager Civil of Bharat Heavy Electricals Limited, VARANASI. And if the General Manager/ Chief Project Manager / Manager Civil is unable or unwilling to act, to the sole arbitration of some other person appointed by the General Manager, Chief Project Manager, Manager Civil willing to act as such arbitrator. There will be no objection if the arbitrator so appointed in an employee of Bharat Heavy Electricals Limited, VARANASI and that he had to deal with the matters to which the contract relates and that in the course of his duties to such he had expressed views on all or any of the matter in dispute or difference. The arbitrator to whom the matter is originally referred being transferred or vacating his office being unable to act for any reason, such General Manager/ Chief Project Manager / Manager Civil as aforesaid at the time of such transfer, vacation of office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is also a term of this contract that no person other than a person appointed by such General Manager/ Chief Project Manager / Manager Civil as aforesaid should act as arbitrator and if for any reason, that is not possible the matter is not be referred to arbitration at all. In all cases where the amount of the claim is dispute is Rs 50,000 (Rupees Fifty Thousand) and above, the arbitrator shall give reasons for the award.

Subject as aforesaid the provisions of the Arbitration, Act. 1940, or any statutory modification or re-enhancement thereof and the rules made there-under and for the time being in force shall apply to the arbitration proceeding under this clause.

It is a term of the contract that the party invoking arbitration shall specify the dispute or disputes to be referred to arbitration under this clause together with the amount or amounts claimed in respect of each such dispute.

The arbitrator (s) may from time to time with consent of the parties enlarge the time, for making and publishing the award.

The work under the contract shall, if reasonably possible, continue during the arbitration proceedings and no payment due or payable to the contractor shall be withheld on account of such proceedings.

The award of the arbitrator shall be final, conclusive and binding all parties to this contract.

51. Laws governing the contract

This contract shall be governed by the Indian laws for the time being in force.

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BLANK PRICE BID (PART-II)

SCHEDULE-A

BOQ and Scope of Work for Construction of Fabrication Shop, Open Gantry, Material Gate, Extension of Machine Shop- Bay-I,II & III, Laying of Rail Track for Battery Trolley etc. and allied utilities at BHEL, HERP , Tarna, Shivpur Varanasi

SECTION –A (Civil Works)

SN	DSR Code	Description of Work	DSR-2007 (Reprint-2010) Item Code/ Page No.	Total Qty.	Unit	DSR'2007 Rate	Amount (In Rs.)
	(A)	CIVIL WORKS					
	1.0	CARRIAGE OF MATERIALS					
1		Carriage of material by mechanical transport including loading, unloading and stacking.					
(a)		Lime, moorum, building rubbish. - 1Km. Lead	1.1.1/54	41.00	Cu.Mt.	39.53	1620.73
(b)		Earth 1Km. Lead	1.1.2/54	9592.21	Cu.Mt.	49.42	474046.95
(c)		Brick 1Km. Lead	1.1.8/54	58.50	1000Nos.	105.42	6167.07
(d)		Cement, stone blocks, GI, CI, AC, & CC pipes below 100mm dia and other heavy materials.	1.1.10/54	217.62	Tonne	35.14	7647.17
	2.0	EARTH WORK					
2		Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. Ordinary soil.	2.8.1/64	13400.80	Cu.Mt.	103.40	1385642.74
3		Open timbering in trenches including strutting and shoring complete (measurements to be taken of the face area timbered):					
(a)		Depth not exceeding 1.5m	2.20.1/66	234.00	Cu.Mt.	35.20	8236.80
(b)		Depth exceeding 1.5m but not exceeding 3m	2.20.2/67	156.00	Cu.Mt.	36.70	5725.20
4		Extra for every additional lift of 1.5 m or part thereof in all kind of soil.	2.26.1/67	3404.79	Cu.Mt.	18.90	64350.49
5		Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	2.25/67	5111.29	Cu.Mt.	45.70	233586.07
6		Supplying and filling in plinth with Jamuna sand under floors including, watering, ramming consolidating and dressing complete.	2.27/67	1538.86	Cu.Mt.	301.50	463965.32
7		Surface dressing of the ground including removing vegetation and in-equalities not exceeding 15 cm deep and disposal of rubbish, lead upto 50 m and lift upto 1.5 m.	2.28.1/67	55.00	Sq.Mt.	5.12	281.66
8		Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth upto 30 cm measured at a height of 1 m above ground level and removal of rubbish upto a distance of 50m outside the periphery of the area cleared.	2.31/68	14477.35	Sq.Mt.	2.64	38205.74
	4.0	CONCRETE WORK					
9		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	4.1.3/79	0.30	Cu.Mt.	3257.45	977.24

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10		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size).	4.1.6/79	32.34	Cu.Mt.	2713.05	87726.47
11		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:4:8 (1 cement : 4 fine sand : 8 graded stone aggregate 40 mm nominal size).	4.1.9/79	2420.09	Cu.Mt.	2296.15	5556887.61
12		Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level :1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)	4.1.10/79	13.00	Cu.Mt.	2237.75	29090.75
13		Providing and laying damp-proof course 40mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5mm nominal size).	4.10/81	5.59	Sq.Mt.	144.15	806.48
	5.0	REINFORCED CONCRETE CEMENT					
14		Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level :1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size).	5.1.3/88	810.60	Cu.Mt.	3359.60	2723291.76
15		Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer in charge. M-25 grade reinforced cement concrete by using 380 kg. of cement per cum of concrete. All work upto plinth level.	5.33/93	1417.60	Cu.Mt.	3983.75	5647370.72
16		Providing and laying in position machine batched, machine mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including Admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer in charge. M-25 grade reinforced cement concrete by using 380 kg. of cement per cum of concrete. All work above plinth level up to floor V level.	5.33A/93	470.71	Cu.Mt.	3983.75	1875175.11
17		Centering and shuttering including strutting ,propping etc. and removal of form for:					
(a)		Foundations, footings, bases of columns, etc. for mass concrete	5.9.1/89	1732.86	Sq.Mt.	119.25	206643.56
(b)		Suspended floors, roofs, landings, balconies and access platform.	5.9.3/89	258.43	Sq.Mt.	187.35	48416.81
(c)		Lintels, beams, plinth beams, girders, bressumers and cantilevers.	5.9.5/89	2829.25	Sq.Mt.	162.65	460176.79
(d)		Columns, Pillars, Piers, Abutments, Posts and Struts.	5.9.6/89	443.88	Sq.Mt.	238.40	105820.99
(e)		Vertical and horizontal fins individually or forming box louvers band, facias and eaves boards.	5.9.13/89	13.85	Sq.Mt.	285.55	3954.87
18		Add or deduct for plaster drip course/ groove in plastered surface or molding to R.C.C. projections.	5.30/93	75.00	Rmt.	11.95	896.25
	6.0	BRICK WORK					
19		Brick work with F.P.S. bricks of class designation 75 in foundation and plinth in Cement mortar 1:6 (1 cement : 6 coarse sand).	6.1.2/99	992.99	Cu.Mt.	2121.75	2106879.11

