

CENTRAL COALFIELDS LIMITED
OFFICE OF THE GENERAL MANAGER
KATHARA

Ref. No:- GM(KTA)/S.O(C)(Ws)/Tender/11-12 / 235

Dated:- 07 .10.11

NOTICE INVITING TENDERS

1. Sealed tenders in two parts are invited for the work detailed as below: -

Sl. No.	Name of work	Estimated Coast	Earnest Money	Cost of Tender document	Period of Completion
1.	Development and maintenance of new portico side with some petty job under Kathara GM Unit(Ws) at Kathara	Rs. 5,12,611.74	Rs 5,126.00	Rs. 285. (Inclusive VAT) 14%	3(Three) month
2	Strengthening of PCH transfer B/C gantry under Sawang Washery	Rs. 4,21,570.72	Rs. 4,216.00	Rs. 285. (Inclusive VAT) 14%	3(Three) month

2. Tender documents may be purchased from the Officer of the Staff Officer (Civil), Ws, Kathara, from **14.11.11 to 15.11.11** on deposit of the application fee in cash (non- refundable) with cashier, Kathara Washery/Sawang Washery upto 1.00PM on all working days except on Saturday upto **12.00** noon. Tender documents can also be purchased by depositing the application fee in the form bank draft of any Nationalized Bank in favour of CCL, EBC (Ws) Kathara payable at SBI, Kathara. . This tender document are also available on CCL website www.ccl.Gov.in. and can be downloading in due date and time i.e. within sale period of the tender . Such downloaded tender can be submitted alongwith the (Application fee) in addition to E/M etc as mentioned in NIT

3. Earnest money is to be deposited in the form of DD/ Certified cheque/irrevocable bank guarantee (from Nationalized Bank/ scheduled bank with validity 28 days beyond the validity of the bid in the format given in the bid document) in a separate envelope along with the tender. Certified cheque and demand drafts submitted as earnest money/bid security should be drawn in favour of CCL, EBC (Ws) Kathara on any nationalized bank/ schedule bank payable at SBI, Kathara.

4. (i) Tenders must be submitted in 2(Two) parts as specified in the tender document in the Office of Staff Officer (C)(WS), KTA, Kathara upto **1.00 Pm 17.11.11**.

(ii) Part- I tender will contain earnest money and documentary evidence in support of credentials of the tenderers as detailed in tender document whereas Part-II tender will containe price bid only. Part II tender of only those tenderers will be opened who will qualify on the basis of credentials submitted in Part - I tender.

Part - I of the tenders will be opened on **17.11.11** at 4.30PM in the office of **Staff Officer (C) (Ws), KTA, Kathara**.

5. The minimum eligibility criteria for consideration for award of the contract shall include the following: -

- a) The intending tenderers must have in its name as a prime contractor experience of having successfully completed similar works during last 7 (Seven) years ending last day of month previous to the one in which bid applications are invited (i.e. eligibility period) should be either of the following: - **Three similar** completed works each costing not less than the amount equal to 40% of the estimated cost.

OR

Two similar completed works each costing not less than the amount equal to 50% of the estimated cost.

OR

P/2

One similar completed work costing not less than the amount equal to 80% of the estimated cost. Similar nature of work shall mean: **“Experience of Diploma Holder”**. Working experience of only Govt./Govt. owned organization would be reckoned.

b) Average annual financial turnover of civil work during the last 3 (Three) years. Ending 31st March of the previous financial year should be at least 30% of the estimated cost.

The intending tenderers must submit documentary evidence in support of 5 (a) &(b) above in the form of certified copy of work order, completion certificate. Payment certificates/vouchers indicating the period of work for which the payment has been made.

6. In addition, the intending tenderers has to submit the following:

The tenderers shall have to ensure implementation of PF & Miscellaneous Provision Act.1948 and allied scheme. The tenderers should submit affidavit in this regard duly authenticated by Notary.

OR

Those tenderers who are registered under EPF scheme and their employees covered under the said scheme may continue to operate under EPF scheme. They should furnish such proof.

7.The validity of tenders shall be 4 (Four) months from the date of opening of price bid.

8.Following documents are required to be submitted with part I of the tender.

- a) Firm registration details / any other document of the firm.
- b) Credentials of satisfactory performance of contracts completed with full details of client’s location of work, cost & time taken for completion during the period as indicated at Sl. No.5.
- c) Current Bankers certificate of financial soundness (Issued within last one year from the date of issue of NIT).
- d) Registration with appropriate sales Tax authority and valid sales Tax clearance certificate.
- e) Photocopy of PAN card either of the firm or of the individual as the case may be.
- f) Affidavit in original to the effect that: -
 - I. None of the partners of the firm has either individually or collectively been involved in any criminal offence.
 - II. The agency shall not employ on this contract any close relative of any CCL's employees.
 - III. None of the partner of the firm has a relative employed in CCL.
 - IV. Credentials submitted by the tenderers are genuine.
- g) Particulars of registration/ clearance from appropriate provident fund authority or affidavit in original that the tenderers shall ensure implements ensure implementation of PF & Miscellaneous Provision Act. 1948 and allied scheme
- h) Part II :- Price bids only

9. Other edibility criteria and details required to be submitted with tender should be as detailed in tender document

10. Mere issue of tender document to intending bidders will not mean that they have fulfilled the requisite qualification criteria will be examined at the time of the evaluation of part -1 of the bid.

11. If any document submitted by the tenderers is found to be false on verification, legal / penal action will be taken against the tenderers including forfeiture of the earnest money & debarring from participating the tenderers in future.

12. CCL reserve the right to reject any or all the tenders with out assigning any reasons what so ever and to over and spilt up & distribute the work among more than one tender.
13. All the pages of tender documents, credentials should be signed by the tenderers including cutting / over writing
14. Incomplete tenders shall be out rightly rejected.
15. The decision of CCL in awarding the work shall be final and cannot be subject to arbitration.
16. No sub letting of work by the contractor is permissible.
17. Payment clause: Payment to the Contractor will be made by **E** payment through **RTGS / NEFT**

Staff Officer (Civil)(Ws)
KTA, Kathara

Copy to:

1. The D.T.(P&P) CCL, Ranchi.
 2. The C.G.M (Civil), CCL, Ranchi
 3. The G.M (Ws), KTA, Kathara.
 4. The G.M(Sys) , CCL,Ranchi.
 5. The Committee members.
 6. The Public relation officer CCL/Ranchi :- He is requested to arrange publication of NIT in paper .
 7. All CGM's and G.M's of Areas of CCL.
 8. All Staff Officer (Civil) of Area of CCL.- N.K, Piparwar ,Argadda, Barka-sayal, Kuju, B&K, Dhori, Kathara, C.W.S. Barkakana,Rajrappa, Rajhara and Charhi.-
 9. The Project Officer's Kathara Washery/ Sawang Washery/ Kedla// Kargali Washery.
 10. The A.F.M (Ws), KTA, Kathara.
 11. All Staff Officer (CP)(Ws), KTA Area Kathara
 12. The Project Engineer (Civil), Kathara/ Sawang /Kedla / Kargali Washery
 13. The Area Security Officer, (Ws) KTA, Kathara.:- He is requested to kindly depute security men for safety of tender box and remain present till sealing of tender box on the date of receiving tender.
 14. The Senior Cashier Kathara Washery/Sawang Washery.
- All Notice Board.

INFORMATION TO BE FURNISHED BY THE TENDERER

<u>Sl.No.</u>	<u>Particulars</u>	<u>Information to be filled by the Tenderer</u>
1.	Name of Tenderer	:-
2.	Whether the firm if Proprietorship 'or' Partnership.	:-
3.	If Proprietorship name of the Proprietor.	:-
4.	If Partnership firm name of the Partners.	:-
5.	If a partnership firm whether Partnership deed is enclosed.	:-
6.	Present address 'or' Address of correspondence.	:-
7.	Permanent address of the Contractor.	:-

Signature of Tenderer
with seal.

ADDITIONAL TERMS AND CONDITIONS

1. Earnest money :- 1% of the estimated cost put to tender.

2. Initial security deposit :- 1% of the award value (Inclusive earnest money) to be deposited before execution of agreement.

3. The total amount of security deposit will be 5% of the award value of the revised value of the Work as the case may be 1% of the award value is to be deposited before execution of the agreement value in the form of initial security deposit as mentioned at Sl.No.02 above. The balance 4% security deposit is to be recovered from 1st four running account bills.

4. Retention money :- In addition to the security deposit mentioned above 5% of the gross value of each bills will be kept back as retention money. The amount so retention will be refunded along with the final bill.

5. Supply of materials :- All materials required for the completion of the work are to be arranged by the contractor. All the materials should confirm to the relevant ISI specification.

Signature of
the tenderer

Tender document
issuing authority

DECLARATION REGARDING C.C.L. EMPLOYEES RELATIVES

I / We declare

- (i) That I / We will not employ this contract any close relatives of any C.C.L.'s employees.**
- (ii) That I or any of the partners of our firm do not have any relative in C.C.L.**
- (iii) That following C.C.L.'s employees are related to me / partner of the firm indicated below:-**

Sl.No.	Name of CCL employee with designation and place of posting.	Related to Shri.

Declaration regarding criminal offences :

- (a) We hereby declare that none of the partners of the firm has of other individual in any criminal offences.**

Signature

- (b) I hereby declare that I have not been involved in any criminal offences.**

Signature

DECLARATION

I have gone through the General terms and condition of contract of C.C.L. and I undertake to abide by these conditions. I am also legally bond to follow other conditions as stipulated in standard agreement form of C.C.L.

Signature of Tenderer

BIO-DATA OF THE TENDERER

1. Name of the Firm :

2. Whether it is a proprietorship firm or Partnership firm. :

3. If proprietorship firm, name of the the proprietor. :

4. If partnership firm, name of the partner :

5. If partnership firm whether partnership deed enclosed . :

6. Address of the Firm :

Permanent :

Correspondence :

7. Name of person who has signed the tender: document whether as proprietor or partner.

Signature of tenderer

BCW, Area
PART-I TENDER
TENDER DOCUMENT

Sl. No.	Particulars	Details
1.	Name of Work	I. Development and maintenance of new portico side with some petty job under Kathara GM Unit(Ws) at Kathara II. Strengthening of PCH transfer B/C gantry under Sawang Washery
2	Estimated Cost	(i) Rs. 5,12,611.74 (ii) Rs. 4,21,570.72
3	Cost of Tender Paper	(i)Rs.5,126/- + 14% VAT (ii)Rs. 4,216//- + 14% VAT
4.	Tender Notice No. & Date	Ref. No:- GM(KTA)/S.O(C)(Ws)/Tender/11-12/ Dated:- .10.11
5.	Date & time for receipt of tender	14.11.011 to 15.11.11 upto 1.00PM
6.	Date & time for opening of tender(Part-I)	17.11.11 at 4.30PM
7.	C.R. No.,& date against deposit of cost of tender documents.	
8.	Name & Address of tenderer to whom tender document issued.	

Signature of tender issuing authority

Tender document prepared by

AMENDED TERMS & CONDITIONS

- The amount of Earnest Money as per revision in Civil Engg. Manual has been fixed as 1% of the estimated cost subject to a maximum of Rs. 50.00 lakh.
 - Security deposit shall consist of two parts –
 - a) Performance security / Security Deposit amounting to 5% of the award value including earnest money shall be deposited by the contractor before execution of the agreement or within a period mentioned in the work order and in any case is to be deposited prior to the commencement of any payment to the contractor.
5% Performance Security (Security Deposit) shall be refunded within 14 days of the issue of Defect Liability Certificate (Taking Over Certificate with a list of defects).
 - b) All running on a/c bills shall be paid at 95% of work value. This 5% deduction towards retention money will be the 2nd part of security deposit. The retention money is to be refunded after issue of No Defect Certificate.
-

Signature of Contractor

**CENTRAL COAL FIELDS LIMITED
BCW,AREA**

UNDERTAKING BY THE CONTRACTOR

I/We, undertake to abide by the following conditions which are not enclosed in the tender document but are covered in the standard tender booklet of CCL.

- General Terms and conditions except the clause related to mobilisation advance and escalation clause covered under “Additional terms & conditions.”
- Additional safety measures
- List of approved manufacturers.
- Specifications.
- General specification for plumber’s work.

Signature of Contractor

BCW, Area
PART-I TENDER
TENDER DOCUMENT

Sl. No.	Particulars	Details
1.	Name of Work	III. Development and maintenance of new portico side with some petty job under Kathara GM Unit(Ws) at Kathara IV. Strengthening of PCH transfer B/C gantry under Sawang Washery
2	Estimated Cost	(i) Rs. 5,12,611.74 (ii) Rs. 4,21,570.72
3	Cost of Tender Paper	(i)Rs.5,126/- + 14% VAT (ii)Rs. 4,216//- + 14% VAT
4.	Tender Notice No. & Date	Ref. No:- GM(KTA)/S.O(C)(Ws)/Tender/ 11-12/ Dated:- .10.11
5.	Date & time for receipt of tender	14.11.011 to 15.11.11 upto 1.00PM
6.	Date & time for opening of tender(Part-I)	17.11.11 at 4.30PM
7.	C.R. No.,& date against deposit of cost of tender documents.	
8.	Name & Address of tenderer to whom tender document issued.	

Signature of tender issuing authority

Tender document prepared by

PRICE BID

To,

The General Manager,
BCW, AREA.

Sub.:

Ref.:

Dear Sir,

I/We have gone through the Terms & Conditions of contract of CCL and after inspection of site of work I/We are quoting below our lowest rate for the work.

Particular	Rate quoted
Estimated Cost of the work	
Rate to be quoted in %age above or below in figure & word.	Rs.
Amount worked out both in figure & word.	Rs.