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20		Brick work with F.P.S. bricks of class designation 75 in superstructure above plinth level up to floor V level in all shapes and sizes in :Cement mortar 1:4 (1 cement : 4 coarse sand).	6.4.1/99	12.84	Cu.Mt.	2601.90	33417.56
21		Brick work with F.P.S. bricks of class designation 75 in superstructure above plinth level up to floor V level in all shapes and sizes in :Cement mortar 1:6 (1 cement : 6 coarse sand).	6.4.2/99	703.75	Cu.Mt.	2430.25	1710284.94
22		Half brick masonry with F.P.S. bricks of class designation 75 in superstructure above plinth level up to floor V level. Cement mortar 1:4 (1 cement :4 coarse sand).	6.13.2/100	7.43	Sq.Mt.	302.80	2248.29
	8.0	MARBLE WORK					
23		Providing and fixing stone slab table rubbed, edges rounded and polished of size 75x50 cm deep and 1.8 cm thick fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) as per direction of Engineer-in-charge and finished smooth. Granite Stone of approved shade.	8.10.2/121	6.80	Sq.Mt.	2595.00	17633.03
	9.0	WOOD AND PVC WORK					
24		Providing and fixing IS : 3564 marked aluminium extruded section body tubular type universal hydraulic door closer with double speed adjustment with necessary accessories and screws etc. complete.	9.84/148	4.00	Nos.	911.10	3644.40
25		Providing and fixing aluminium hanging floor door stopper ISI marked anodised (anodic coating not less than grade AC 10 as per IS:1868) transparent or dyed to required colour and shade with necessary screws etc. complete. Twin rubber stopper.	9.101.2/150	5.00	Nos.	53.90	269.50
26		Providing and fixing bright finished brass 100 mm mortice latch and lock ISI marked with six levers and a pair of anodised (anodic coating not less than grade AC 10 as per IS : 1868) aluminium lever handles with necessary screws etc. complete (Best make of approved quality).	9.103/150	4.00	Nos.	435.90	1743.60
27		Providing and fixing aluminium sliding door bolts ISI marked anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade with nuts and screws etc. complete :300x16 mm.	9.96.1/149	1.00	Nos.	158.50	158.50
28		Providing and fixing aluminium tower bolts ISI marked anodised (Powder coated not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade with necessary screws etc. complete.					
(a)		(Size 300x10mm) (DSR-2007,9.97.1/149)	9.97.1/149	15.00	Nos.	71.45	1071.75
(b)		(Size 150x10mm) (DSR-2007,9.97.4/149)	9.97.4/149	42.00	Nos.	42.75	1795.50
29		Providing and fixing aluminium handles ISI marked anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade with necessary screws etc. complete :					
(a)		100mm (DSR-2007, 9.100.2/150)	9.100.2/150	27.00	Nos.	35.30	953.10
(b)		75mm (DSR-2007, 9.100.3/150)	9.100.3/150	35.00	Nos.	28.35	992.25



30		Providing and fixing factory made UPVC door frame made of UPVC extruded section having an overall dimension as below (tolerance ± 1 mm) with wall thickness 2.0mm \pm 0.2mm, corners of the door frame to be Jointed with galvanized brackets and stainless steel screws, joints mitred and Plastic welded. The hinge side vertical of the frames reinforced by galvanized M.S. tube of size 19 X 19mm and 1mm \pm 0.1mm wall thickness and 3 nos. stainless steel hinges fixed to the frame complete as per manufacturers specification and direction of Engineer-in- charge. Extruded section profile size 48x40 mm.	9.117.1/152	34.65	Rmt.	141.00	4885.65
31		24 mm thick factory made PVC door shutters made of styles and rails of a UPVC hollow section of size 59x24 mm and wall thickness 2 mm \pm 0.2 mm with inbuilt edging on both sides. The styles and rails mitred and joined at the corners by means of M.S. galvanised/plastic brackets of size 75x220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 20x20 mm and 1 mm \pm 0.1 mm wall thickness. The lock rail made up of 'H' section, a UPVC hollow section of size 100x24 mm and 2 mm \pm 0.2 mm wall thickness fixed to the shutter styles by means of plastic/galvanised M.S. 'U' cleats. The shutter frame filled with a UPVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm \pm 0.1 mm wall thickness. The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and washers, complete as per manufacturer's specification and direction of Engineer-in-charge. (For W.C. and bathroom door shutter).	9.118.1/152-153	11.03	Sq.Mt.	2190.50	24150.26
	11.0	FLOORING					
32		Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement including cement slurry, but excluding the cost of nosing of steps etc. complete.40mm thick with 20mm nominal size stone aggregate.	11.3.1/172	732.00	Sq.Mt.	192.95	141239.40
33		52 mm thick cement concrete flooring with concrete hardener topping under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12 mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume .hardening compound is mixed @ 2 litre per 50kg of cement or as per manufacturers specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete.	11.4/172	540.00	Sq.Mt.	286.55	154737.00
34		62 mm thick cement concrete flooring with concrete hardener topping under layer 50 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) and top layer 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6mm nominal size) by volume. Hardening compound is mixed @ 2 litre per 50kg of cement or as per manufactures specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete.	11.5/172	10808.00	Sq.Mt.	318.65	3443969.20

35		Providing and laying Ceramic glazed floor tiles 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS: 15622 of approved make in all colours, shades, except White, Ivory, Grey, Fume Red Brown laid on 320mm thick bed of Cement Mortar 1:4 (1 Cement: 4 Coarse sand) including pointing the joints with white cement and matching pigments etc., complete.	11.38/178	48.98	Sq.Mt.	630.80	30896.22
36		Providing and fixing 1st quality ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacturer) of approved make in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete.	11.36/177	173.65	Sq.Mt.	556.60	96653.03
37		Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption's less than 0.08% and conforming to IS : 15622 of approved make in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with white cement and matching pigments etc., complete. Size of Tile 60x60 cm.	11.41.2/178	181.83	Sq.Mt.	1031.85	187619.38
	12.0	ROOFING					
38		Making khurras 45x45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) over P.V.C. sheet 1mx1mx400micron, finished with 12mm cement plaster 1:3 (1 cement : 3 coarse sand) and a coat of neat cement rounding the edge sand making and finishing the outlet complete.	12.22/189	14.00	Nos.	108.00	1512.00
39		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.(i) Single socketed pipes.110 mm diameter	12.41.2/192	53.70	Rmt.	163.40	8774.58
40		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:					
(a)		Bend 87.5 degree .110 mm bend.	12.42.5.2/192	14.00	Nos.	134.20	1878.80
(b)		Single tee with door.110x110x110 mm.	12.42.3.2/192	14.00	Nos.	260.70	3649.80
(c)		Coupler, 110mm	12.42.1.2/192	20.00	Nos.	101.65	2033.00
41		Providing and fixing unplasticised -PVC pipe clips of approved design to unplasticised - PVC rain water pipes by means of 50x50x50mm hard wood plugs, screwed 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.110mm	12.43.2/192	42.00	Nos.	96.90	4069.80
	13.0	FINISHING					
42		15 mm cement plaster 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement on the rough side of single or half brick wall.	13.10/202	1724.86	Sq.Mt.	128.50	221643.89
43		15 mm cement plaster on the rough side of single or half brick wall of mix :1:6 (1 cement: 6 fine sand).	13.2.2/201	3524.13	Sq.Mt.	78.55	276820.56
44		12 mm cement plaster of mix :1:6 (1 cement: 6 fine sand)	13.1.2/201	3042.60	Sq.Mt.	67.65	205831.55
45		6 mm cement plaster of mix :1:3 (1 cement: 3 fine sand)	13.16.1/202	234.54	Sq.Mt.	62.15	14576.72