Signature of tenderer

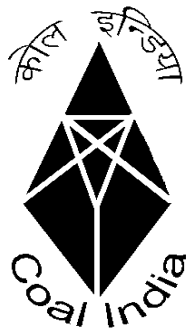
Estimate for Patch repair of road from Gaytri colony more to CPP Railway crossing at Kathara

SN	Particulars	Qty.	Rate	Amount	Remarks
1					

TOTAL

CENTRAL COALFIELDS LIMITED

(A Subsidiary of Coal India Limited)



DETAIL TENDER DOCUMENT

**PART – I OF TENDER
TENDER DOCUMENT ISSUE DETAILS**

NAME OF WORK: _____

TENDER NOTICE NO. AND DATE _____

DATE AND TIME OF SUBMISSION OF TENDER _____

DATE AND TIME OF OPENING TENDER _____

COST OF TENDER DOCUMENT: _____

ISSUED TO / SUBMITTED BY:

NAME OF TENDERER: _____

POSTAL ADDRESS: _____

e-mail address _____

Telephone No. _____

Mobile No. _____

Against deposit of cost of tender document vide CR / DD No. _____ Dated _____

This document contains – _____ Pages for Part – I
and _____ Pages for Part – II

For General Manager

BASIC INFORMATION FOR BIDDERS

1. Name of work
(To be superscripted on
tender covers / envelopes) -:
2. Sealed tenders in 2 parts will be received in the Office of the Staff Officer (Civil), CCL, AT+PO: BCW, Area , Distt. Bokaro (Jharkhand)
3. Closing of receipt of tenders on
4. Opening of Part-I of tenders on..... Opening of part –I I of the tenders : to be notified to all the successful bidders in Part – I of the tenders.
5. Sale of tender document : fromTO.....
6. **Price of tender document (non-refundable) to be paid in cash / bank draft From Nationalized bank, drown in favour of CCL,EBC(Ws),Kathara payable at Kathara**
7. **Earnest Money deposit in the form of Bank draft from Nationalized Banks bank draft From Nationalized bank, drown in favour of CCL,EBC(Ws),Kathara payable at Kathara**
8. No interest is payable on this earnest money deposit even in case of successful bidders in whose cases the money will be retained for conversion as part of security deposit.
9. Validity of tender from date of opening of Part-II of the tender or revised price bid, if any : 4 (four) months.
10. In case of tender document down loaded from the web site the cost of T.D (application fee) should be submitted in a separate envelope marked PART –III . along with a undertaking that the tender documents as available in the website is accepted and their tender may be rejected, if any tampering in the tender document is found to be done at the time of opening of tender.

CONTENTS OF PART – I

PART – I OF TENDER SHOULD CONTAIN

- a. Details of Earnest Money. AS MENTIONED IN NIT (refer CL3. OF DETAIL TENDER NOTICE)
- b. In case of Firms, registration or proof of application for registration, partnership Deed and Power of attorney in the case of partnership firms, affidavit regarding proprietorship in the case of proprietorship firm/Articles of Association, Memorandum in the case of Company / declaration of individual concern.
- c. Photo copy of PAN card of income tax and Valid sales tax registration / clearance /, Under prevailing sale tax rule of state.
- d. Credentials on satisfactory performance of contracts completed in the past as per the following

Eligibility Criteria :

- a. Average annual financial turnover during the last 3(three) years ending 31st March of the previous financial years should be at least 30% of the estimated cost.
- b. Experience of having successfully completed similar works during last 7(Seven) years ending last day of Month previous to the one in which applications are invited should be either of the following.

Three similar completed works costing not less than the amount equal to 40% of the Estt. Cost.

OR

Two similar completed works costing not less than the amount equal to 50% of the Estt. Cost.

OR

One similar completed work costing not less than the amount equal to 80% of the Estt. Cost.

Definition of similar nature of work: AS MENTIONED IN ENCLOSED NIT

WORKING EXPERIENCE ONLY IN GOVT./ GOVT OWNED ORGANISATION WOULD BE RECKONED.

- a. Affidavit to the effect that none of the partners of the firm has either individually or collectively been involved in criminal offences AND ALL THE CREDENTIALS SUBMITTED BY THEM ARE GENUINE in the enclosed format.(SEE ANNEX-VI)
- b. Affidavit to the effect in the enclosed format that the agency shall not employ on this contract any close relative of CCL's employee. Should the tenderers being an individual have a relative employed in CCL or in the case of partnership firm / or company under the Indian Company's Act and it, such firm / or company under the partner / shareholder whose relative in employed in CCL. The same should be declared at the time of submission of fact subsequently comes to light and the contract may be rescinded if already entered into tenders failing which the tender may be rejected if such.
- c. Details of construction equipment to be deployed on the job. The contractor must submit documentary evidence of possession of or have firm arrangement with others road making machines such as Hot-mix plant, Paver mechanical power, grader and Road Roller and all survey equipments required for road construction.
- d. Any nationalized Bank's reference/certificate of transactions in a year in the recent past for business of executing contracts assets owned, if any etc.
- e. Tender document issued by CCL (PART – I) every page should be duly signed. CCL Reserves full right to reject any tender at Part –I stage in case any information as required is lacking in Part-I of tender and no appeal against CCL's decision will be entertained.
- f. List of technical persons to be engaged in the work.
- g. Declared and logical construction programme based on PERT net work is to be furnished.
- h. Tenderers(s) submit an affidavit regarding genuineness of the credential submitted by them.
- i. All the format / information's must be filled / provided duly authenticated by the Tenderer. Incomplete tenders will be rejected outright.
- j. The tenders should go through NIT requirement carefully regarding eligibility criteria and other and ensure submission of relevant documentary evidence along with the date.
- k. Declaration to the effect that no condition has been given in the price bid envelope no. II.
- l. Documents submitted along with the tender shall be final. No further correspondence with regard to documents submitted shall be made with the tenderers. Decision regarding the qualification of the tenderers shall solely depend on the documents once submitted.

PART – II OF THE TENDER SHOULD CONTAIN

Price – bid indicating the rate offered along with the schedule of quantities each page duly signed

(Also refer to instruction in enclosed NIT)

INSTRUCTIONS TO TENDERERS

1. Tenderers who want to download the T.D. directly from the CCL Website, they may do so in the following manner :

Download the Part – I

Download the Part – II

2. Use separate envelopes for Part – I and Part – II and enclose them together in another covering envelope for each work.
3. Strike off the work, which is not applicable (if any).
4. Separate tender is required to be submitted for each work (if applicable).
5. All the pages of tender must be signed.
6. Part – II envelope should contain signed BOQ of relevant work with quoted rate on percentage basis / item rate basis as indicated.
7. For other information detailed tender notice may be referred to.
8. For any query, may contact -Office of Staff Officer (Civil)
(During Office Hours) Central Coalfields Limited,
AT+PO: BCW, Area
Distt. Bokaro (Jharkhand)
PIN – 829 116.
9. Utmost care has been taken to place the correct information / data as per original TD. However, if the tenderers find any discrepancy in the downloaded T.D. that might have occurred due to inadvertent error / problems in downloading, they are requested to preferably go through the master copy of the T.D. available in the Office of Staff Officer (Civil) to sort out the same, if they feel so.
10. While submission of the downloaded tender document, the tenderers must enclose a certificate that “the tender document has been downloaded from website & in case it is found that the documents are tampered, the tender will be summarily rejected”.

11. In case of downloaded tender document, cost of tender document should be deposited through a separate Demand Draft enclosed in a separate envelope besides the one for depositing Earnest Money.

LETTER SUBMITTING TENDER

To

.....
.....
.....

Dear Sirs,

With reference to the tender invited by you for the construction
.....
.....
.....

I / We do hereby offer to execute the works under contract at the respective rate mentioned in the bill of quantity I / We have examined the Drawings, seen the site and read the articles of agreement, conditions of contract, specifications and special clauses forming part of the bill of quantity. I / We agree to finish the whole of the works within calendar months inclusive of coming monsoon form the date of getting possession of the site or order to start work.

I/We have deposited Rs. _____ (Rupees _____) only by Cash / Bank draft (Nationalized bank) in favour of **favour of CCL,EBC(Ws),Kathara payable at Kathara**

I / We have deposited as Earnest Money Rs. (Rupees only) by a Bank Guarantee / Bank draft in favour of CCL which amount is not to bear any interest. I / We do hereby agree that this sum shall be forfeited by you in the event our tender is accepted and I / We fail to execute the contract when called upon to do so.

I / We understand that you are not bound to accept the lowest or any tender that you receive.

Name of partners of the firm:

Yours faithfully,

Name of our Bankers

Tenders submitted on before P.M.

DECLARATION

**I/We hereby declare that there is no condition in Envelope No.
II i.e. Price bid.**

Signature of Tenderer

DETAILED TENDER NOTICE

1. Sealed tenders in prescribed forms and parts with the name of works superscribed as
.....
.....

(description of work, place, Tender Notice No. and date)

on each of the envelopes are invited from bonafide and experienced contractors and will be received at the Office of the Staff Officer (Civil), CCL, BCW , Area, AT+PO: BCW, Area Distt- Bokaro (Jharkhand) – PIN 829 116 upto on.....All tenders will be opened at..... on in the presence of the attending tenderers or their authorised representatives who wish to be present .In case where the tender is in two parts, only Part-I, will be opened on the above day and time.

2 (a) Tenders should be submitted in the prescribed form in time. These forms together with the proposed contract document including specifications and tender drawings (if available)may be obtained from the above office during normal working hours on payment of requisite amount as indicated in NIT, as application Fee for each set. **Earnest Money deposit in the form of Bank draft from Nationalized Banks bank draft From Nationalized bank, drown in favour of CCL,EBC(Ws),Kathara payable at Kathara / General specification and description of work is enclosed with the tender document.**

2 (b) Any Bids received after the deadline prescribed at Clause 1 above due to any reasons whatsoever will not be accepted.

In the event of the specified date for the submission of bids being declared a holiday by the employer, the bids will be received upto the appointed time on the next working day.

2 (c) Tenders thus submitted shall consist of the following (also refer NIT)

- I. Complete set of tender documents as sold, duly filled in and signed on all pages and at different places as required of the tender documents including Part I & Part II of the tenders as per the tender notice as applicable.
- II. Sales-tax clearance certificate copy attested by a Gazetted Officer of the Govt. (Central or State) also refer to NIT

III. PAN (Permanent I. Tax Account Number)

IV. Earnest money deposit (as specified hereafter)

V. Power of Attorney in the case the tender is signed by an authorised representative of the tenderer.

VI. Full name and address of the tenderer shall be written on the bottom left hand corner of the sealed cover.

VII. All other documents required as per NIT.

2 (d) The tender document in which the tender is submitted by the tenderer shall become the property of the Company shall have no obligation to return the same to the tenderer.

2 (e) The Tender shall be submitted,

EITHER

* in Two Envelope System with the first envelope containing credentials (duly authenticated by the bidder) in support of his qualifications in accordance with the eligibility criteria along with the EMD in a separate envelope and the second envelope containing the uly filled in Tender Document superscribing Envelope I , II and EMD on the cover

OR

* in two parts as indicated in the Notice Inviting Tenders. Part-I shall consist of any deviations from terms & conditions of the tender and additional terms & conditions and if asked for, technical bid and credentials.

Part II shall consist of tender documents as sold to the tenderers duly filling in rates, amounts etc.i.e. price bid.

The Earnest Money Deposit is to be submitted in a separate Envelope altogether ; superscribing "Earnest Money Deposit"; and not inside the envelope containing Part I or part II of the Bid.

The Part I & Part II should also be put into separate sealed envelopes superscribed as such. Thereafter all the three envelopes should be submitted in a sealed envelope with appropriate superscription.

The date of opening of the Second Envelope or Part II of the tenders shall be communicated in due course after consideration of First Envelope or Part-I.

(* STRIKE OUT WHICHEVER IS NOT APPLICABLE AS PER THE ESTIMATED VALUE OF THE WORK)

2 (f) Each bidder shall submit only one bid for one package. A bidder who submits or participates in more than one bid (other than as sub-contractor or in case of alternatives that have been permitted or requested) will cause all the proposals with the bidders' participation to be disqualified.

3. Earnest money bid security @ 1% of the estimated cost(rounded to a nearest hundred rupees) subject to maximum of Rs. 50 lac is to be deposited in the form of irrevocable bank guarantee(from scheduled bank/Nationalised bank with validity 28 days beyond the validity of the bid in the format given in the bid document in a separate envelop along with the tender. Certified cheques and demand drafts will also be acceptable as earnest money/bid security drawn in favour of Central Coalfields Ltd. on any scheduled bank payable at its branch at Ramgarh Area. For works valued upto Rs. 5 lacs the earnest money may be deposited in cash or in the aforesaid form .In case of earnest money deposit by cash,cash receipt is to be submitted in a separate envelop along with the tender. Earnest money/bid security of the unsuccessful bidder shall be refunded as promptly as possible after opening of price bid and finalization of the tender and shall bear no interest.

4. No tender shall be considered unless accompanied by the said Earnest Money.

5. The earnest money will be retained in the case of successful tenderer and refunded to the unsuccessful tenderer in due course and will not carry any interest. The earnest money deposited by the successful tenderer will be dealt with as provided elsewhere in the tender documents.

6 (a) Site Investigation Report: The contractor, in preparing the bid, shall rely on the site investigation report referred to in the bid document, supplemented by any information available to the bidder.

6 (b). Every tenderer is expected, before quoting his rates, to go through the requirements of materials/workmanship under specification/requirements and conditions of contract and to inspect the site/area of the proposed work.

In case of item rate tender a schedule of quantities is enclosed with the tender document. He should quote specific rate for each item in the schedule and the rates shall be in rupees and paise. The rates shall be written both in words and figures and the unit in the words and the amount against each item totaled. In the event of any discrepancy between the description in words and figures, the description in words will prevail. The rates for the work should be inclusive of all incidentals, overheads, all taxes, Octroi's, duties, leads, lifts, carriage, tools & plant etc. as required for execution and completion of the work. It shall be deemed that the tenderer has visited the site/area and got fully acquainted with the working conditions and other prevalent conditions and fluctuations thereto whether they actually visited the site/area or not and have taken all the above factors into account while quoting his rates.

7 (a) Corrections where unavoidable, shall be made by crossing out and rewriting duly authenticated with full signature and date by the tenderer. Erasing or over-writing in the tender documents may disqualify the tender.

7 (b) The tender shall be submitted either in English or in Hindi.

7 (c) Cost of Bidding: The bidder shall bear all costs associated with the preparation and submission of his bid and the Employer will in no case be responsible and liable for those cost

8. 8. The tenderer shall closely study all specification in detail, which govern the rates for which he is tendering.
9. Sales-tax clearance certificates for the last financial year or the last assessment whichever is later or proof of filing the returns for the previous financial year should accompany the tender.
10. The work should be completed within the period as stipulated in NIT from expiry of ten (10) days from the issue of letter of acceptance of tender/work order or handing over the site or handing over reasonable number of working drawings to the contractor or the period of mobilization allowed in the work order for starting the work in special circumstances, whichever is latest.
11. On completion of the work all rubbish, debris, brick bats etc. shall be removed by the contractor(s) at his/their own expense and the site cleaned and handed over to the company and he/they shall intimate officially of having completed the work as per contract.
12. The Company does not bind itself to accept the lowest tender and reserves the right to reject any or all the tenders without assigning any reasons whatsoever and to split up the work between two or more tenderers or accept the tender in part and not in its entirety.
13. The tenderer(s) will indicate the equipment/machinery/ vehicles he/they is/are going to use on this job and also give adequate evidence of experience in doing similar works and financial capacity to complete the work in time.