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46		Providing and applying plaster of paris putty of 2mm thickness over plastered surface to prepare the surface even and smooth complete.	13.26/203	1586.77	Sq.Mt.	47.20	74895.61
47		Distemping with oil bound washable distemper of approved brand and manufacture to give an even shade New work (two or more coats) over and including priming coat with cement primer	13.41.1/204	3216.09	Sq.Mt.	41.55	133628.60
48		Finishing walls with water proofing cement paint of required shade New work (Two or more coats applied @ 3.84 kg/10Sq.mt)	13.44.1/204	3702.09	Sq.Mt.	30.80	114024.28
49		Forming groove of uniform size from 12x12mm and upto 25x15mm in plastered surface as per approved pattern using wooden battens, nailed to the under layer including removal of wooden battens, repairs to the edges of plaster panel and finishing the groove complete as per specifications and direction of the Engineer-in-Charge.	13.76/208	345.00	Rmt.	13.30	4588.50
	14.0	REPAIRS TO BUILDING					
50		Repairs to plaster of thickness 12mm to 20mm in patches of area 2.5 sq. meters and under including cutting the patch in proper shape, raking out joints and preparing and plastering the surface of the walls complete including disposal of rubbish to the dumping ground within 50metres lead :With cement mortar 1:4 (1 cement : 4 fine sand)	14.1.1/215	18.00	Sq.Mt.	114.35	2058.30
	15.0	DISMANTLING AND DEMOLISHING					
51		Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in-charge.	15.3/226	45.08	Cu.Mt.	537.55	24232.75
52		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.	15.7.4/226	142.75	Cu.Mt.	310.75	44359.56
53		Dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc. including dismembering and stacking within 50metres lead.	15.18/228	82000.00	Kg.	0.85	69700.00
54		Dismantling cement asbestos or other hard board ceiling or partition walls including stacking of serviceable materials and disposal of unserviceable materials within 50 metres lead.	15.41/229	1728.00	Sq.Mt.	8.60	14860.80
55		Dismantling manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50metres lead as per direction of Engineer-in-charge : Bituminous road	15.43.2/229	188.50	Sq.Mt.	66.30	12497.55
56		Dismantling G.I. pipes (external work) including excavation and refilling trenches after taking out the pipes, manually/ by mechanical means including stacking of pipes within 50 metres lead as per direction of Engineer-in-charge :					
(a)		15mm to 40mm nominal bore	15.44.1/230	7.50	Rmt.	24.90	186.75
(b)		Above 40mm nominal bore	15.44.2/230	4.25	Rmt.	29.05	123.46
57		Demolishing C.C. /R.C.C. work by mechanical means and stockpiling at designated locations and disposal of dismantled materials up to a lead of 1000m, stacking serviceable and unserviceable material separately including cutting reinforcement bars.	15.58/231	46.75	Cu.Mt.	731.05	34176.59
58		Demolishing stone rubble masonry 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:	15.9.2/226	35.25	Cu.Mt.	370.75	13068.94

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59		Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead :					
(a)		Of area 3 sq. metres and below	15.12.1/227	10.00	Nos.	54.60	546.00
(b)		Of area beyond 3 sq. metres	15.12.2/227	2.00	Nos.	75.35	150.70
60		Dismantling old plaster or skirting raking out joints and cleaning the surface for plaster including disposal of rubbish to the dumping ground within 50 metres lead.	15.56/231	100.00	Sq.Mt.	8.20	820.00
	16.0	ROAD WORK					
61		Preparation and consolidation of sub grade with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 22.5 cm. depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-rolling the sub grade and disposal of surplus earth lead upto 50 metres.	16.1/240	4739.14	Sq.Mt.	33.90	160656.73
62		Supplying and stacking at site.					
(a)		90 mm to 45 mm size stone aggregate.	16.3.1/240	710.87	Cu.Mt.	742.30	527679.15
(b)		63 mm to 45 mm size stone aggregate.	16.3.2/240	710.87	Cu.Mt.	768.45	546268.42
(c)		53 mm to 22.4 mm size stone aggregate.	16.3.3/240	737.87	Cu.Mt.	810.55	598080.91
63		Laying spreading and compacting stone aggregate of specified sizes to WBM specifications including spreading in uniform thickness, hand picking, rolling with 3 wheeled road / vibratory roller 8-10 tonne in stages to proper grade and camber, applying and brooming requisite type of screening / binding material to fill up interstices of coarse aggregate watering and compacting to the required density.	16.4/240	2132.61	Cu.Mt.	192.55	410634.33
64		Providing and laying design mix cement concrete in roads, taxi tracks and runways having a minimum works test beam flexural strength of 30 kg. per cm ² at 28 days using not less than 340 Kg. of cement per cum of finished concrete, coarse sand and graded stone aggregate of 40mm nominal size in appropriate proportions as per specified design criteria approved by Engineer-in-Charge, mechanically vibrated using needle and surface vibrators including steel form work with sturdy M. S. channel sections including curing and providing and filling construction joints and dummy joints with approved joint filler and primer including rounding of the edges and filling the grooves 10x25mm deep at top for construction joints and 10mmx50mm deep at top for dummy joints with joint sealing compound (conforming to grade B of IS : 1834) including making necessary arrangements for expansion joints etc. all complete.	16.43/246	947.83	Cu.Mt.	3692.20	3499567.96
	17.0	SANITARY INSTALLATIONS					
65		Providing and fixing water closet squatting pan (Indian type W.C. pan) with 100mm sand cast Iron P or S trap, 10 litre low level white P.V.C. flushing cistern with manually controlled device (handle lever) conforming to IS: 7231, with all fittings and fixtures complete including cutting and making good the walls and floors wherever required: White Vitreous china Orissa pattern W.C. pan of size 580x440mm with integral type foot rests.	17.1.1/263	4.00	Nos.	2304.65	9218.60



66		Providing and fixing white vitreous china pedestal type water closet (European type) with seat and lid, 10 litre low level white vitreous china flushing cistern & C.P. flush bend with fittings & C.I. brackets, 40mm flush bend, overflow arrangement with specials of standard make and mosquito proof coupling of approved municipal design complete including painting of fittings and brackets, cutting and making good the walls and floors wherever required :W.C. pan with ISI marked white solid plastic seat and lid.	17.3.1/263	3.00	Nos.	3282.95	9848.85
67		Providing and fixing white vitreous china flat back half stall urinal of size 580x380x350mm with white PVC automatic flushing cistern, with fittings, standard size C.P. brass flush pipe, spreaders with unions and clamps (all in C.P. brass) with waste fitting as per IS : 2556, C.I. trap with outlet grating and other couplings in C.P. brass including painting of fittings and cutting and making good the walls and floors wherever required : Single half stall urinal with 5 litre P.V.C. automatic flushing cistern.	17.5.1 / 264	9.00	Nos.	3720.30	33482.70
68		Providing and fixing P.V.C. waste pipe for sink or wash basin including P.V.C. waste fittings complete.					
(a)		32mm dia.	17.28.2.1/267	9.00	Nos.	46.80	421.20
(b)		40mm dia.	17.28.2.2/267	7.00	Nos.	49.10	343.70
69		Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.	17.31/267	7.00	Nos.	493.65	3455.55
70		Providing and fixing trap of self cleansing design with screwed down or hinged grating with or without vent arm complete, including cost of cutting and making good the walls and floors :100 mm inlet and 75 mm outlet. Sand cast iron S&S as per IS - 3989.	17.60.2.1/272-273	22.00	Nos.	573.35	12613.70
71		Cutting chases in brick masonry walls for following diameter sand cast iron/ centrifugally cast (spun) iron pipes and making good the same with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 12.5 mm nominal size) including necessary plaster and pointing in cement mortar 1:4 (1 cement : 4 coarse sand) : 100 mm dia.	17.61.1/273	20.00	Rmt.	152.45	3049.00
	18.0	WATER SUPPLY					
72		Providing and fixing G.I. Pipes complete with G.I. fittings and clamps i/c making good the walls etc. concealed pipe including painting with anti corrosive bitumastic paint, cutting chases and making good the wall:					
(a)		15 mm dia nominal bore	18.11.1/292	340.00	Rmt.	144.75	49215.00
(b)		20 mm dia nominal bore	18.11.2/292	220.00	Rmt.	170.60	37532.00
73		Providing and fixing PTMT grating of approved quality and colour.100 mm nominal dia.	18.58.1.1/301	23.00	Nos.	39.70	913.10
74		Providing and fixing PTMT grating of approved quality and colour.125 mm nominal dia.with 25mm waste hole.	18.58.1.2/301	17.00	Nos.	46.65	793.05
75		Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end):32 mm nominal bore.	18.17.2/293	3.00	Nos.	358.00	1074.00
76		Providing and fixing uplasticised PVC connection pipe with brass unions:15 mm nominal bore.	18.21.2.1/294	22.00	Nos.	44.75	984.50
77		Providing and fixing C.P. brass bib cock of approved quality conforming to IS: 8931. 15mm nominal bore.	18.49.1/300	10.00	Nos.	313.10	3131.00
78		Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.15 mm nominal bore.	18.51.1/300	7.00	Nos.	315.80	2210.60

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79		Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved make conforming to IS:8931. 15 mm nominal bore.	18.52.1/300	24.00	Nos.	313.10	7514.40
	19.0	DRAINAGE					
80		Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) up to haunches of S.W. pipes including bed concrete as per standard design :					
(a)		150 mm diameter S.W. pipe	19.3.2/315	120.00	Rmt.	255.10	30612.00
(b)		200 mm diameter S.W. pipe	19.3.3/315	164.00	Rmt.	299.85	49175.40
81		Providing and fixing square-mouth S.W. gully trap class SP-1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per standard design :150 x 100 mm size P type.With F.P.S. bricks class designation 75.	19.4.2.1/316	7.00	Nos.	961.95	6733.65
82		Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete :					
(a)		450 mm dia. R.C.C. pipe	19.6.5/316	250.00	Rmt.	499.55	124887.50
(b)		500 mm dia. R.C.C. pipe	19.6.6/316	250.00	Rmt.	584.85	146212.50
(c)		600 mm dia. R.C.C. pipe	19.6.7/316	350.00	Rmt.	895.10	313285.00
83		Constructing brick masonry circular type manhole 0.91m internal dia at bottom and 0.56m dia at top in cement mortar 1:4 (1 cement :4 coarse sand), in side cement plaster 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement, foundation concrete 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size), and making necessary channel in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement all complete as per standard design : 0.91 m deep with S.F.R.C. cover and frame (heavy duty, HD-20 grade designation) 560mm internal diameter conforming to I.S. 12592, total weight of cover and frame to be not less than 182kg., fixed in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including centering shuttering all complete. (Excavation, foot rests and 12mm thick cement plaster at the external surface shall be paid for separately) : With F.P.S. bricks class designation 75.	19.9.1.1/317-318	25.00	Nos.	4933.50	123337.50
84		Providing M.S. foot rests including fixing in manholes with 20x20x10 cm cement concrete blocks 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) as per standard design:With 20x20 mm square bar.	19.15.1/319	200.00	Nos.	149.85	29970.00
85		Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40mm nominal size) inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement complete as per standard design :					

(a)		Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) : With F.P.S. bricks with class designation 75.	19.7.1.1/317	6.00	Nos.	5383.70	32302.20
(b)		Inside size 120x90 cm and 90 cm deep including C.I. cover with frame (medium duty) 500 mm internal diameter, total weight of cover and frame to be not less than 116 kg (weight of cover 58 kg and weight of frame 58 kg) :With F.P.S. bricks class designation 75.	19.7.2.1/317	5.00	Nos.	11882.20	59411.00
86		Providing and fixing in position pre-cast R.C.C. manhole cover and frame of required shape and approved quality.L D- 2.5. Rectangular shape 600x450mm internal dimensions.	19.19.1.1/320	10.00	Nos.	883.25	8832.50
87		Constructing brick masonry chamber for underground C.I. inspection chamber and bends with 75 class designation bricks in cement mortar 1:4 (1 cement : 4 coarse sand) C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover with frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) R.C.C. top slab with 1:2:4 mix (1 cement :2 coarse sand : 4 graded stone aggregate 20 mm nominal size) foundation concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete as per standard design : Inside dimensions 455x610 mm and 45 cm deep for single pipe line. With F.P.S. bricks	19.30.1.1/322	9.00	Nos.	3146.40	28317.60
88		Making soak pit 2.5 m diameter 3.0 metre deep with 45 x 45 cm dry brick honey comb shaft with bricks of class designation 75 and S.W. drain pipe 100 mm diameter, 1.8 m long complete as per standard design.With F.P.S. bricks	19.32.1/323	1.00	Nos.	9938.60	9938.60
	21.0	ALUMINIUM WORK					
89		Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS : 1285, fixed with rawl plugs and screws or with fixing clips, or with expansion hold fasteners including necessary filling up of gaps at junctions, at top, bottom and sides with required EPDM rubber/neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing and paneling to be paid for separately) :					
(a)		Powder coated aluminium (minimum thickness of powder coating 50 micron)	21.1.1.2/337	50.60	Kg.	306.30	15500.23
(b)		For shutters of doors, windows & ventilators including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required (Fittings shall be paid for separately).Powder coated aluminium (minimum thickness of powder coating 50 micron)	21.1.2.2/337	1114.81	Kg.	326.60	364096.56
90		Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge . (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 5.50 mm thickness	21.3.2/338	202.85	Sq.Mt.	673.55	136629.48

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91		Providing and fixing 12mm thick pre-laminated particle board flat pressed three layer or graded wood particle board conforming to IS: 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of engineer-in-charge. Pre-laminated particle board with decorative lamination on one side and balancing lamination on other side.	21.2.1/337	15.98	Sq.Mt.	776.05	12401.28
	22.0	WATER PROOFING					
92		Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc consisting of following operations: a) Applying a slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with water proofing compound conforming to IS. 2645 and approved by Engineer-in-charge over the RCC slab including adjoining walls upto 300mm height including cleaning the surface before treatment. b) Laying brick bats with mortar using broken bricks/brick bats 25 mm to 115mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge over 20 mm thick layer of cement mortar of mix 1:5 (1 cement :5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge to required slope and treating similarly the adjoining walls upto 300 mm height including rounding of junctions of walls and slabs c) After two days of proper curing applying a second coat of cement slurry using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS: 2645 and approved by Engineer-in-Charge d) Finishing the surface with 20mm thick joint less cement mortar of mix 1:4 (1 cement :4 coarse sand) admixed with water proofing compound conforming to IS:2645 and approved by Engineer-in-Charge including laying glass fibre cloth of approved quality in top layer of plaster and finally finishing the surface with trowel with neat cement slurry and making pattern of 300 x300mm square 3m deep). The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Engineer-in-charge. With average thickness of 120mm and minimum thickness at khurra as 65mm.	22.7.1/347	232.08	Sq.Mt.	541.05	125569.54
						TOTAL	36222563.11

We hereby quote our rates
to 92.

% Above/ At Par/ Below to DSR'2007 Rates for all items Sl. No.1

NOTE: While quoting percentage (%) premium over total amount of scheduled items for Civil Works above, bidders may take a note that the cement & reinforcement steel is free supply by BHEL.