14. The tenderer(s) should also state what technical/ supervisory personal he/they would be employing for supervising the work.

14 (a). Full information should be given by the tenderer in respect of following:

- | | |
|---------------------------|---|
| i) If an individual: | Full name.
Postal Address.
Place of Business. |
| ii) If proprietary firm: | Name of the Proprietor.
Full postal address of
Firm/Proprietors. |
| iii) If partnership firm: | Full name of partners.
Full postal addresses of the registered office of firm &
the partners.
Registered partnership Deed. |
| iv) In case of Company: | Date and place of registration. |

Memorandum & Articles of Association.

Name of all the Directors. Full postal address of the registered office & all the Directors.

- | | |
|------------------|---|
| v) Joint Venture | Two or three companies/contractors may jointly undertake contract/contracts. Each entity will be jointly responsible for completing the task as per the contract. |
|------------------|---|

14(b) Change in Constitution of the Contracting Agency:

Prior approval in writing of the company shall be obtained before any change is made in the constitution of the contracting agency, otherwise it will be treated as a breach of Contract.

15. Canvassing in connection with the tenders in any shape or form is strictly prohibited and tenders submitted by such tenderers who resort to canvassing shall be liable for rejection.

16 (a) Every Tenderer will have to submit a declaration in support of the authenticity of the credentials submitted by him along with the Tender in the form of an AFFIDAVIT as per the format provided at ANNEXURE VI. (Applicable for works of Estimated Cost of over Rs. 50 Lakhs.)*

16 (b) If a Tenderer deliberately provides wrong information or submits false credentials in support of his qualifications, the Company reserves the right to terminate/rescind the contract, forfeit the EMD and other dues of the contractor and to take any other action as may be deemed fit.*

*** (STRIKE OUT WHICHEVER IS NOT APPLICABLE)**

17 (a) An intending tenderer, after obtaining tender documents on payment of Application Fee, having doubts as to the meaning of any part of the tender documents may submit to the official inviting tender a written request for interpretation or clarification thereof. Any interpretation or clarification of the tender documents by formal addendum if issued by the official inviting tender, shall be final and valid and binding on the company and the tenderers.

17(b) A pre-bid meeting will be held on at..... Hrs at the Office of the to clarify the issues and to answer questions on any matter that may be raised at that stage.

(Pre-bid meeting will be held for turnkey civil works only. Such a meeting for normal civil works is considered as not necessary).

18. On receipt of letter for acceptance of the tender issued by the Company, the successful tenderer shall execute/accept contract agreement/work order in the company's prescribed form for the due fulfillment of the contract. Failure to enter into the required contract/accept the work order issued by the company within the specified period in the work order shall entail cancellation of letter of acceptance of tender/work order and forfeiture of the earnest money. The written contract/ work order to be entered into between the contractor and the company shall be the foundation of the rights of both the parties and the contract shall not be deemed to be executed until the contract/ work order is signed/ accepted by both the parties i.e. Contractor and the Company.

19(a) The validity period of the tenders shall be 4 (four) months from the date of opening of price bid or revised price bid, if any.

The tenderer shall not, during the said period or within the period extended by mutual consent, revoke or cancel his tender or alter the tender or any terms/conditions thereof without consent in writing of the company.

In case the tenderer violates to abide by this, the Company will be entitled to forfeit the Earnest Money and reject the tender.

19(b) The Company reserves the right to postpone the date of receipt and opening of tenders or to cancel the tenders without assigning any reason whatsoever.

20. The Company reserves its right to allow Public Enterprises purchase preference facility as admissible under prevailing policy.

21. This detailed Tender Notice shall be deemed to be part of the Contract Agreement/Work Order.

22. No subletting of work as a whole by the contractor is permissible. Subletting of work in piece rated jobs is permissible with the prior approval of the department / company.

The Contract Agreement will specify major items of supply or services for which the contractor proposes to engage sub-contractor/sub-vendor. The contractor may from time to time propose any addition or deletion from any such list and will submit proposals in this regard to the Engineer-in -Charge/Designated Officer in charge for approval well in advance so as not to impede the progress of work. Such approval of the Engineer in Charge / Designated Officer in Charge will not relieve the contractor from any of his obligations, duties and responsibilities under the contract.

23. In case the contractor enters into any litigation, such action should have to be taken in a court of law with jurisdiction over the place where the subject work is to be executed.

GENERAL TERMS AND CONDITIONS

1. Definitions

i) "Employer" or "Company" means the Coal India Limited or any of its subsidiaries who will employ the contractor represented by the appropriate authority.

ii) "Principal Employer" means the Coal India Limited or any of its subsidiaries or the officer nominated by the Company to function on its behalf.

iii) The word "Contractor/ Contractors" wherever occurs means the successful tenderer / tenderers who has/have deposited the necessary Earnest money and has/have been given written intimation about the acceptance of tender and shall include legal representative of such individual or persons composing a firm or a company or the successors and permitted assignees of such individual, firm or Company, as the case may be.

iv) "Site" means the land and places including any building and erection thereon, over, under, in or through which the Permanent works or Temporary works designed by the Engineer in Charge are to be executed and any other lands and places provided by the Employer for working space or any other purpose as may be specifically designated in the Contract as forming part of the site.

v) The term "Sub-Contractor" as employed herein, includes those having a direct contract with Contractor either on piece rate, item rate, time rate or any other basis and it includes one who furnishes work to a special design according to the plans or specifications of this work but does not include one who merely supplies materials.

vi) "Accepting Authority" shall mean the management of the company and includes an authorized representative of the company or any other person or body of persons empowered in this behalf by the company.

vii) "Engineer-in-charge" shall mean the officer nominated by the company in the Civil Engineering cadre/discipline who is competent to direct supervisors and authorised to be in charge of the works for the purpose of this contract. The Engineer in Charge /Designated Officer in Charge who is of an appropriate seniority, will be responsible for supervising and administering the contract, certifying payments due to the contractor, valuing variations to the contract, awarding extension of time and valuing compensation events. The Engineer in Charge /Designated Officer in Charge may further appoint his representatives i.e. another person/Project Manager or

any other competent person and notify to the contractor who is directly responsible for supervising the work being executed at the site, on his behalf under their Delegation of Powers of the company. However, overall responsibility, as far as the contract is concerned, will be that of the Engineer in Charge/Designated Officer in Charge.

viii) The "Contract" shall mean the notice inviting tender, the tender as accepted by the Company, the work order issued to the contractor, and the formal contract agreement executed between the company and the contractor together with the documents referred to therein including general terms and conditions, special conditions, if any, scope of work, frozen terms & conditions/technical parameters/scope of work and revised offer, if any, specifications, drawings, including those to be submitted during progress of work, schedule of quantities with rates and amounts.

ix) A "Day" shall mean a day of 24 hours from midnight to midnight.

x) The "Work" shall mean the works required to be executed in accordance with the contract/workorder or parts thereof as the case may be and shall include all extra or additional, altered or substituted works or any work of emergent nature, which in the opinion of the Engineer-in-charge, become necessary during the progress of the works to obviate any risk or accident or failure or become necessary for security.

xi) "Schedule of Rates" referred to in this conditions shall mean the standard schedule of rates prescribed by the company and the amendments issued from time to time.

xii) "Contract amount" shall mean:

- a. In the case of turnkey contracts the total sum for which tender is accepted by the company.
- b. In the case of other types of contracts the total sum arrived at based on the individual rates quoted by the tenderer for the various items shown in the "Schedule of Quantities" of the tender document as accepted by the Company with or without any alteration as the case may be.

xiii) "Written notice" shall mean a notice or communication in writing and shall be deemed to have been duly served if delivered in persons to the individual or to a member of the contractors firm or to an office of the company for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.

xiv) "The constructional plant" means all appliances, tools, plants or machinery or whatsoever nature required in or about the execution, completion or maintenance of the works but does not include materials or other things intended to form part of the permanent work.

xv) "Letter of Acceptance of Tender" means letter giving intimation to the tenderer that his tender has been accepted in accordance with the provisions contained in that letter.

xvi) "Department" means the Civil Engineering Department of Coal India Limited or any of its subsidiary companies/units represented by the appropriate authority.

xvii) "Act of insolvency" means as it is designed by Presidency Town Insolvency Act or Provincial Insolvency Act or any act amending such originals.

xviii) The words indicating the singular only also include the plural and vice-versa where the context so requires.

2. Contract Documents:

The following documents shall constitute the contract documents :

- i) Notice Inviting Tender/Detailed Tender Notice.
- ii) Articles of Agreement / Letter of Acceptance of Tender/ Work Order.

iii) General Terms & Conditions of contract/ Commercial Terms & Conditions of contract.
iv) Additional Terms & Conditions of contract, if any.

v) Specifications.

vi) Schedule of quantities (or Bill of Quantities)/ Schedule of work/ Scope of work and schedule of deviation (to be provided by the contractor.)

vii) Frozen terms & conditions / technical parameters/ scope of work and revised offer, if any.

viii) Contract drawings and work programme.

ix) Safety Code etc. forming part of the tender.

N.B. Deviations:

Deviations sought by the bidders, whether they are technical or commercial deviations, must only be given in the schedules prescribed for them. Any willful attempt by the bidders to camouflage the deviations by giving them in the covering letter or in any other documents than the prescribed schedules may render the bid itself as non-responsive.

2.1 The contractor shall enter into and execute contract agreement in the prescribed form (ref. format at ANNEXURE VII). The cost of the stamp papers for the contract agreement shall be borne by the contractor. Two sets of contract document/agreements shall be prepared and signed by both the parties. One of the sets shall be stamped "Original" and the other "Duplicate". The duplicate copy will be supplied to the contractor free of cost and the original is to be retained by the company. For any additional copies required by the contractors the price to be charged would be that of the cost of the Tender Document (Application Fee).

All additional copies should be certified by the Engineer in Charge.

The contractor shall keep copy of these documents on the site/place of work in proper manner so that these are available for inspection at all reasonable times by the Engineer-in-charge, his representatives or any other officials authorised by the company for the purpose.

2.2 The contract document shall not be used by the contractor for any purpose other than this contract & the contractor shall ensure that all persons employed for this contract strictly adhere to this and maintain secrecy, as required of such documents.

2.3 Tender Evaluation & Bid Assessment:

The Tenders received will be scrutinized and evaluated by a duly constituted Tender Committee.

The Tender Committee will examine the Comparative Statements prepared by the concerned technical department and will satisfy itself that all aspects/conditions of each offer has been properly evaluated with respect to financial implications etc.

Tenders received without Earnest Money will be rejected.

The deviations from the commercial terms & conditions & the Tender specifications are scrutinized before opening of price bids. Normally no deviations in the commercial terms & conditions will be accepted.

However, the Tender Committee may decide to scrutinize the different conditions given by the tenderers and formulate and freeze the acceptable conditions and intimate all the tenderers about the same and give them an opportunity to revise their price bid if necessary before opening the same.

The Price Bids are opened at the time and place fixed for the same in presence of the tenderers & committee members and due information for opening of Price Bid is to be given to all concerned. In case where

the tenderers are given opportunity to revise their Price Bids, only the revised price bids are opened and the original Price Bids are to be kept in tact in the custody of the company.

The Price Bids of the tenderers will have no condition. The Price Bids which are incomplete & not submitted as per instructions given in the Tender Document will be rejected.

Bidders who meet the minimum qualifications criteria will be qualified only if their available bidcapacity is more than the updated estimated value. The available bid capacity will be calculated asunder:

$$\text{Assessed Available Bid capacity} = (A \times N \times 2 - B)$$

where,

A= Maximum value of Civil Engineering Works executed in any one year during the last fiveyears (updated to present level @ 5% per calendar year) taking into account the completed as well as works in progress.

N= Number of years prescribed for completion of the works for which bids are invited.

B=Value at present price level, of existing commitments and on going works to be completed during the nextmonths (period of completion of works for which bids are invited)

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

-made misleading or false representations in the forms, statements and attachments submitted in proof of the qualifying requirements, and/or

-record of poor performance such as abandoning of works, not properly completing the contract ,inordinate delays in completion, litigation history or financial failures etc.

Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

1 (A) Existing commitments and on going works.

Description of work	Place & State	Contract No.& Date	Name and address of Employer	Value of Contract (Rs.lakh)	Stipulated period of completion	Value of works remaining to be completed	Anticipated date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1 (B) Works for which bids already submitted.

Description of work	Place & State	Estimated value of works (Rs.lakhs)	Stipulated period of completion	Date when decision is expected	Remarks if any
(1)	(2)	(3)	(4)	(5)	(6)

2. Works performed as prime contractor (In the same name) on works of a similar nature over the last five years **

Project Name	Name of employer	Description of work	Contract No.	Value of contract (Rs.lakh)	Date of issue of work order	Stipulated period of completion	Actual date of completion	Remarks explaining reasons for delay and work completed

3. Quantities of work executed as prime contractor (in the same name and style) in the last five years**

(The table given below is a typical example & the contents may vary depending upon the nature & scope of work)

Year	Name of the work	Quantity of work performed(cum)			Remarks (indicate contract ref.)
		Cement concrete (Including RCC & PCC)	Masonry	Earth Work	
20... - 20....					
20... - 20....					

20... - 20....					
20... - 20....					
20... - 20....					

1. Enclose a certificate(s) from Engineer(s)-in-charge.
 2. Immediately proceeding the financial year in which bids are received.
- (THE SYSTEM OF DETERMINATION OF BID ASSESSMENT CAPACITY AS ABOVE WILL BE USED ONLY IN CASE OF WORKS OF ESTIMATED VALUE OF OVER Rs. 1 CRORE.)

No document presented by the bidder after the closing date & time of the bid will be taken into account unless it is of purely technical nature which has no bearing financially on the contract & which does not seek major changes in the technical specifications given in the bid documents. If a bidder offers a rebate unilaterally after the closing date & time of the bid, it will not be taken into account for evaluating purposes by the Tender Committee, but if that bidder emerges as the lowest evaluated, the rebate offered will be taken into account for determination of the total offer.