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SECTION-A (Electrical Works)

SN	DSR Code	Description of Work	DSR-2007 Item Code No	Total Qty.	Unit	DSR'2007 Rate	Amount (In Rs.)
93		Supply and fixing 20amps, 240 volts, SPN industrial type, socket outlet, with 2 pole and earth, metal enclosed plug top along with 20amps 'C' series, SP, MCB, in sheet steel enclosure, on surface or in recess, with chained metal cover for the socket out let and complete with connections, testing and commissioning etc. as required. Make - Schneider/Legrand/Havells (SOR-Internal (Part-1)2007, 2.62)	(SOR-Internal (Part-1)2007, 2.62)	104.00	Nos.	520.00	54080.00
94		Supply and fixing following way, three pole and neutral, prewired, sheet steel, MCB distribution board, 415 volts, on surface/racess, complete with loose wire box, terminal blocks duly prewired with suitable size FR PVC insulated copper conductor upto terminal blocks, tinned copper busbar, neutral link, earth bar, din bar, detachable gland plate, interconnections, phosphatized and powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator). 6 Way (4+18), Double Door. Make Legrand/Schneider/Havells (SOR-Internal (Part-1)2007, 2.42.6)	(SOR-Internal (Part-1)2007, 2.42.6)	12.00	Nos.	6941.00	83292.00
95		Supply and fixing following way, three pole and neutral, prewired, sheet steel, MCB distribution board, 415 volts, on surface/racess, complete with loose wire box, terminal blocks duly prewired with suitable size FR PVC insulated copper conductor upto terminal blocks, tinned copper busbar, neutral link, earth bar, din bar, detachable gland plate, interconnections, phosphatized and powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator). 4 Way (4+12), Double Door. Make Legrand/Schneider/Havells (SOR-Internal (Part-1)2007, 2.42.5)	(SOR-Internal (Part-1)2007, 2.42.5)	10.00	Nos.	5395.00	53950.00
96		Supply and fixing following way, single pole and neutral, prewired, sheet steel, MCB distribution board, 240 volts, on surface/ recess, complete with loose wire box, terminal blocks, duly prewired with suitable size FR PVC insulated copper conductor up to terminal blocks, tinned copper busbar, neutral link, neutral link, earth bar, din bar, detachable gland plate, interconnections, phosphatized and powder painted including earthing etc. as required. (But without MCB/RCCB/ Isolator) 2+4 way, Double Door. Make Legrand/ Schneider (SOR-Internal (Part-1)2007, 2.41.4)	(SOR-Internal (Part-1)2007, 2.41.4)	1.00	Nos.	2139.00	2139.00
97		6 amps. To 32 amps, ratings, SP MCB, "B" series, 10KA breaking capacity. Make Legrand/Schneider/Havells (SOR-Internal (Part-1)2007, 1701)	(SOR-Internal (Part-1)2007, 1701)	220.00	Nos.	65.00	14300.00
98		6 amps. To 32 amps, ratings, SP MCB, "C" series, 10KA breaking capacity. Make Legrand/Schneider (SOR-Internal (Part-1)2007, 1706)	(SOR-Internal (Part-1)2007, 1706)	120.00	Nos.	72.00	8640.00
99		6 amps. To 32 amps, ratings, DP MCB, "B" series, 10KA breaking capacity. Make Legrand/Schneider/Havells (SOR-Internal (Part-1)2007, 1703)	(SOR-Internal (Part-1)2007, 1703)	1.00	Nos.	150.00	150.00
100		63 amps. Rating, 4 pole ELCB + MCB 100mA/300mA sensitivity. Make Legrand/Schneider/Havells (SOR-Internal (Part-1)2007, 1728)	(SOR-Internal (Part-1)2007, 1728)	22.00	Nos.	1357.00	29854.00

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101		Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 sq.mm FR PVC insulated copper conductor single core cable in surface / recessed PVC conduit, with piano type Switch, phenolic laminated sheet, suitable size MS box and earthing the point with 1.5 sq.mm. FR PVC insulated copper conductor single core cable etc as required. Group A Make Legrand/ Anchor/ Havells (SOR-Internal (Part-1)2007, 1.8.1)	(SOR-Internal (Part-1)2007, 1.8.1)	55.00	Nos.	264.00	14520.00
102		Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated copper conductor, single core cable in surface / recessed PVC conduit as required. 2 x 1.5 sq.mm + 1 x 1.5 sq. mm earth wire. Make Polycab/ Havells/ Anchor (SOR-Internal (Part-1)2007, 1.14.1)	(SOR-Internal (Part-1)2007, 1.14.1)	300.00	Mt.	71.00	21300.00
103		Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of PVC insulated copper conductor, single core cable in surface / recessed PVC conduit as required. 2 x 2.5 sq.mm + 1 x 2.5 sq. mm earth wire. Make Polycab/ Havells/ Anchor (SOR-Internal (Part-1)2007, 1.14.2).	(SOR-Internal (Part-1)2007, 1.14.2)	650.00	Mt.	81.00	52650.00
104		Wiring for circuit/ submain wiring alongwith earth wire with the following sizes of PVC insulated copper conductor, single core cable in surface / recessed PVC conduit as required. 2 x 4 sq.mm + 1 x 4 sq. mm earth wire. Make Polycab/ Havells/ Anchor (SOR-Internal (Part-1)2007, 1.14.3).	(SOR-Internal (Part-1)2007, 1.14.3)	100.00	Mt.	97.00	9700.00
105		Supply and fixing of metal box of 150mm x 75mm x 60mm deep (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including providing and fixing 3 pin 5/6 amps socket outlet and 5/6 amps piano type switch, connection, painting etc. as required. (For light plugs to be used in non residential buildings). Make Legrand/ Anchor/ Havells (SOR-Internal (Part-1)2007, 1.29).	(SOR-Internal (Part-1)2007, 1.29)	30.00	Nos.	102.00	3060.00
106		Supply and fixing of metal box of 180mm x 100mm x 60mm deep (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including providing and fixing 6 pin 5/6 amps & 15/16 amps socket outlet and 15/16amps piano type switch, connection, painting etc. as required. Make Legrand/Anchor. (SOR-Internal (Part-1)2007, 1.30).	(SOR-Internal (Part-1)2007, 1.30)	14.00	Nos.	161.00	2254.00
107		Stepped type Fan regulator. Make Legrand/Anchor/Havells (SOR-Internal (Part-1)2007, 1408)	(SOR-Internal (Part-1)2007, 1408)	8.00	Nos.	207.00	1656.00
108		Modular blanking plate. Make Legrand/ Anchor/ Havells (SOR-Internal (Part-1)2007, 1411)	(SOR-Internal (Part-1)2007, 1411)	55.00	Nos.	7.00	385.00
						TOTAL	351930.00

We hereby quote our rates
93 to 108.

% Above/ At Par/ Below to DSR'2007 Rates for all items Sl. No.