If the bid of the successful bidder is seriously unbalanced in relation to the estimate of the cost of work to be performed under the contract, the company may require the bidder to produce detailed price analysis for any or all items of the Bill of quantities to demonstrate the internal consistency of these prices with the construction method and the schedule proposed. After evaluation of the price analysis,

the company may require that the amount of the performance security/security deposit is increased at the expense of the successful bidder to a level sufficient to protect the company against financial loss in the event of default on the part of the successful bidder under the contract.

2.4. Abnormally High Rate (AHR) & Abnormally Low Rate (ALR) Items.

Abnormally High Rates & Abnormally Low Rates, if quoted by the contractor, in item rate tenders will be identified & dealt with as under:

- I. For identification of AHR & ALR items the ceiling of +/- 20% respectively, when compared with the updated estimated rate, will be considered.
- II. Variation in Quantity on quoted rate during execution for AHR & ALR items shall be permitted upto +/- 25% (+25% for AHR & -25% for ALR) of the quantity provided for items of work below plinth level & +/- 5% of the quantity provided for items of work above plinth level respectively.
- III. Quantity variation beyond the limit mentioned at ii) above shall be dealt by arriving at new rate based on prevalent market rates of materials & labour analysed as per standard analysis of rate of N.B.O./C.P.W.D. Payment of extra quantity over the permitted quantity of +/-25% and +/-5% (as the case may be) would be made on the basis of the new analysed rate.
- IV. For identified abnormally low rate (ALR) items, the contractor will be required to deposit with the company the difference in amount calculated between the departmental justified rate multiplied by the quantity of a particular ALR item and the ALR rate quoted by the contract or multiplied by the quantity of the same item.

The total amount to be deposited will be the sum total of all the identified ALR items calculated as per the method outlined above.

The amount so retained will be refunded on successful completion of individual ALR items of work.

2.5 Negotiations:

No negotiation will be held. Work will be awarded to the lowest bidder (L1) without post tender negotiations if the rates are reasonable.

The decision of the company regarding reasonableness of rates quoted will be final & binding on the bidder

2.6 Acceptance of Offer:

Letter of Acceptance is an acceptance of offer by the company and it need not be accepted by the tenderer. But the tenderer should acknowledge the receipt of the order within 15 days of mailing of work order and any delay in acknowledging the receipt will be treated as a breach of contract and compensation for the loss caused by such breach will be declared by the company by forfeiting EMD/Bid bond.

2.7 Banned or delisted Contractors:

The bidders would give a declaration that they have not been banned or delisted by any Govt. or Quasi Govt. agencies or PSU's. If a bidder has been banned or delisted by any Govt. or Quasi Govt. agencies or PSU's this fact must be clearly stated and it may not necessarily be a cause for dis qualification. If the declaration is not given, the bid will be rejected as non-responsive.

3. Discrepancies in contract documents & Adjustments thereof

The documents forming part of the contract are to be treated as mutually explanatory of one another and in case of discrepancy between schedule of quantity, the specifications and/or drawing, the following order of preference shall be observed;

- a) Description in Bill of Quantities of work.
- b) Particular specification and special conditions, if any
- c) Drawings.
- d) General specifications.

3.1 In the event of varying or conflicting provision in any of the document(s) forming part of the contract, the Accepting Authority's decision/clarification shall hold good with regard to the intention of the document or contract as the case may be.

3.2 Any error in description, quantity or rate in Bill of Quantities or any omission there from, shall not vitiate the contract or release the contractor from discharging his obligations under the contract including execution of work according to the Drawings and Specifications forming part of the particular contract document.

3.3 Any difference detected in the tender/ tenders submitted resulting from :

- a. discrepancy between description in words and figures, the rate which corresponds to the amount worked out by the contractor shall be taken as correct.
- b. discrepancy in the amount quoted by the contractor due to calculation mistake of the unit rate and quantity, the unit rate shall be regarded as firm and amount corrected.
- c. discrepancy in totaling or carry forward in the amount quoted by the contractor shall be corrected.

The tendered sum so corrected and altered shall be substituted for the sum originally tendered and considered for acceptance instead of the original sum quoted by the tenderer alongwith other tender/tenders. Rounding off to the nearest rupee should be done in the final summary of the amount instead of in totals of various sections of the offer.

4. Security Deposit:

4.1.1 Security deposit shall consist of two parts;

a. performance security to be submitted at award of work and

b. retention money to be recovered from running bills.

The security deposit shall bear no interest.

4.1.2 Performance security should be 5% of the contract amount and should be submitted within 28 days of receipt of LOA by the successful bidders in any of the form given below

- a bank guarantee in the form given in the bid document
- Govt. securities, FDR or any other form of deposit stipulated by the owner
- Demand draft drawn in favour of **CCL,EBC(Ws),Kathara payable at Kathara**

The earnest money/bid security deposited in the form of bank guarantee shall be discharged when the bidder has signed the agreement and furnished the required performance security/security deposit. The bid security deposited in the form of demand draft/cash shall be adjusted against the security deposit.

If performance security is provided by the successful bidders in the form of bank guarantee it shall be issued either –

- a. at bidder's option by a nationalized/scheduled Indian bank or
- b. by a foreign bank located in India and acceptable to the employer
- c. the validity of the bank guarantee shall be for a period of one year or ninety days beyond the period of contract, whichever is more.

Failure of the successful bidder to comply with the requirement as above shall constitute sufficient ground for cancellation of the award of work and forfeiture of the bid security.

4.2.1 All running on account bills shall be paid at 95% (ninety five percent) of work value. This 5% (five percent) deduction towards retention money will be the second part of security deposit.

4.2.2 5% performance security should be refunded within 14 days of the issue of defect liability certificate (taking over certificate with a list of defects). Retention money should be refunded after issue of no defect certificate. Retention money should be deducted at 5% from running bills.

4.4 The Company shall be at liberty to deduct/appropriate from the security deposit such sums as are due and payable by the contractor to the company as may be determined in terms of the contract, and the amount appropriated from the security deposit shall have to be restored by further deduction from the contractors subsequent on account running bills, if any.

The refund of security deposit shall be subject to company's right to deduct/ appropriate its due against the contractor under this contract or under any other contract.

4.5 On completion of the entire work and certified as such by the Engineer-in-charge and on passing of the final bill by the Department, one half of the security deposit lying with the company shall be refunded to the contractor. The other half shall be refunded to the contractor on the expiry of six months from the date of completion as certified by the Engineer-in-charge subject to the following conditions:

- a. Any defect/ defects in the work, if detected after issue of completion certificate is / are rectified to the satisfaction of the Engineer-in-charge within the said period of six months.
- b. In the case of building work/other work of similar nature, the refund shall be made on the expiry of the said six months period or at the end of one full monsoon period i.e. June to October, whichever is later in point of time and any defects such as leakage in roof, efflorescence in walls, dampness, defects in drainage etc. should be rectified to the satisfaction of Engineer In Charge.

5. Deviations/Variations in Quantities and Pricing

The quantities given in the "Schedule of Quantities" are based on estimates and are meant to indicate the extent of the work and to provide a uniform basis for tendering and any variation either by addition or omission shall not vitiate the contract.

5.1 The company through its Engineer In Charge or his representative shall, without radically changing the original scope and nature of the work, under contract, have power to make any alterations in or additions to or substitution of the original specifications, drawings, designs and instructions that may appear to be necessary or advisable during the progress of the work.

The contractor shall be bound to carry out the works in accordance with the instructions given to him in writing by the Engineer In Charge or his representative on behalf of the company. Such altered or additional or substituted work, which shall form part of the original contract, shall be carried out by the contractor on the same terms and conditions in all respects on which they agreed to do the main work and at the same rate/rates as are specified in the contract/ work-order.

5.2 The right is reserved to cancel any items of work included in the contract agreement or portion thereof in any stage of execution if found necessary to the work and such omission shall not be a waiver of any condition of the contract nor invalidate any of the provisions thereof.

5.3 If the additional, altered or substituted work includes any class of work for which rate/rates is/aren't specified in the contract/work order, rates for such items shall be determined by the Engineer In Charge as follows:

- a. In the case of percentage tenders, if the rate for the item of work executed is available in the company's approved SOR, it will be paid at the schedule rate plus or minus the accepted percentage as per contract,
- b. In case of item rate tenders, the rate for extra item shall be derived from the rate for similar item or near similar item of work available in the agreement schedule of work or by analysis of rates as at (c) below and the lower rate out of the above two shall be considered.
- c. In case the rate for extra item is to be derived by analysis of rate, the same shall be done by analysis on prevalent market rate of materials and labour based on standard norms of analysis of rate of N.B.O./C.P.W.D.
- d. In case of combined tender with partly item rate for non-schedule items & partly percentage tenders for SOR items, the rate for extra item shall be derived as at (b) above in case of non-schedule items rates and in case of percentage rates for SOR items the rate for extra item shall be derived as at (a) above.

In case of any difference between the contractor and the Engineer-In Charge as to the fixation of rates, the matter shall be referred to the accepting authority of the company i.e. CGM(C)/GM(C)/CE(C) of the company or Staff Officer(C) for the work awarded at Company Hqrs. level and Area level respectively, whose decision shall be final and binding on the contractor.

5.4 Payment for such deviated items (additional/ altered / substituted items of work or excess quantities of work beyond +/- 25% of the agreement schedule) shall be made in the contractors running on account bills, till the revised estimate regularising these items are sanctioned by the competent authority of the company, at the provisional rates and shall not exceed :

- a) 75% of the rate recommended by the Engineer In Charge to the accepting authority of the company i.e. CGM(C)/GM(C)/ CE(C) of the company or SO(C) of the Area , if the rate is directly available in the SOR of the company.

b) 50% of the rate recommended by the Engineer In Charge to the accepting authority of the company, i.e. CGM(C)/ GM(C)/ CE(C) of the company or SO(C) of the Area , if it is analysed item rates based on prevalent market rates of materials and labour following NBO/CPWD norms.

5.5 *The time for completion of the originally contracted work shall be extended by the company in the proportion that the additional work (in value) bears to the original contracted work (in value) plus 25% of the time calculated as explained above or such further additional time as may be considered reasonable by the Engineer in Charge.*

5.6 The company through its Engineer In Charge or his representative, on behalf of the company, shall have power to omit any part of the work in case of non-availability of a portion of the site or for any other reason and the contractor shall be bound to carry out the rest of the work in accordance with the instructions given by the Engineer In Charge. No claim from the Contractor shall be entertained/ accepted on these grounds.

5.7 In the event of any deviation being ordered which in the opinion of the contractor changes radically the original scope/nature of the contract, the contractor shall under no circumstances suspend the work, either original or altered or substituted, and the dispute/disagreement as to the nature of deviation and the rate/rates to be paid for such deviations shall be resolved separately with the company as per the procedures/ norms laid down hereafter.

6. Time for Completion of Contract, Extension thereof, Defaults and Compensation for Delay

Time is the essence of the contract and as such all works shall be completed within the time stipulated in the contract/ work order.

Immediately after the contract is executed/the work order is issued, the Engineer In Charge and the contractor shall agree upon a detailed time and progress chart prepared based on BAR CHART/ PERT CPM techniques on the basis of a construction schedule submitted by the contractor at the time of executing contract showing the order in which the work is proposed to be carried out within the time specified in the contract document/work order. For the purpose of this detailed time and progress chart, the work shall be deemed to have commenced on the expiry of 10 (ten) days from the issue of Letter of Acceptance of Tender/Work Order or handing over the site of work or handing over reasonable number of working drawings to the contractor or the period of mobilisation allowed in the work order for starting the work in special circumstances, whichever is later.

6.1 If the contractor, without reasonable cause or valid reasons, commits default in commencing the work within the aforesaid time limit, the company shall without prejudice to any other right or remedy, be at liberty, by giving 15 days notice in writing to the contractor to commence the work, to forfeit the Earnest Money deposited by him and to rescind the Letter of Acceptance of Tender/Work Order.

Additionally, the Company will reserve the right to debar such defaulting Contractors from participating in future Tenders for a minimum period of 1 (One) year.

6.2 If the contractor fails to maintain the required progress in terms of the agreed time and progress chart or to complete the work and clear the site on or before the contract of extended date of completion, he shall without prejudice to any other right or remedy available under the law to the company on account of such breach, pay as compensation (liquidated damages) @ half percent(½ %) of the contract price per week of delay. The aggregate of such compensation/compensations shall not exceed 10(ten) percent of the total value as shown in the contract.

This will also apply to items or group of items for which separate period of completion has been specified. The amount of compensation may be adjusted or set off against any sum payable to the contractor under this or any other contract with the company.

6.2.1 The company, if satisfied, that the works can be completed by the contractor within a reasonable time after the specified time of completion, may allow further extension of time at its discretion with or without the levy of LD. In the event of extension granted being with LD, the company will be entitled without prejudice to any

other right or remedy available in that behalf, to recover from the contractor as agreed damaged equivalent to half percent of the contract value of the works for each week or part of the week subject to a ceiling of 10% of the contract price.

6.2.2 The company, if not satisfied that the works can be completed by the contractor, and in the event of failure on the part of the contractor to complete work within further extension of time allowed as aforesaid, shall be entitled, without prejudice to any other right, or remedy available in that behalf to rescind the contract.

6.2.3 The company, if not satisfied with the progress of the contract and in the event of failure of the contractor to recoup the delays in the mutually agreed time frame, shall be entitled to terminate the contract.

6.2.4 In the event of such termination of the contract as described in clauses 6.2.2 or 6.2.3 or both the company, shall be entitled to recover LD up to ten percent (10%) of the contract value and forfeit the security deposit made by the contractor besides getting the work completed by other means at the risk and cost of the contractor.

6.3 a) The company may at its sole discretion, waive the payment of compensation on request received from the contractor indicating valid and acceptable reasons if the entire work is completed within the date as specified in the contract/work order or as validly extended date without stipulating any compensation for delay. or

b) If the progress of the work or of any portion of the work is unsatisfactory, the Engineer In-charge shall be entitled, after giving the contractor 15 days' notice in writing, to employ another Agency for executing the job or to carry out the work departmentally either wholly or partly debiting the contractor with the cost involved in engaging another Agency or the cost involved in executing the work departmentally, as the case may be. The certificate to be issued by the Engineer In-charge for the cost of the work so done shall be final and conclusive and the extra cost, if any, shall be borne by the contractor.

6.4 Extension of date of completion: On occurrences of any events causing delay as stated hereunder, the contractor shall intimate immediately in writing to the Engineer In Charge.

a) Force Majeure :

i) Natural phenomena, including but not limited to abnormally bad weather, unprecedented flood and draught, earthquakes & epidemics.

ii) Political upheaval, civil commotion, strikes, lockouts, acts of any Govt. (domestic/foreign) including but not limited to war, proprieties, quarantine embargoes

The successful bidder/ contractor will advise in the event of his having to resort to this clause by a registered letter duly certified by the local chamber of commerce or statutory authorities, the beginning and end of the cause of delay, within fifteen days of the occurrence and cessation of such Force Majeure condition.

In the event of delay due to Force Majeure for more than one month the contract may be terminated at the discretion of the company. Termination under such circumstances will be without any liability on either side.

b) Serious loss or damage by fire

c) Non-availability of stores which are the responsibility of the company to supply as per contract

d) Non-availability of working drawings in time, which are to be made available by the company as per contract during progress of the work

e) Delay on the part of the contractors or tradesmen engaged by the company not forming part of the contract, holding up further progress of the work

f) Non-availability or breakdown of tools and plant to be made available or made available by the company

g) The execution of any modified or additional items of work or excess quantity of work.

h) Any other causes which, at the sole discretion of the company, is beyond the control of the contractor.

6.4.1 A HINDRANCE REGISTER shall be maintained by both department and the contractor at site to record the various hindrances, as stated above, encountered during the course of execution.

Hindrance register will be signed by both the parties. The contractor may also record his observations in the Hindrance Register. In case the contractor has a different opinion for hindrance and a dispute arises then the matter would be referred to the EIC and or the next higher authority whose decision would be final & binding on the contractor & the decision to be communicated within 15 days.

6.4.2 The contractor shall request the company in writing for extension of time within 15 days of happening of such event causing delay stating also, the period for which extension is required. The company may, considering the genuinity of the request, give a reasonable extension of time for completion of the work. Such extension shall be communicated to the contractor in writing by the company through the Engineer In Charge within 1(one) month of the date of receipt of such request.

6.4.3 The opinion of the Engineer-in-charge, whether the grounds shown for the extension of time are or are not reasonable, is final. If the Engineer-in-charge is of the opinion that the grounds shown by the contractor are not reasonable and declines to the grant of extension to time, the contractor can not challenge the soundness of the opinion by reference to arbitration.

The opinion of the Engineer-in-charge that the period of extension granted by him is proper or necessary is not, however, final. If the contractor feels that the period of extension granted is inadequate he can appeal to the CGM(Civil)/ GM(Civil)/ CE(Civil) of the company for consideration on the question whether the period of extension is or is not proper or necessary.

6.4.4 Provisional extension of time may also be granted by the Engineer In Charge during the course of execution, on written request for extension of time within 15(fifteen) days of happening of such events as stated above, reserving the company's right to impose/ waive penalty at the time of granting final extension of time as per contract agreement.

6.4.5 When the period fixed for the completion of the contract is about to expire, the question of extension of the contract may be considered at the instance of the Contractor or the Department or of both. The extension will have to be by party's agreement, express or implied.

In case the contractor does not apply for grant of extension of time within 15(fifteen) days of the hindrance occurring in execution of the work and the department wants to continue with the work beyond the stipulated date of completion for reason of the work having been unavoidably hindered, the Engineer-in-charge can grant extension of time even in the absence of application from the contractor. Such extension of time granted by the Engineer In Charge is valid provided the contractor accepts the same either expressly or implied by his actions before and subsequent to the date of completion. Such extension of time shall be without prejudice to Company's right to levy compensation under the relevant clause of the contract.

The contractor shall however use his best efforts to prevent or make good the delay by putting his endeavors constantly as may be reasonably required of him to the satisfaction of the Engineer In Charge.

7. Material Supply & other facilities

7.1* The company does not undertake any responsibility for supply of any materials to the contractor.

Or

7.1* The company will supply steel both reinforcement and structural and cement at the following rates inclusive of all taxes.

The contractor shall bear all the cost for transportation; handling and storage from the issuing store of the company to contractor's work site store.

i) Reinforcement Steel:-

a) M.S.Round : Rs.

b) Tor Steel : Rs.

c) Structural Steel : Rs.

ii) Cement : Rs.

[* delete whichever is not applicable]

7.2 If the steel is issued by the department, the wastage of steel shall be the barest minimum. The wastage allowed from theoretical quantity will be upto a maximum of 5% to cover the wastage due to cutting into pieces, bending and other factors. No cut pieces or scrap less than 2 mtr. in length will be taken by the department. Efforts should be made to use the cut pieces of 2 mtr. or above length as far as possible.

If the wastage of steel is more than the permissible variation mentioned above the cost of excess wastage made by the contractor shall be recovered at double the issue rates indicated above, or 115% of prevailing market rate including sales tax and general tax during the period of work, whichever is more.

No allowances shall be entertained on account of Rolling Margin for the steel either issued by the department or procured by the contractor.

7.3 If the cement is issued by the department, the variation of 5% will be permitted over the theoretical consumption of cement for value of work upto Rs.10.00 lakhs and 3% for value of work above Rs.10.00 lakhs. In the event of cement consumed is more/less than specified above, the recovery for the quantity of cement consumed in excess or less than the specified quantity shall be made at double the issue rate or 115% of prevailing market rate including sales tax and general tax during the period of work, whichever is more.

7.4 In case the department is not able to supply cement/steel as per the provisions of the contract, the Engineer In Charge may allow, with the approval of CGM(Civil)/ GM(Civil)/ CE(Civil) of the company, the contractor in writing for procurement of cement/ steel from the approved sources and the extra on this account including transport charges, if any, over the issue rate shall be reimbursed to the contractor on production of authentic documents. Transportation of cement/ steel from the place of purchase to the site of work and proper storage of cement/steel at site shall be contractor's responsibility .He should maintain proper account of cement/steel issued/procured by him and should allow inspection of his godown and his cement/steel account by the concerned Engineer-in-charge or any other authorised officers of the company. Contractor should draw materials from the company on the basis of actual requirement as assessed by the Engineer In Charge on "as and when required" basis.

7.5 Recovery of cost of materials issued on sale A/c will be made as per actual consumption basis but the Engineer In Charge will have the discretion for making full recovery while processing a particular bill or asking for the return of the balance materials if the work is not progressing satisfactorily.

The contractor shall keep accurate record of materials issued by the company, maintain proper account for the materials received and consumed in the work and shall be open to check by the Engineer In Charge or his authorised representative. The contractor shall ensure that such materials are consumed for the contract works only and the Register for the aforesaid account shall be signed both by the representatives of Engineer In Charge and the contractor.

7.6 All materials, tools and plants brought to site by the contractor including the materials supplied by the company shall be deemed to be held in lien by the company and the contractor shall not have the right to remove the same from the site, without the written permission of the Engineer In Charge. The company shall

not however be liable for any loss, theft or damage due to fire or other cause during this period of lien, the responsibility for which shall lie entirely on the contractor.

7.7 The contractor shall bear the cost of loading, transportation to site, unloading, storing under cover as required etc. as may be necessary for the use and keeping the materials in good condition.

7.8 Any surplus materials issued by the company, remaining after completion or termination of the contract, shall be returned by the contractor at his cost to the place of issue and the Engineer In Charge shall accept the same at the rate not exceeding the rate at which these were originally issued taking into consideration the deterioration or damage, if any, that may have been caused during the custody of the contractor. In the event, the contractor fails to return the surplus materials out of those supplied by the company, the Engineer In Charge may, in addition to any other liability which the contractor would incur in this regard, by giving notice in writing require the contractor to pay the amount at double the issue rate for such unreturned surplus materials or 115% of the prevailing market rate including Sales Tax & General Tax during the period of work, whichever is more.

7.9 On completion or on termination of the contract and on complete recovery of secured advance paid by the company, if any, in respect of materials brought to site, the contractor with due permission of the Engineer In Charge shall be entitled to remove at his expenses all surplus materials originally supplied by him and upon such removal, the same shall become the property of the contractor.

7.10 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) shall be borne by the contractor.

7.11 The contractor shall arrange necessary electricity at his own cost for the work and his own establishment. However, if available and feasible the company may arrange electricity at one point near the work site and necessary recovery of cost of energy consumed will be made at rates prescribed by the company from time to time. Energy meter for this purpose shall be provided by the contractor.

7.12 The contractor shall arrange necessary water for the work and his own establishment. However, if available and feasible the company may arrange water at one point near the work site for which recovery @ 1% of the contract value of work done will be made from the contractor's bills.

7.13 Coal required for manufacturing of bricks to be used in the work will be issued @ 25 tonnes per one lakh of bricks on payment at the rate prevailing on the date of issue. Requirement of coal may vary depending on the quality of coal. Transportation of coal and the charges thereof shall be contractor's responsibility.

7.14 Explosives, detonators and other inflammable materials shall not be used in the execution of the work at site by the contractor without prior written permission of the Engineer In Charge. Transportation and storage of such materials shall be done in specified manner in accordance with the law in force. The contractor shall also obtain licence under such laws for, transportation, storage, use and all other operations, connected with the handling of the same.

8. Quality Assurance - Materials and Workmanship

The contractor shall carry out and complete the work in every respect in accordance with the contract and shall ensure that the work conforms strictly to the drawings, specifications, instructions of the Engineer In Charge. The Engineer In Charge may issue, from time to time, further drawings, detailed instructions/ directions in writing to the contractor. All such drawings, instructions/directions shall be consistent with the contract documents and should be reasonably inferable there from, alongwith clarifications/ explanations thereof, if necessary.

8.1 For Quality Assurances of all the Civil Engineering Works the norms/ guidelines laid down by the company herein and elsewhere will form part of the contract for the purpose of quality of works.

8.2 The contractor shall be responsible for correct and complete execution of the work in a workman like manner with the materials as per specification which shall be subject to the approval of the company. All work under execution in pursuance of the contract shall be open to inspection and supervision by the Engineer In Charge or by his authorised representative or any other official of higher rank or any other person authorised by the company in his behalf & the contractor shall allow the same.

8.3 All materials to be provided by the contractor shall be in conformity with the specifications/schedule of work as per the contract and the contractor shall furnish proof, if so required by the Engineer In Charge to his satisfaction that the materials do so comply.

8.4 The contractor shall immediately after the award of work draw up a schedule giving dates for submission of samples as required or necessary as per the specification for approval of Engineer In Charge who shall approve ,if found acceptable, promptly so that there is no delay in the progress of the work of the contractor or of the work of any of the sub-contractor.

On receipt of samples as per schedule, the Engineer In Charge shall arrange to examine/test with reasonable promptness ensuring conformity of the samples with the required specification and complying with the requirements as per contract documents keeping in view that the work shall be in accordance with the samples approved by him. The contractor shall not start bringing materials at the site unless the respective samples are approved. Materials conforming to approved samples shall only be brought to site.

Samples are to be supplied by the contractor at his own cost. The cost involved in tests shall be borne by the contractor. If any test is ordered by the Engineer In Charge which is to be carried out by any independent person or agency at any place other than the site even then the cost of materials and testing charge etc. shall be borne by the contractor. If the test shows that the materials are not in accordance with the specifications, the said materials shall not be used in the work and removed from the site at contractors cost.

8.5 The company, through the Engineer In Charge, shall have full powers to reject any materials or work due to a defect therein for not conforming to the required specification, or for materials not being of the required quality and standard or for reasons of poor workmanship or for not being in accordance with the sample approved by him.

The contractor shall forthwith remedy the defect/replace the materials at his expense and no further work shall be done pending such rectification/replacement of materials, if so instructed by the Engineer In Charge.

In case of default on the part of the contractor, the Engineer In Charge shall be at liberty to procure the proper materials for replacement and/or to carry out the rectifications in any manner considered advisable under the circumstances and the entire cost & delay for such procurement/rectification shall be borne by the contractor.

8.6 The Engineer In Charge shall be entitled to have tests carried out for any materials, according to the standard practice followed for such tests, other than those for which satisfactory proof has already been furnished by the contractor who shall provide at his expense all facilities which the Engineer In Charge may require for the purpose.

The cost of any other tests, if so required by the Engineer In Charge, shall be borne by the contractor only, if the test shows the workmanship or materials not to be in accordance with the provision of the contract or the instruction of Engineer In Charge, but otherwise by the company.

8.7 Access to the works: The Engineer-in-charge and any person authorised by the company shall at all times have access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles are being obtained for the works and the contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

8.8 Inspection of works: i) No work shall be covered up or put out of view without the approval of the Engineer-in-charge or the Engineer-in-charge's representative or any other officer nominated by the company

for the purpose and the contractor shall afford full opportunity for the EIC or EIC `s representative or any other officer nominated by the company for the purpose to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. the contractor shall give due notice to the Engineer-in-charge's representative whenever any such work or foundations is ready or about to be ready for examination and the Engineer-in-charge's representative shall, without unreasonable delay, unless he considers it unnecessary and advises the contractor accordingly, attend for the purpose of examining and measuring such work or foundations.

ii) The contractor shall uncover any part or parts of the works or making openings in or through the same as the Engineer In Charge may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of Engineer-in-charge.

If any such part or parts have been covered up or put out of view after compliance with the requirement of sub-clause above and are found to be executed in accordance with the contract, the expenses of uncovering, making openings in or through and making good the same shall be borne by the Employer, but in any other cases all costs shall be borne by the contractor.

8.9 Removal of Improper Work and Materials:

i) The Engineer-in-charge shall during the progress of the works have power to order in writing from time to time :

- a) The removal from the site, of any materials which in the opinion of Engineer-in-charge, are not in accordance with the contract/ work order/ approved sample.
- b) The substitution with proper and suitable materials.
- c) The removal and proper re-execution, notwithstanding any previous test thereof or interim payment there from, of any work which in respect of materials or workmanship is not in accordance with the contract.

ii) In case of default on the part of the contractor in carrying out such order, the Engineer-in charge shall be entitled to employ and pay other agency to carry out the same and all expenses consequent thereon shall be recoverable from the contractor or may be deducted from any amount due or which may become due to the contractor.

8.10 Devaluation of Work : In lieu of rejecting work done or materials supplied not in conformity with the contract/work order/approved samples , the Engineer-in-charge or any other officer nominated by the company for the purpose may allow such work or materials to remain, provided the Engineer In Charge/ the officer nominated by the company is satisfied with the quality of any materials, or the strength and structural safety of the work, and in that case shall make such deduction for the difference in value, as in his opinion may be reasonable.