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NON-SCHEDULED ITEMS

SECTION-B (Civil Works)

SN	Description of Work	Non-Scheduled Items	Total Qty.	Unit	Rate	Amount (In Rs.)
109	Shifting of pipes and cables including disposal of unserviceable material within 50 metres lead as per direction of engineer-in -charge.		475.00	Rmt.		
110	Dismantling of RCC/PCC of length exceeding 8m but not exceeding 11m including wire/cable.		12.00	Nos.		
111	Layout of building and making reference pillars etc. complete with all respect as per instruction of engineer-in-charge.		8310.00	Sq.Mt.		
112	Layout of building and making reference pillars etc. with checking of alignment, top levels, span diagonals, foundation top, column, crane girders, rails by using modern electronic surveying instrument like total station complete with all respect as per instruction of engineer-in-charge.		2735.00	Sq.Mt.		
113	Providing and injecting chemical emulsion for Pre-constructional anti-termite treatment and creating a chemical barrier under and around the column pits, wall trenches, basement excavation top surface of plinth, filling junction of walls and floors , along the external perimeter of building, expansion joints, surrounding of pipes and conduit etc. complete plinth area of the building at ground floor only shall be measured as per IS 6313 (Part- II 1981) Aldrine exulsifiable concentrate or any other approved material such as chloropyriphos or Heptachlor or chlordance will be used. The rate of application of chemical emulsion shall be as follows:		230.00	Sq.Mt.		
(i)	Treatment for Masonary and foundation 5 liters per Sq.Mt.					
(ii)	Back fill in immediate contact with foundation 7.5 liters per Sq.Mt.					
(iii)	Treatment of top surface of plinth filling 5 litres per Sq.Mt.					
(iv)	Treatment of junctions of walls and the floors 7.5 litres per Sq.Mt.					
(v)	Treatment of soil along External perimeter of building 7.5 litres per Sq.Mt.					
(vi)	Treatment of soil under apron along external perimeter 5 liters per Sq.Mt.					
114	Supply & filling of good earth in plinth under floors including watering, ramming, consolidating and dressing complete including supply of all material, labour,T&P, royalties and duties etc required for proper completion of work.		145.00	Cu.Mt.		
115	Making grooves 10 mm to 12 mm wide 8mm deep in plaster of the wall or in ceiling vertically or horizontally as required.		31.00	Rmt.		
116	Making drip course in sun shade or facia as per direction of engineer-in-charge including supply of all materials labour etc. required for proper completion of the work.		42.00	Rmt.		

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117		Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require :White Vitreous China Angle back wash basin size 600x480 mm (oval shape) with single 15 mm C.P. brass pillar tap.		5.00	Nos.		
118		Dag belling 15 cm (6) deep one line alligned flags and Jhandies and directed by engineer in charge. & Fixing of levels along pipe line both sides.		1700.00	Rmt.		
119		Fencing with angle iron post placed at top of each column in 'Y' shape of ISA- 35x35x6mm embedded in RCC top beam, it also includes the Concertina Coil of 600mm dia. With GI staples, turn brackets complete with all respect as per instruction of engineer-in-charge.		1000.00	Rmt.		
120		Supply and fixing of PVC pipe 225mm dia. for inlet, outlet and over flow complete with all respects.		225.00	Rmt.		
121		Bore hole 400 mm dia. 50m depth complete with all respects.		250.00	Rmt.		
122		Supply and installation of 200 mm dia. Perphorated PVC pipe complete with all respects.		250.00	Rmt.		
123		2.00 to 4.75mm size pea Gravel supply and filling in between bore hole and perphorated PVC pipe.		25.00	Cu.Mt.		
124		2.00 to 4.75mm size Gravel, supply duly screened and washed.		27.00	Cu.Mt.		
		FABRICATION WITH PAINTING WORKS					
125		Fabricating and erecting structural steel works at all heights comprising sag rods floor beams, columns, girders, rails bracings, clamps, purlins with channels & angles, gutters with M.S. plates, M.S. flat supports including all connections as per detailed drawings connected steel works etc. cleats, gusset plates all bolts, nuts washers base plates anchor bolts etc., as per detailed drawings cutting welding and painting 2 coats of red oxide primer before erection & 2 coats of synthetic enamel paint of approved brand & colour after erection complete. Advani made electrodes or other approved make electrodes are to be used. All bolts nuts washers, gas, electrodes paints are in contractor's scope.		17100.00	Qtl.		
126		Providing, erecting and fixing of SMP color coated Galvolume Sheet (approved Make) trapezoidal profile 0.5 mm thick. Sheeting in its place with the fasteners of high quality corrosion resistant grade of self tapping/self drilling (STSD) type approved make provided with suitable cap fixed at the rate not more than 1.5 m center to center. (detail are given in Annexure -I).		11000.00	Sq.Mt.		
127		Polycarbonate Sheet : Providing, fitting and fixing, fire retardant and U.V. resistant polycarbonate clean sheet of minimum 3mm thickness (profile to match with profile of metal sheeting) at various elevations including all labour, material, fasteners, scaffolding, equipment and side laps, cutting of openings, preparation of working drawings, testing etc. all complete as per specifications, Drawings and instructions of the Engineer. (details are given in Annexure - I.)		4000.00	Sq.Mt.		
128		Supply and fixing Aluminium Composite Panel (ACP) 4mm thick complete with structural frame work and necessary fittings with all respect as per instruction of engineer - in - charge.		70.00	Sq.Mt.		
		FIRE FIGHTING SYSTEM					

129		S.I.T.C. external (yard)hydrant stand post type comprising of stand post, plain duck foot flanged bends, butterfly valve 80mm (PN 1.6)and single headed S.S male coupling valve confirming to IS:5290:1985.The stand post column shall be galvanized iron size 80 mm confirming to IS:1239 (heavy class) The out let shall be angled to the ground with an instantaneous spring lock type gun metal female coupling of 63 mm dia for connecting to the hose pipe (as per drawing) (OMEX/SB)		12.00	Nos.		
130		S.I.T.C. first aid fire hose reel wall mounting swinging type complete with drum bracket and 20mm dia 30 mtr. Long high pressure Dunlop hose reel IS:444 tubing with gun metal shutoff nozzle confirming to IS: 8090-1976 with 5 mm orifice. The hose reel shall be as per IS:884-1985 (OMEX)		12.00	Nos.		
131		Providing 100% synthetic flax canvas NON-percolating Fire Hose type "A" ISI marked 63 mm dia 15 mtr. Long with S.S & female coupling (IS: 903 bound & riveted to hose pipes with copper rivets and copper wire. (OMEX)		24.00	Nos.		
132		Providing and fixing of 63 mm dia short branch with 20 mm dia nozzle		12.00	Nos.		
133		Providing fixing testing and commissioning of M.S pipe (IS:1239/3589 part-1-2) medium class (B) including cutting screwing welding etc. and providing all fittings. The cost shall include for cost of elbows, reducers, clamps, hangers, etc. as required, including cutting holes and chases in brick or RCC walls/slabs and making goods complete. (TATA C Class Heavy)					
(a)		150 mm dia (APROX)		60.00	Rmt.		
(b)		80 mm dia (APROX)		60.00	Rmt.		
134		S.I.T.C. of butterfly valves class PN-1.6 including welding of flanges nut bolt rubber packing etc.					
(a)		150 mm dia		1.00	Nos.		
135		S.I.T.C. of N.R.V. including welding of flanges nut bolts rubber packing etc. ISI marked					
(a)		150 mm dia		1.00	Nos.		
136		S.I.T.C. of Gun Metal gate valve ISI marked screwed type IS:778-1984 25 mm		12.00	Nos.		
137		S.I.T.C. of Aluminium fire hose cabinet standard size (600x500x300 mm) 1.6 MM sheet with front glass door and locking arrangement		12.00	Nos.		
138		S.I.T.C. Fire Brigade inlet four way connection at under ground tank comprising of the following (a) 4 Way suction collecting head of CI body 63mm dia. With instantaneous type male coupling, and blank cap and chain.		1.00	Nos.		
139		ISI marked 5 kg capacity ABC type fire extinguishers with high pressure discharge hose, squeeze grip nozzle.		25.00	Nos.		
140		ISI marked 4.5 kg capacity co2 type fire extinguishers with high pressure discharge hose, squeeze grip nozzle.		25.00	Nos.		
141		Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete (reinforcement bars will be supplied free of cost from BHEL store).Thermo-Mechanically Treated bars.		2160.00	Qtl.		
142		Making groove in floor of size (4.50m x 4.50m) & 10mm wide and 12mm deep in green concrete (within 24 hour from casting) filling the grove by poly sulphide sealant using masking tape and repair of edges if required complete with all respect as per instruction of engineer-in-charge.		5085.00	Rmt.		
143		Making septic tank capacities 50 users of size (3.70 x 0.90 x 1.20m). The liquid surface there should be free board (open space of 30cm to 45cm.complete with all respects as per instruction of engineer in charge.		01	No.		