8.11 Final Inspection of Work: The Engineer-in-charge and any other officer nominated by the company for the purpose shall make final inspection of all work included in the contract/work order, or any portion thereof, or any completed structure forming part of the work of the contract, as soon as practicable after notification by the contractor that the work is completed and ready for acceptance. If the work is not acceptable to the Engineer-in-charge at the time of such inspection, he shall inform the contractor in writing as to the particular defects to be remedied before final acceptance can be made.

8.12 Defects appearing after acceptance: Any defects which may appear within the defect liability period and arising, in the opinion of the Engineer-in-charge, from lack of conformance with the drawings and specifications, shall, if so required by the Engineer-in-charge in writing, be remedied by the contractor at his own cost within the time stipulated by the Engineer-in-charge. If the contractor fails to comply, the Engineer-in-charge may employ other persons to remedy the defects and recover the cost thereof from the dues of the contractor.

8.13 Site Order Book : A Site Order Book is a Register duly certified by the Engineer-in-charge regarding number of pages it contains, each page being numbered, name of work, name of contractor, reference of contract/ work order and the aforesaid certificate should be recorded on its first page.

Site Order Books shall be maintained on the sites of works and should never be removed there from under any circumstances. It shall be the property of the company. The Engineer In Charge or his authorised representative shall duly record his observations regarding any work which needs action on the part of the contractor like, improvement in the quality of work, failure to adhere to the scheduled programme etc. as per contract/work order. The contractor shall promptly sign the site order book and note the orders given therein by the EIC or his representative and comply with them. The compliance shall be reported by the contractor in writing to EIC in time so that it can be checked.

The Site Order Book will be consulted by the Engineer In Charge at the time of making both running on account and final bills of the contractor. A certificate to this effect should be given in the Measurement books by the Engineer In Charge or his representative.

8.14 Samples and Testing of Materials: All the materials to be procured by the contractor and to be used in work shall be approved by the Engineer In Charge in advance, and shall pass the tests and analysis required by him, which will be as specified in the specifications of the items concerned and or as specified by BIS or the IRC standard specifications acceptable to the Engineer In Charge. The method of sampling and testing shall be as per the relevant BIS, IRC and other relevant standards and practices. Minor minerals like sand, stone chips etc. shall be conforming to relevant BIS standards. All bought out items including Cement and Steel shall be procured from such manufacturers who hold valid license conforming to relevant BIS standards for manufacturing of such items.

8.15 Storage of Materials : Materials shall be so stored as to ensure the preservation of the quality and fitness for the work. When considered necessary by the Engineer-in-charge, they shall be placed on wooden platforms or other hard, clean surfaces and not directly on the ground.

Materials shall be placed under cover when so directed and the contractor shall erect and maintain at his own cost temporary weather-proof sheds at the work site for the purpose. Stored materials shall be so located as to facilitate prompt inspection. All stored materials shall be inspected at the time of use in the work, even though they may have been inspected and approved before being placed in storage or during storage.

8.16 Defective Materials: All materials not conforming to the requirements of the specifications shall be considered as defective, and all such materials, whether in place or not shall be rejected. They shall be removed immediately by the contractor at his expenses and replaced with acceptable material.

No rejected material, the defects of which have been subsequently corrected, shall be used on the work until approval in writing has been given by the Engineer In Charge. Upon failure on the part of the contractor to comply with any instruction of the Engineer-in-charge made under the provisions of this article within the time stipulated by the Engineer-in-charge, the Engineer-in-charge shall have authority to remove and replace defective material and recover the cost of removal and replacement from the contractor.

Further all such defective material lying at site not removed and replaced within 30 days after issue of notice by the Engineer-in-charge, if the Engineer-in-charge so decides, shall dispose off such material in any manner without any further written notice to the contractor.

9. Measurement and Payments

Except where any general or detailed description of the work in the Bill of Quantities or specifications of the contract/ work order provides otherwise, measurement of work done shall be taken in accordance with the relevant standard method of measurement published by the Bureau of Indian Standards(BIS) and if not covered by the above, other relevant Standards/practices shall be followed as per instructions of the Engineer In Charge.

9.1 All items of work carried out by the contractor in accordance with the provision of the contract having a financial value shall be entered in the Measurement Book as prescribed by the company so that a complete record of the measurements is available for all the works executed under the contract and the value of the work executed can be ascertained and determined there from. Measurements of completed work / portion of completed work shall be recorded only in the Measurement Books.

9.2 Measurement shall be taken jointly by the Engineer-in-Charge or his authorised representative and by the contractor or his authorised representative.

9.3 Before taking measurements of any work, the Engineer In Charge or the person deputed by him for the purpose shall intimate the contractor to attend or to send his representative to attend the measurement. Every measurement thus taken shall be signed and dated by both the parties on the site on completion of the measurement. If the contractor objects to any measurements, a note to that effect shall be made in the Measurement Book / Log Book and signed and dated by both the parties.

9.4 The measurement of the portion of work/items of work objected to, shall be re-measured by the Engineer In Charge himself or the authority nominated by the company for the purpose in the presence of the contractor or his authorised representative and recorded in the M.B. which shall be signed and dated by both the parties. Measurements so recorded shall be final and binding upon the contractor and no claim whatsoever shall thereafter be entertained.

In case the contractor or his authorised representative does not attend to the joint measurements at the prefixed date and time after due notice, the measurements taken by the Engineer In Charge or his representative shall be final and binding on the contractor.

Measurement of the extra items of work or excess quantities of work duly authorised in writing by the Engineer In Charge shall also be taken and recorded in the M.B. based on the existing items in the SOR of the company and if such items do not exist in the company's SOR, the description of the work shall be as per actual execution. Payment for such extra items will be based on the rates to be derived as described in the relevant clauses of the contract/ work-order

9.5 No work shall be covered up or put out of view without the approval by the Engineer In Charge and recording of measurements and check measurement thereof duly accepted by the contractor. The contractor shall provide full opportunity to the Engineer In Charge or his representative to examine and measure all works to be covered up and to examine the foundations before covering up.

The contractor shall also give notice to Engineer In Charge whenever such works or foundations are ready for examination and the Engineer In Charge shall without unreasonable delay arrange to inspect and to record the measurements, if the work is acceptable and advise the contractor regarding covering of such works or foundations.

9.6 In case of items which are claimed by the contractor but are not admissible according to the department, measurements of such items, will be taken by for record purposes only and without prejudice so that in case it is subsequently decided by the department to admit the contractor's claims, there should be no difficulty in determining the quantities of such work. A suitable remark should, however, be made against such measurements to guard against payment in the ordinary way.

9.7 Payments: The running on account payments may be made once in a month or at interval stipulated in the work order/ contract agreement.

9.7.01 Running on account bill/bills for the work executed/ materials supplied in accordance with the work order/ contract shall be prepared on the basis of detailed measurements recorded as described hereinbefore and processed for payments.

9.7.02 Payment of on account bill shall be made on the Engineer In Charge's certifying the sum to which the contractor is considered entitled by way of interim payment for the following :

a) The work executed as covered by the bill/bills after deducting the amount already paid, the security deposit and such other amounts as may be deductible or recoverable in terms of the work order/ contract.

b) (i) Payment for excess quantity of work done with the written instructions of the Engineer In Charge for items already appearing in the bill of quantities of work with approved rates, will be made alongwith the on account bills only upto 10% of the quantity provided in the agreement subject to overall value of work not exceeding the agreement value.

(ii) The CGM(Civil)/ GM(Civil)/ CE(Civil) of the company and / or the Staff Officer(C) of the Area may authorise interim payment for excess work done upto 20 % of the quantity of work provided in the Bill of Quantity of the work awarded from Company level and Area level respectively subject to overall value of work done does not exceed the contract value.

c) Extra items of work executed will be paid on specific written authorisation of CGM (Civil)/ GM(C)/ CE(C) of the company or Staff Officer (Civil) of the Area provided that the value of such extra items of work when added together is not more than 10% of the contract value and the total gross payment including excess quantity does not exceed the contract value.

Balance amount on account of excess quantity and extra items of work executed shall be paid after the deviation estimate / revised estimate regularising the extra items and excess quantities of work is sanctioned by the competent authority of the company with the concurrence of the Finance Department of the company.

d) On the Engineer In Charge's certificate of completion in respect of the work covered by the contract / final measurements of the work certified by the Engineer In Charge or his representative.

9.7.03 The measurements shall be entered in the M.B for the work done upto the date of completion and evaluated based on the approved rates for the items in the contract agreement/sanctioned revised estimate. In case of extra items of work, the rates shall be derived as stated in the relevant clause of the contract.

The payments shall be released against the final bill subject to all deductions which may be made on account of materials supplied, water supply for construction, supply of electricity and any other dues payable by the contractor to the company, and further subject to the contractor having given to the Engineer In Charge a no claim certificate. The contractor shall indemnify the company against proof of depositing royalty on account of minor minerals used in the work before the final bill is processed for payments. The final payment to be made will also be subject to Clause-4.5 of the General Terms & Conditions of the contract.

9.7.04 Any certificate given by the Engineer In Charge for the purpose of payment of interim bill/bills shall not of itself be conclusive evidence that any work/materials to which it relate is/are in accordance with the contract and may be modified or corrected by the Engineer In Charge by any subsequent certificate or by the final certificate.

9.7.05 The company reserve the right to recover/enforce recovery of any over payments detected after the payment as a result of post payment audit or technical examination or by any other means, notwithstanding the fact that the amount of disputed claims, if any, of the contractor exceeds the amount of such overpayment and irrespective of the facts whether such disputed claims of the contractor are the subject matter of arbitration or not.

The amount of such over payments shall be recovered from subsequent bills under the contract, failing that from contractor's claim under any other contract with the company or from the contractor's security deposit or the contractor shall pay the amount of over payment on demand. In case of contractor's non-payment on such demand, the same should be realised from the contractor's dues, if any, with Coal India Limited or any of it's subsidiaries.

9.7.06 The contractors are required to execute all works satisfactorily and according to the specifications laid down in the contract/ work order. If certain items of work, executed by the contractor, are below specifications, the contractor should re-do them according to the specifications and instructions of EIC and if the contractor fails to rectify the defect within the time and in the manner specified by the EIC, the work shall be got re-done or rectified by the department at the risk and cost of the contractor. Engineer In Charge may accept such work of below specifications provided the department is satisfied with the quality of such works and the strength/ structural safety of such works. In that case Engineer In Charge shall make such deductions for the difference in value, as in his opinion is reasonable and is approved by the accepting authority of the company i.e. CGM(C)/ GM(C)/ CE(C) of the company in this case or any other officer nominated by CGM(C)/ GM(C)/ CE(C) for the purpose.

9.7.07 Payment Stage: The payment stage involved will be as under.

- i) Signature of EA(Civil)/ Sr. Overseer(C) / Overseer(C) in MB's both in pages recording measurements, abstract of bill & the duly filled in bill form.
- ii) Signature of Engineer(C)/ EE(C) with appropriate check measurements in the MB's and the bill form.
- iii) Signature of Sr. EE(C)/ SE(C) with appropriate check measurements in MB's and the bill form.
- iv) Signature of Engineer in Charge as per definition as at clause 1(vii) of the General Terms and Conditions, as a token of acceptance for payment of the bill. The EIC may sign in the abstract of the bill in the MB & the bill form. In between stage iii) and iv) accountal checking may be made by the concerned Accounts Officer/ Accountant.

9.7.08 Secured Advance: Secured advance can be paid for items of materials required for execution of the work and covered under categories A & B and supplied by the contractor at work site, supported by necessary vouchers, challans, test certificates etc. after execution of indemnity bond as per prescribed Form of the company on non-judicial stamp paper of prescribed value.

This advance shall be recovered in four equal installments or as per consumption whichever is higher. Engineer In Charge shall recover at his discretion all or any part of secured advance paid, if in his opinion the work is not progressing satisfactorily or the security of these materials at site is not adequately taken care of by the contractor. Secured advance shall be payable for contracts of value above Rs.10.00 lakhs only.

Secured advance for structural steel sections, reinforcement steel and cement, collected at site, will be paid upto 75% of the corresponding stock yard prices of SAIL for the corresponding steel item and Govt. approved/ D.G.S.D. prices for cement, if the same exist.

In case of non-availability of Govt. approved prices of cement & steel and for the materials falling under Category - A and B the secured advance will be paid at the basic rate available in the approved schedule of rates of the company plus or minus the overall percentage on which the work was awarded, provided such rate is not more than 60% of the quoted rate of the contractor for the actual work.

At any point of time the outstanding recoverable secured advance shall not be more than 10% of the contract value.

Items against which secured advance can be granted:

Category-A

Civil:

1. Bricks
2. Stone and brick aggregate
3. Stones
4. Finished products of brass, iron and steel such as doors & windows frames, wire mesh, gate, GI Sheets.

5. Pre-cast R.C.C. products such as pipes, jali, water storage tanks etc.
6. Doors & Window fittings.
7. Pipes and sanitary fittings of CI, SCI & HCI

Electrical :

1. Steel conduits
2. G.I. Pipes
3. I.C. Boards
4. Switchgears (Air circuit breakers and Air break switches)
5. C.I. Boxes.
6. A.C.S.R. Conductors
7. A.C. Plant & Machinery
8. Pumps
9. Generating sets (without oil)

Items against which secured advance can be granted:

Category- B

Civil:

1. Glazed tiles, terrazzo tiles and similar articles.
2. Marble slabs
3. Asbestos cement products
4. Finished timber products such as doors, windows, flush doors, particle boards (subject to mandatory test being satisfactory) etc.
5. Bitumen in sealed drums
6. Bitumen felt
7. Polythene pipes and fittings and tanks
8. Sanitary fittings and pipes of S.W., porcelain and chinaware materials
9. Laminated / Safety, one way vision, and bullet proof glasses.
10. Chemical required for anti-termite treatment (in sealed drums)
11. Paints, varnishes, distempers, pigment, spirits etc.

Electrical:

1. Transformers
2. Oil-filled switch gears.
3. L.T. & H.T. Cables
4. Fans
5. Storage and Dry Batteries
6. Insulation tapes
7. Epoxy cable compounds
8. Electric light fittings
9. Wooden battens, casing & capping and wooden boards
10. Flexible wires
11. PVC materials
12. Oil and lubricants
13. Rubber materials
14. Glass wool, thermocole & other insulating materials
15. Porcelain H.T. and L.T. insulators.

In addition to indemnity bond, for materials listed under Category-B, the contractor shall be required to provide necessary insurance cover of equivalent value of materials.

Items against which no secured advance shall be granted:

Civil:

1. Glass products other than those indicated in Category-B.
2. Sand and moorum
3. Chemical compounds other than those indicated in Category-B.

Electrical:

1. Glass gloves and shades
2. Bulbs and tubes
3. Petrol and diesel
4. Freon and other refrigeration gases.

9.8 Income tax deduction @ 2% (Two percent) of the gross value of each bill or at the rate as amended from time to time, shall be made unless exempted by the competent authority of the IncomeTax Department

Sales tax on works contract shall be payable by the contractor. If, however, the company is asked to make deduction from the contractor's bills, the same shall be done and a certificate to this effect shall be issued to the contractor for dealing with the State Govt. and the company does not take any responsibility to do anything further in this regard.

9.9 No interest shall be payable on the amounts withheld, under the terms of the Contract Agreement/Work-order.

10. Termination, Cancellation, Suspension and Foreclosure of Contract

The company shall, in addition to other remedial steps to be taken as provided in the conditions of contract be entitled to cancel the contract in full or in part, if the contractor :-

- a. Makes default in proceeding with the works with due diligence and continues to do so even after a notice in writing from the Engineer In Charge, then on the expiry of the period as specified in the notice
Or
- b. Commits default/breach in complying with any of the terms and conditions of the contract and does not remedy it or fails to take effective steps for the remedy to the satisfaction of the Engineer In Charge, then on the expiry of the period as may be specified by the Engineer In Charge in a notice in writing.
Or
- c. Obtains a contract with the company as a result of ring tendering or other non-bonafide methods of competitive tendering.
Or
- d. Shall offer or give or agree to give any person in the service of the company or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for act/acts of favour in relation to the obtaining or execution of this or any other contract for his company.
Or
- e. Fails to complete the work or items of work with individual dates of completion, on or before the date/dates of completion or as extended by the company, then on the expiry of the period as may be specified by the Engineer In Charge in a notice in writing.
Or
- f. Transfers, sublets, assigns the entire work or any portion thereof without the prior approval in writing from the Engineer In Charge. The Engineer In Charge may by giving a written notice, cancel the whole contract or portion of it in default.

10.1 The contract shall also stand terminated under any of the following circumstances :

- a) If the contractor being an individual in the case of proprietary concern or in the case of a partnership firm any of its partners is declared insolvent under the provisions of Insolvency Act for the time being in force,

or makes any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors amounting to proceedings for liquidation or composition under any Insolvency Act.

b) In the case of the contractor being a company, its affairs are under liquidation either by a resolution passed by the contractor's company or by an order of court, not being a voluntary liquidation proceeding for the purpose of amalgamation or re-organisation, or a receiver or manager is appointed by the court on the application by the debenture holders of the contractor's company, if any.

c) If the contractor shall suffer an execution being levied on his/their goods, estates and allow it to be continued for a period of 21 (twenty-one) days.

d) On the death of the contractor being a proprietary concern or of any of the partners in the case of a partnership concern and the company is not satisfied that the legal representative of the deceased proprietor or the other surviving partners of the partnership concern are capable of carrying out and completing the contract. The decision of the company in this respect shall be final and binding which is to be intimated in writing to the legal representative or to the partnership concern.

10.2 On cancellation of the contract or on termination of the contract, the Engineer In Charge shall have powers:

a) to take possession of the site and any materials, constructional plant, equipments, stores etc. thereon.

b) to carry out the incomplete work by any means at the risk and cost of the contractor.

c) to determine the amount to be recovered from the contractor for completing the remaining work or in the event the remaining work is not to be completed the loss/damage suffered, if any, by the company after giving credit for the value of the work executed by the contractor upto the time of cancellation less on a/c payments made till date and value of contractor's materials, plant, equipments, etc. taken possession of after cancellation.

d) to recover the amount determined as above, if any, from any money due to the contractor on any account or under any other contract and in the event of any shortfall, the contractor shall be called upon to pay the same on demand. The need for determination of the amount of recovery of any extra cost/expenditure or of any loss/damage suffered by the company shall not however arise in the case of termination of the contract for death/demise of the contractor as stated in clause 10.1(d) of the contract.

e) to give the contractor or his representative of the work 7 (seven) days notice in writing for taking final measurement for the works executed till the date of cancellation or termination of the contract. The Engineer In Charge shall fix the time for taking such final measurement and intimate the contractor in writing. The final measurement shall be carried out at the said appointed time notwithstanding whether the contractor is present or not. Any claim as regards measurement which the contractor is to make shall be made in writing within 7 (seven) days of taking final measurement by Engineer-In-charge as aforesaid and if no such claim is received, the contractor shall be deemed to have waived all claims regarding above measurements and any claim made thereafter shall not be entertained.

10.3 Suspension of Work:

i) The company shall have power to suspend the work or any part thereof and the Engineer In Charge may direct the contractor in writing to suspend the work, for such period and in such manner as may be specified therein, on account of any default on the part of the contractor, or for proper execution of the work for reasons other than any default on part of the contractor, or on ground of safety of the work.

ii) In the event of suspension for reasons other than any default on the part of the contractor, extension of time shall be allowed by the company equal to the period of such suspension and the contractor shall properly protect and secure the works to the extent necessary during such suspension.

The contractor shall carry out the instructions given in this respect by the Engineer-In Charge & if such suspension exceeds 45 (forty five) days, the contractor will be compensated on mutually agreed terms.

10.4 The work shall, throughout the stipulated period of contract, be carried out with all due diligence on the part of the contractor. In the event of termination or suspension of the contract, on account of default on the part of the contractor, as narrated hereinbefore, the security deposit and other dues of this work or any other work done under this company shall be forfeited and brought under the absolute disposal of the company provided, that the amount so forfeited shall not exceed 10 (ten) percent of the contract value.

10.5 Foreclosure of contract:

If at any time after acceptance of the tender the company decides to abandon for any reason whatsoever the company, through its Engineer In Charge, shall give notice in writing to that effect to the contractor. In the event of abandonment the company shall be liable :-

a) to pay reasonable amount assessed and certified by the Engineer In Charge of the expenditure incurred, if any, by the contractor on preliminary works at site e.g. temporary access roads, temporary construction for labour and staff quarters, office accommodation, storage of materials, water storage tanks and water supply for the work including supply to labour/ staff quarters, office etc.

b) to pay the contractor at the contract rates full amount for works executed and measured at site upto the date of such abandonment.

c) to pay for the materials brought to site or to be delivered at site, which the contractor is legally liable to pay, for the purpose of consumption in works carried out or were to be carried out but for the foreclosure, including the cost of purchase and transportation and cost of delivery of such materials. The materials to be taken over by the company should be in good condition and the company may allow at its discretion the contractor to retain the materials in full or in part if so desired by him and to be transported by the contractor from site to his place at his own cost with due permission of the Engineer In Charge.

d) to take back the materials issued by the company but remaining unused, if any, in the work on the date of abandonment/reduction in the work, at the original issue price less allowance for any deterioration or damage caused while in custody of the contractor.

e) to pay for the transportation of tools and plants of the contractor from site to contractor's place or to any other destination, whichever is less.

10.5.01 The contractor shall, if required by the Engineer In Charge, furnish to him books of accounts, papers, relevant documents as may be necessary to enable the Engineer In Charge to assess the amount payable in terms of clauses 10.5(b) (c) & (e) of the contract. The contractor shall not have any claim for compensation for abandonment of the work, other than those as specified above.

11. Completion Certificate

Except in cases where the contract provides for "Performance Test" before issue of completion certificate, in which case the issue of completion certificate shall be in accordance with the procedure specified therein, the contractor shall give notice of completion of work, as soon as the work is completed, to the Engineer In Charge. The Engineer In Charge and / or any other Officer, nominated for the purpose by the company, shall within 30 (thirty) days from the receipt thereof, inspect the work and ascertain the defects/deficiencies, if any, to be rectified by the contractor as also the items, if any, for which payment shall be made at reduced rate.

If the defects, according to the Engineer In Charge are of a major nature and the rectification of which is necessary for the satisfactory performance of the contract, he shall intimate in writing the defects and instruct the contractor to rectify the defects/remove deficiencies within the period and in the manner to be specified therein. In such cases completion certificate will be issued by the Engineer In Charge after the above rectifications are carried out/ deficiencies are removed by the contractor to the satisfaction of Engineer In Charge.

In the event there are no defects or the defects/ deficiencies are of a minor nature and the Engineer In Charge is satisfied that the contractor has already made arrangements for rectification, or in the event of contractor's failure to rectify the defects for any reason whatsoever, the defects can be rectified by the company departmentally or by other means and the 50% of the security deposit of the contractor shall be sufficient to cover the cost thereof, he shall issue the completion certificate indicating the date of completion of the work, defects to be rectified, if any, and the items, if any, for which payment shall be made at reduced rate indicating reasons there for and with necessary instructions to the contractor to clear the site/place of work or all debris/ waste materials, scaffoldings, sheds, surplus materials etc. making it clean.

11.1 In cases where separate period of completion for certain items or groups of items are specified in the contract, separate completion certificate for such items or groups of items may be issued by the Engineer In Charge after completion of such items on receipt of notice from the contractor only in the event the work is completed satisfactorily in every respect.

Refund of security deposit and payment of final bill shall, however, be made on completion of the entire contract work, but not on completion of such items of work.

12. Additional Responsibilities of the Contractor(s)

The cost on account of the "Additional Responsibilities of the Contractors" under this clause is deemed to be included in the tendered rates.

i) The company reserves the right to let other contractors also works in connection with the Project and the contractor/contractors shall co-operate in the works for the introduction and stores and materials and execution of his/their works.

ii) The contractor/contractors shall keep on the work site during the progress a competent and experienced Resident Engineer exclusively for the work and necessary assistants who shall represent the contractor(s). The contractor shall employ, on the site in connection with the execution and maintenance of the work, the following technical staff :

For Buildings Roads, Water Supply & Sanitary Works:

- | | |
|--|---|
| 1) For value of work ranging from Rs.10 lakhs to Rs.20 lakhs. | 1 Experienced Diploma holder. |
| 2) For value of work above Rs.20 lakhs and upto Rs. 1 Crore | Experienced Graduate Engineer inand addition to Diploma holder as per sl.no.4 below. |
| 3) For value of work in excess of Rs.1 crore & for every additional Rs. 2crores or part thereof. | 1 Graduate Engineer extra in addition to2Graduate Engineer and Diploma holder as per sl.no.1 & 4. |
| 4) For value of work in excess of Rs.20 lakhs & for every additional Rs.50lakhs or part thereof. | 1 Diploma holder extra. |

For Industrial Structures :

- | | |
|--|-------------------------------|
| 1) For value of work ranging from Rs.5 lakhs to Rs.15 lakhs. | 1 Experienced Diploma holder. |
|--|-------------------------------|

- | | |
|---|---|
| 2) For value of work above Rs.15 lakhs and upto Rs.75 lakhs | 1 Experienced Graduate Engineer in addition to Diploma holder as per sl.no.4 below. |
| 3) For value of work in excess of Rs.75 lakhs & for every additional Rs.1.5 crores or part thereof. | 1 Graduate Engineer extra in addition to Graduate Engineer and Diploma holder as per sl.no.1 & 4. |
| 4) For value of work in excess of Rs.15 lakhs & for every additional Rs.50lakhs or part thereof. | 1 Diploma holder extra. |

The contractor shall intimate the Engineer In Charge in writing the names, qualifications ,experience and full postal address of each and every technical personnel employed at site by him.

The contractor(s) shall not be allowed to execute the work unless he/they engage the required technical staff at site as stated above. The delay on this account, if any, shall be the contractor's responsibility.

Important instructions shall be confirmed to the contractor(s) in writing. If the contractor/contractors in course of the works finds/find any discrepancy between the drawing, forming part of the contract documents and the physical conditions of the locality or any errors or omissions in drawings except those prepared by himself / themselves and not approved by the Engineer In Charge. It shall be his/their duty to immediately inform the Engineer In Charge in writing and the Engineer In Charge shall verify the same. Any work done after such discovery and without intimation as indicated above will be done at the risk of the contractor/contractors.

iii) The contractor / contractors shall employ only competent, skillful and orderly men to do the work. The Engineer In Charge shall have the right to ask the contractor/ contractors to remove from the work site any men of the contractor/contractors who in his opinion is undesirable and the contractor/contractors will have to remove him within 3 (three) hours of such orders.

The contractor shall employ apprentices in the execution of the contract work as required under Apprentices Act.

The contractor shall further be responsible for making arrangements at his own cost, or accommodation and social needs of the staff and workers under his employment.

iv) Precautions shall be exercised at all times by the contractor(s) for the protection of persons (including employees) and property. The safety required or recommended by all applicable laws, codes, statutes and regulations shall be observed by the contractor(s).In case of accidents, the contractor(s) shall be responsible for compliance with all the requirements imposed by the Workmen's Compensation Act or any other similar laws in force, and the contractor(s) shall indemnify the company against any claim on this account.

All scaffoldings, ladders and such other structures which the workmen are likely to use shall be examined by the Engineer In Charge or his authorised representative whenever they want and the structure must be strong, durable, and safe and of such design as required by Engineer In Charge.

In no case any structure condemned by the Engineer In Charge or his authorised representatives shall be kept on the work and such structure must be pulled down within three hours of such condemnation and any certificate or instructions, however, shall in no way absolve the contractor/contractors from his/their responsibility, as an employer, as the company shall in no way be responsible for any claim.

The contractor / contractors shall at all times exercises reasonable precautions for the safety of employees in the performance of his/their contract and shall comply with all applicable provisions of the safety laws drawn up by the State Govt. or Central Govt. or Municipalities and other authorities in India. The

contractor/contractors shall comply with the provision of the safety hand book as approved and amended from time to time by the Government of India.

v) The contractor / contractors shall familiarise themselves with and be governed by all law sand rules of India and Local statutes and orders and regulations applicable to his/ their work.

vi) The contractor shall maintain all records as per the provision made in the various statutes including Contract Labour (Regulation & Abolition) Act, 1970 and the Contract Labour (Regulation & Abolition) Central Rules,1971, Minimum Wages Act, Workmen Compensation Act etc. and latest amendment thereof. Such records maintained by the contractor shall be opened for inspection by the Engineer In Charge or by the nominated representative of the Principal Employer.

vii) The contractor/ contractors shall provide facilities for the sanitary necessities of all personemployed on the work shall be constructed and maintained in the number, manner and place approved or ordered by the Engineer In Charge. The contractor/contractors shall vigorously prohibit committing of nuisance at any other place. Cost of all works under this item shall be covered by the contractor/contractor's tendered rates.

viii) The contractor/contractors shall furnish to the Engineer In Charge or his authorised representative with work reports from time to time regarding the contractor / contractors organisation and the progress made by him / them in the execution of the work as per the contract.

ix) All taxes, whether Local, Municipal, Provincial or Central etc. and cess, royalties etc. are payable or may become payable during the entire periods of contract, shall be to the contractor/contractors account and shall be deemed to have been included in the tender for the work to be executed by him/them.