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SECTION-B (Electrical Works)

S.N.	DSR Code	Description of Work	Non-Scheduled Item	Total Qty.	Unit	Rate	Amount (In Rs.)
144		Supply, Installation, Testing & Commissioning of Main Lighting Distribution Panel as SLD Drg. No. FP/EL-01 shall be made CRCA sheet 2 mm thk. Powder Coated Comprise Pattern each MCCB Feeder Details as under I/C - 250 A MCCB Micro Processor - O / L, S / C & E / F equipped, O/G - 63 A, 4-Pole, MCCB, 25 KA breaking capacity, 18-Nos., Make - L & T, Semiens And Schneider/Legrand		1.00	Nos.		
		BUS-BAR - Main 300 A TPN EC Gr. / incase of Al. Bus Bar Size 50 x 6 mm. Shall be used and MCB 63 A shall be connect from main busbar incase of CU wire 16 sq mm. and 32 A MCB 6 sq mm.					
		METERING SET - Volt Meter and Ampere Meter 96 x 96 mm Flash Mounted Volt scale 0 -500 V, Ampere scale 0-250 A, CT - Ratio tape bound 250 / 5 - dia 75 mm. 3-Nos. VSS and ASS R, Y & B indication procured with 6 A control Fuse.					
145		Supply and fixing of integral industrial highbay light of 250 Watt, revenue high bulb with high pressure, metal halide with connection & Mounting Arrangement by using of 25 x 3mm MS Angle. Make Phillips HPK 225 HPL 250.		320.00	Nos.		
146		Earthing BFC chemical 70 mm, 3 mt. long with earth chamber for lighting arrester.		8.00	Nos.		
147		Earthing BFC chemical 50 mm, 3 mt. long with earth chamber for body earth and neutral.		14.00	Nos.		
148		Copper lighting arrester suitable for 6 KA.	-	4.00	Nos.		
149		Supply and laying of GI Strip (50 x 6mm) for body earth with using by GI clamp.	-	1350.00	Mt.		
150		Supply and laying of 4c x 16mm ² copper armoured cable in trench. Make Gloster/Universal/CCI/ Torrent/National.		450.00	Mt.		
151		Supply and laying of 4c x 10mm ² copper armoured cable in trench. Make Gloster/ Universal/ CCI/ Torrent/National.		1175.00	Mt.		
152		Supply and laying of 4c x 4mm ² copper armoured cable in trench. Make Gloster/Universal/ CCI/Torrent/National.		1100.00	Mt.		
153		Supply and laying of 3c x 2.5mm ² copper armoured cable (Red, Black, Green Color) supported by U type MS clamp and necessary hardware. Make Gloster/ Universal/ CCI/ Torrent/ National.		5900.00	Mt.		
154		Supply and laying of GI strips (25 x 6mm) with using by 25 mm DMC Insulator for Lighting Arrester.		200.00	Mt.		
155		Providing and making of cable termination by using heavy duty single compression brass gland and by using aluminium, copper crimping lug.					
(a)		4C x 16 mm ²		32.00	Nos.		
(b)		4C x 10 mm ²		23.00	Nos.		
(c)		4C x 4 mm ²		20.00	Nos.		
(d)		3C x 2.5 mm ²		153.00	Nos.		
156		Supply and fixing of 1200mm dia swing ceiling fan, 1 phase, 230 volts with MS Fan box 3mm thick. Make Crompton Greves/ Khetain/Orient.		8.00	Nos.		

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157		Installation, testing and commissioning of 300 mm dia swing exhaust fan, 1 phase 230 volts with 19mm thick waterproof plywood duly painted. Make Crompton Greves/ Khetain /Orient.		6.00	Nos.		
158		Installation, testing and commissioning of Ceiling Mounted Light 36 Watt with 25mm MS Deep Junction Box. Make Phillips, TBX 322.		12.00	Nos.		
159		Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tube etc. directly on ceiling/ wall, including connection with 1.5 sq.mm FR PVC insulated, copper conductor, single core cable and earthing etc. as required. Make Phillips TC090.		10.00	Mt.		
160		Installation, testing and commissioning of wall bracket light / CFL, 18 Watt with holder. Make Phillips.		13.00	Nos.		
161		Installation, testing and commissioning of computer socket for computer network by using RJ-45 computer socket. Make Legrand/Anchor.		12.00	Nos.		
162		Supply and laying of computer wire CAT-6, using of 25mm PVC conduit. Make Polycab/Anchor.		1200.00	Mt.		
163		Supply and fixing of 32 amps, 240 volt SPN Industrial type socket outlet with 2 pole and earth metal enclosed plug top along with 32 amps "C" series MCB for AC/Make-Legrand/Schneider.		2.00	Nos.		
164		Supply and laying of 8 SWG GI wire.		295.00	Mt.		
165		Supply and fixing of decorated basin light with 10 watt CFL. Make Phillips FBH120 PLC.		8.00	Nos.		
166		Installation, Testing and Commissioning of 100 KVA, LT Transformer 0.4/0.4 KV, oil cooled, indoor type. Both side cable box required.		1.00	Nos.		
167		Supply of Galvanized Steel High Mast Lighting System of 20 Mtrs. With it accessories. Mast shall be in Two section, Hot Dip Galvanized and suitable with velocity as per IS:875 Part-3. It shall also include accessories for high mast including head frame, 6mm dia. stainless steel wire rope of 316 grade double drum winch, galvanized Lantern Carriage Symmetrically arrangement suitable for 12-Nos. Non integral flood light fitting with die cast aluminium housing and heat and resistant toughened glass cover IP-65 COMPLETE WITH 2 Nos. die cast control gear box for 400 watt luminaries (2x400 watt), 4 nos. 1 x 400 watt Non integral die cast flood light fitting with toughened glass cover IP-65 & its control gear boxes and lighting finial. The mast shall have an integral power tool installed inside the base compartment for its operation. the high mast having 150mm top, 460mm bottom, sheet thickness 3mm top & 4mm bottom PCD 550 mm (as per attached TDS) Foundation Bolts, anchor plate and template suitable for above mast. Make Crompton Greaves / GE/ Phillips		1.00	Nos.		



168	Supply of Galvanized Steel Mid High Mast Lighting System of 16 Mtrs. With it accessories. Mast shall be Hot Dip Galvanized and suitable wind velocity as per IS:875 Part-3. It shall also include accessories for mid high mast including head frame, 6mm dia. stainless steel wire rope of 316 grade double drum winch, galvanized Lantern Carriage Symmetrically arrangement suitable for 12-Nos. Non integral flood light fitting with die cast aluminium housing and heat and resistant toughened glass cover IP-65 COMPELETE WITH die cast control gear box for 1 x 400 watt Non intgra die cast flood light fitting with toughened glass cover IP-65 & its control gear boxes and lighting finial. The mast shall have an integral power tool installed inside the base compartment for its operation. the high mast having 150mm top, 460mm bottom, sheet thickness 3mm top & 4mm bottom PCD 550 mm (as per attached TDS) Foundation Bolts, anchor plate and template suitable for above mast. Make Crompton Greeaves / GE/ Phillips.		2.00	Nos.		
169	Supply and fixing of MS tray 300 mm (2mm thick) with duly painted.		175.00	Mt.		
170	Supply and fixing of Heat Extractor with Mounting Arrangement.		84.00	Nos.		
171	Providing and fixing telephone socket for telephone network by using RJ-11 phone Socket. Make Legrand/Anchor.		12.00	Nos.		
172	Providing and laying telephone network cable for Broadband, Internet telephone from administrative building. 20 pair Jelly field cable. Cable laying, 3" dia 2mm thick rigid PVC pipe (700mm) depth in ground. Make Polycab/Anchor/Havells.		400.00	Mt.		
173	Providing & laying telephone network cable for Broadband, Internet telephone with 5 pair telephone wire in 20mm dia 1.5mm thick rigid PVC pipe on RCC ceiling, False Ceiling & Wall. Make Polycab/Anchor/Havells.		400.00	Mt.		
174	Providing & Installation of 20 pair crown type telephone tag block box with 20 pair crown.		1.00	Nos.		
175	Supply and laying of 3.5c x 185mm ² aluminium armoured cable in trench. Make Gloster/Universal/CCI /Torrent/ National.		20.00	Mt.		
176	Providing and making of cable termination by using heavy duty single compression brass gland and by using aluminium, crimping lug. 3.5C x 185 mm ² .		4.00	Nos.		
GRAND TOTAL FROM SL.NO.109 TO 176						

NOTE: (1) Parties to quote their individual rates for all the Non-Scheduled items of Section-B related to Civil and Electrical works and appearing from Sl. No.109 to 176.

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SUMMARY OF THE PRICE BID

SNo	Description	Amount (Rs.)
(A)	SCHEDULED ITEMS	
A1	Total amount of Scheduled items (Sl. No. 1 to 92) of the Price Bid for Civil works on the basis of DSR 2007 Rates.	36222563.11
A2	Premium Amount Quoted on the above Scheduled items (Sl. No. 1 to 92 of the Price Bid.	
A3	Total amount of Scheduled items (Sl. No. 93 to 108) of the Price Bid for Electrical works on the basis of DSR 2007 Rates.	351930.00
A4	Premium Amount Quoted on the above Scheduled items (Sl. No. 93 to 108) of the Price Bid.	
(B)	NON-SCHEDULED ITEMS	
B1	Total amount of Non-Scheduled items (Sl. No. 109 to 143) of the Price Bid for Civil works.	
B2	Total amount of Non-Scheduled items (Sl. No. 144 to 176) of the Price Bid for Electrical works.	
	GRAND TOTAL (A1+A2+A3+A4+B1+B2)	

NOTE: Bidders are requested to fill the details of amount in blank column. In case of any error in filling the amount in this summary sheet, the amount quoted in Price Bid shall be considered final.

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Detailed Specification and List of Make of Different Materials

ANNEXURE-I

(A)	Galvolume Sheet					
	Supply and installation of SMP colour coated (blue etc) Galvolume (approved make) trapezoidal profile sheeting in its place with the fasteners of high quality corrosion resistant grade of self tapping / self drilling (STSD) type of "Hilti" or approved make provided with suitable cap fixed at the rate not more than 1.50 m center to center or with screw less profile (reverse profile), minimum 41 mm high crest depth placed @ 215-230 mm c/c , manufactured out of 0.55 mm (TCT) hi-tensile Galvolume steel (AZ-150 gsm) , Aluminium- Zinc alloy metallic coating total on both sides as per ASTM-792 A / AS: 1397, min. 550 MPa yield stress). Exterior coat of SMP (Silicon Modified Polyester), 20 micron top coat applied over 5 micron primer and a 5 micron polyester back coat applied over 5 microns primer as per IS: 14246. The sheet shall have wide pans with 2 small stiffening ribs for effective water shedding and special male/female ends for purlin spacing @ 1.5mtr. c/c. The cost includes all labour and T & P for any height required for proper completion of work as per direction of Engineer I/C.					
(B)	Polycarbonate Sheet					
	The section cover requirements of providing, erecting and fixing of polycarbonate sheet of approved colour and approved transparency on roof for the purpose of roof lighting. The material to be used shall not be less than 3mm thick, and shall be profiled to exactly match the profile of pre-quoted metal sheet to be used for general roof site cladding. Sheet shall be supplied in maximum length that can be transported and erected without causing damage to the sheet, but in any case the length shall not be less than 10m materials shall be free from scratches and other surface damage. Material shall be U-V treated and shall be tested quality.					
	Test	Procedure	Result			
	Flammability					
	Self ignition	ASTM 1929-3	570 o C			
	Smoke density	ASTM D 2843	54%			
	Burning extent	ASTM D 635	less than 1.0			
	Weathering					
	Weathering evaluation	ASTM D 4364-84	Successful exposure to concentrated Sunlight radiation			
	Colour change	ASTM D 2244	Not more than 3 units after 60 60 months			
	Light transmission	ASTM D 1003	Shall not decrease more than 10 points after 60 months			
	-Ditto-	-Ditto-	Shall not decrease by more than 6% after 10 years			
	Heat exposure	300oF/ 25 mins	No darkening effect			
	Water penetration	ASTM E 331	No penetration			
	Impact	ASTM E 822-81	Repels hail storm of 25 mm at Velocity of 21m/sec			
	Expansion/contraction		Linear thermal change of 0.065 mm / m /oC			

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	U-V Filtration	Australian Standard No. 1067	Transmission less than 0.1%	
	Modulus of Elasticity	DIN 53457	24000 kg / sq cm	
	Installation			
	Sheet shall be installed in sequence and fixed to purlin with polymer quoted galvanised hexagon heated self drilling self tamping screw side lap shall be as per manufacturer specification end lap shall be 225mm joints with metal sheet shall be shield with butyl – based adhesive the edge shall be shield with Silicone Sealant as per manufacturer specification and then covered with butyl – based adhesive tape. All materials and product shall confirm to the relevant standard specification IS codes ASTM and other relevant codes etc. The equivalent manufacturer will be only considered with prior approval of consultant in case of non-availability/unforeseen difficulties.			
	WATER PROOFING COMPOUND & OTHER CHEMICALS		SIKA, MC	
	PAINTS		ASIAN, NEROLAC	
	WALL PUTTY		J.K. WHITE, BIRLA WHITE	
	SANITARY FITTINGS		JAGUAR, PLUMBER, HINDWARE, CERA	
	GI PIPES		TATA, QST	
	TILES		KAJARIA, REGENT, SOMANY	
	MORTIC LATCHES		GODREJ	
	ELECTRICAL FITTINGS		HAVELLS, ANCHOR, PHILIPS	
	GLASS		SAINT GOBIN, MODI	
	GRIT		DALA GRIT	
	SAND		COARSE - DUDDHI	
			FINE - CHOPAN	
			LOCAL SAND - GANGA	
	GOLVOLUME SHEET		TRACKDECK, HILTI, DURACOAT, KERBY	
	POLYCARBONATE SHEET		GE Lexan, Danpolan, Dibbutz	