However, in the event of any changes in the Sales Tax on Works Contract as required by the Statutory Authority during the contract period, necessary adjustments will be made in contractual payments. For this purpose, the base date shall be the date on which the price bids/revised price bids have been opened.

Amount payable/repayable for any subsequent change in the Sales Tax on Works Contract will be made to /from the contractors after departmental verification of such changes of tax law issued by the statutory authority.

In case the company land is used for manufacture of bricks or extraction of gravels etc. the contractor will have to pay compensation to the company (apart from the liability of the contractor to make the payment of royalty etc. to the State Government) at the same rates or royalty fixed by the State Government or an appropriate deduction may be made in the rate to be paid to the contractors.

x) The contractor / contractors shall make his / their own arrangement for all materials, tools, staff and labourer required for the contract, which shall include cost of lead, lift, loading, unloading, railway freight, recruiting expenses and any other charges for the completion of the work to entire satisfaction of the company.

xi) The contractor / contractors shall make their own arrangement for carriage of all materials to the work site at his/their own cost.

xii) The work shall not be sublet to any other party, unless approved by Engineer In Charge, in writing.

xiii) a) No fruit trees or valuable plants or trees with trunk diameter exceeding 150mm shall be pulled, destroyed or damaged by the contractor/contractors or any of his/their employees without the prior permission of the company, failing which the cost of such trees or plants shall be deducted from the contractor/contractors dues at the rate to be decided by the company. The rates quoted are supposed to include clearance of shrubs and jungles and removal of such trees upto 150 mm dia., as will be permitted by the Engineer In Charge in writing.

b) Anything of historical or other interest or of significant value unexpectedly discovered on the site is the property of the employer. The Contractor is to notify the Nodal Officer or his nominee of such discoveries and carry out the Nodal Officer or his nominee's instructions for dealing with him.

xiv) The contractor / contractors shall not pay less than the minimum wages to the labourers engaged by him/them as per Minimum Wages Act or such other legislation or award of the minimum wage fixed by the respective State Govt. or Central Govt. as may be in force.

xv) All accounts shall be maintained properly and the company shall have the right of access and inspection of all such books of accounts etc., relating to payment of labourer considered necessary and the company may arrange for witnessing the payment to the labourer by its representatives.

xvi) The contractor shall in additions to any indemnity provided by the relevant clauses of the agreement or by law, indemnify and keep indemnified for the following :

a) The company or any agent or employee of the company against any action, claim or proceeding relating to infringement or use of any patent or design right and shall pay any royalties or other charges which may be payable in respect of any article or material included in the contract.

However, the amount so paid shall be reimbursed by the company in the event such infringement has taken place in complying with the specific directions issued by the company or the use of such article or material was the result of any drawing and/or specifications issued by the company after submission of tender by the contractor. The contractor must notify immediately after any claim being made or any action brought against the company, or any agent or employee of company in respect of any such matter.

b) The company against all claims, damages or compensation under the provisions of payment of Wages Act, 1938, Minimum Wages Act, 1948, Employer's Liability Act, 1938, The Workmen's Compensation Act, 1923, Industrial Dispute Act, 1947, Mines Act as applicable, Employees State Insurance Act 1948 and Maternity Benefit Act, 1961, Acts regulating P.F. or any modification thereof or any other law relating thereto and rules made there under from time to time, as may be applicable to the contract which may arise out of or in consequence of the construction or maintenance or performance of the work under the contract and also against costs, charges and expenses of any suit, action or proceedings arising out of any accident or injury.

c) The company against all losses and claims for injuries or damages to any third party or to any property belonging to any third party which may arise out of or in consequence of the construction or maintenance or performance of the work under the contract and against all claims/demands proceedings/damages, cost charges and expenses whatsoever in respect of or in relation thereto.

xvii) The contractor is under obligation to hand over to the company the vacant possession of the completed building structures failing which the Engineer In Charge can impose a levy upon the contractor upto 5% of the total contract value for the delay in handing over the vacant possession of the completed works after giving a 15 (fifteen) days notice to the contractor.

xviii) a) INSURANCE : The contractor shall take full responsibility to take all precautions to prevent loss or damage to the works or part thereof for any reasons whatsoever (excluding act of God e.g. flood, riots, war, earthquake, etc.) and shall at his own cost repair and make good the loss/damage to the work so that on completion, the work shall be in good order and condition and in conformity with the requirements of the contract and instructions of the Engineer In Charge.

In case of construction works without limiting the obligations and responsibilities under the contract, the contractor shall take insurance policy for the total value of work for the period from commencement to completion including defect liability period against risk of loss/ damage to the extent as permissible under the law of insurance.

The contractor shall arrange necessary insurance and pledge the same in the name of the company and all moneys payable by the insurers shall be recovered by the company which shall be paid to the contractor in installments as may be certified by the Engineer In Charge for the purpose of rebuilding or replacement or repair of the works and/or goods destroyed or damaged for which payment was received from the insurers.

b) Where any company building or part thereof is used, rented or leased by the contractor for the purpose of storing or using materials of combustible nature, the contractor shall take separate insurance policy for the entire building and the policy shall be deposited with the company.

c) The contractor shall at all times during the tenure of the contract indemnify the company against all claims, damages or compensation under the provision of the Workmen's Compensation Act and shall take insurance policy covering all risk, claims, damages, or compensation payable under the Workmen's Compensation Act or under any other law relating thereto.

d) The contractor shall ensure that the insurance policy/ policies is/are kept alive till full expiry of the contract by timely payment of premiums and it/they shall not be cancelled without the approval of the company and a provision is made to this effect in all policies, and similar insurance policies are also taken by his sub-contractors if any. The cost of premium shall be borne by the contractor and it shall be deemed to have been included in the tendered rate.

e) In the event of contractor's failure to effect or to keep in force the insurance referred to above or any other insurance which the contractor is required to effect under the terms of the contract, the company may effect and keep in force any such insurance and pay such premium/premiums as may be necessary for that purpose from time to time and recover the amount thus paid from any moneys due to the contractor.

THE CLAUSE 12 xviii SHALL BE APPLICABLE FOR WORKS OF ESTIMATED VALUE OF OVER Rs. 50 LAKHS.

xix) Setting Out: The contractor shall be responsible for the contract and proper setting out of the works and correctness of the position, reduced levels, dimensions and alignment of all parts of the work including marking out the correct lay out in reference to the permanent bench mark and reference points. Only one permanent bench mark and basic reference lines shall be marked and shown to the contractor as basic data.

The contractor shall have all necessary instruments, appliances and labour in connection therewith. If at any time during the progress of work any error is detected in respect of the position, levels, dimensions or alignment of any part of the work, the contractor on being required to do so by the Engineer In Charge or his representative shall at the expenses of the contractor rectify such errors to the satisfaction of Engineer In Charge unless such error is due to incorrect data supplied by the Engineer In Charge.

xx) On receipt of Letter of Acceptance of Tender / Work Order the contractor shall forthwith Register and obtain License from the competent authority under the Contract Labour (Regulation & Abolition) Act 1970, the Contract Labour (Regulation & Abolition) Central Rules, 1971 and submit certified copies of the same to the Engineer In Charge and the Principal Employer.

xxi) The contractor shall be registered with the concerned State Govt. and the Central Govt. in respect of Sales Tax Act and the certificate having details of Registration No., period of validity etc. should be submitted to the Engineer In Charge.

xxii) The contractor shall, in connection with works, provide and maintain, at his own cost, all lights, security guards, fencing when and where necessary as required by the Engineer In Charge for the purpose of protection of the works, materials at site, safety of workmen and convenience of the public.

xxiii) All materials (e.g. stone, moorum and other materials) obtained in the course of execution of the work during excavation and dismantling etc. shall be the property of the company and the same may be issued to the contractors, if required for use in the works at the rates to be fixed by the Engineer In Charge.

xxiv) Unless otherwise specifically provided for, dewatering of excavation pits, working areas etc. shall be the contractor's responsibility and is to be carried out at his own cost as per instructions of EIC. The rates quoted by the contractor shall be deemed to include the dewatering costs.

xxv) Approval by the Nodal Officer/Engineer in Charge or his nominee: The contractor shall submit specifications and drawings showing the proposed temporary work to the Nodal Officer/Engineer-in-Charge or his nominee, who is to approve them if they comply with the specifications and drawings.

The contractor shall be responsible for design of Temporary Works.

The Nodal Officer/Engineer-in-charge or his nominee's approval shall not alter the contractor's responsibility for design of the Temporary Works.

13. Defects Liability Period:

In addition to the defect/s to be rectified by the contractor as per terms of the contract/ work order, the contractor shall be responsible to make good and remedy at his own expense the defect/s mentioned hereunder within such period as may be stipulated by the Engineer In Charge in writing :

a) Any defect/defects in the work detected by the Engineer In Charge within a period of 6 (six) months from the date of issue of completion certificate.

b) In the case of building works or other works of similar nature any defect in the work detected by the Engineer In Charge within a period of 6 (six) months from the date of issue of completion certificate or before the expiry of one full monsoon period i.e. June to October whichever is later in point of time.

13.1 A programme shall be drawn by the contractor and the Engineer In Charge for carrying out the defects by the contractor detected within the defect liability period and if the contractor fails to adhere to this programme, the Engineer In Charge shall be at liberty to procure proper materials and carry out their rectifications in any manner considered advisable under the circumstances and the cost of such procurement of materials and rectification work shall be chargeable to the contractor and recoverable from any of the pending dues of the contractors.

The defect liability period can be extended by the company on getting request from the contractor only for valid reasons.

There will be no defect liability period for works like Grass Cutting, Jungle Cutting, Surface Dressing & any other work of similar nature to be decided by the Engineer in Charge.

14. Operating and Maintenance Manual:

If "as built" drawings and/or Operating and Maintenance Manual are required the contractor shall supply them by the dates as per instruction of the Engineer-in-charge.

If the contractor does not supply the drawings and/or Manual by the dates as stated above, or they do not receive the Nodal Officer or his nominee's approval, the Nodal Officer or his nominee shall withhold the amount as stated in the agreement.

15. Settlement of Disputes/ Arbitration

15.1 It is incumbent upon the contractor to avoid litigation and disputes during course of execution. However, if such disputes take place between the contractor and the department, effort shall be made first to settle the disputes at the company level. The contractor should make request in writing to the Engineer-in-charge for settlement of such disputes/claims within 30(thirty) days of arising of the cause of dispute/claim failing which no disputes/claims of the contractor shall be entertained by the company.

15.2 If differences still persist, the settlement of the dispute with Govt. agencies shall be dealt with as per the guidelines issued by the Ministry of Finance, Govt. of India in this regard. In case of parties other than Govt. agencies, the redressal of the dispute may be sought in the Court of Law.

ADDITIONAL TERMS AND CONDITIONS

The following additional terms and conditions are also acceptable to the company. The tenderers are requested not to quote any further additional conditions in the tender.

1. Mobilisation Advance

- i) No mobilisation advance is payable for works whose estimated value is less than Rs.100.00 lakhs.
- ii) In the case of turn key work whose estimated value is more than Rs.100 lakhs a maximum of 10 % of the total contract value of work will be paid as mobilisation advance subject to submission of Bank Guarantee for equal amount from any nationalized Bank only.
- iii) In case of other civil works valued more than Rs.100 lakhs mobilisation advance will be paid upto 5% of the contract value subject to submission of Bank Guarantee for equal amount.
- iv) However, such mobilisation advance will carry interest on the basis of CIL's borrowing rate under cash credit arrangement as varying from time to time.
- v) The mobilisation advance shall be recovered from the bills of the contractor from the 2nd running account bill onwards @ 20% of the advance amount paid and full recovery would be ensured before or with the Final Bill.
- vi) The value of Bank Guarantee may be reduced to the extent such advance is recovered by the company subject to the conditions that the value of Bank Guarantee amount at any time is more than the recoverable outstanding advance. Bank Guarantee shall be irrevocable and from a Bank as per the list provided with the document.

2. Application of Price Variation Clause.

If the prices of materials (not being the materials supplied at fixed issue rates by the company) and wages of labour required for execution of the work increase or decrease, the contractor shall be compensated for such increase or recoveries will be made from the bills for such decrease as per provisions detailed hereafter:

- a) The amount of the contract shall accordingly be varied subject to the condition that such compensation for escalation/ de-escalation in price shall be available only for the work done during the stipulated period of the contract including such period for which the contracts validity is extended under

the provisions of the contract without any penal action. The Price Variation Clause shall not be applicable for works for which stipulated period of completion is six months or less.

b) The base date for working out such escalation/de-escalation shall be the last date on which the price bids or revised price bids were stipulated to be received.

c) The compensation for escalation or recoveries to be made shall be worked out at quarterly intervals and shall be with respect to the cost of work done during the previous three months. The first such payment will be made at the end of three months after the month (excluding) in which the tender was accepted and there after at three months' interval.

2.1 Escalation/De-escalation for Labour: The amount paid to the contractor for the work done shall be adjusted for increase or decrease in the cost of labour and the cost shall be calculated quarterly in accordance with the following formula :

$$V L = W \times \frac{A L - L_o}{100} \times \frac{L}{L_o}$$

Where :

VL = Variation in labour cost i.e., increase or decrease in the amount in rupees to be paid or recovered.

W = Value of work done during the period under reckoning to which the escalation/deescalation relates as indicated in clause-2.4 of the Additional Terms & Conditions of the contract.

A = Component of labour expressed as percentage of the total value of the work adopted from the Table-1.

L_o = Minimum wages for unskilled workers payable as per the Minimum Wages Act / Rules of the State or Central Govt., whichever is more, applicable to the place of work as on the last date stipulated for receipt of the price bids or revised price bids whichever is later.

L = Revised minimum wages of unskilled worker corresponding to L_o during the period to which the escalation/de-escalation relates.

2.2 Escalation /De-escalation on Materials: The amount to be paid to the contractor for the work done will be adjusted for increase or decrease in the cost of materials and the cost shall be calculated quarterly in accordance with the following formula :

$$V_m = W \times \frac{B M - M_o}{100} \times \frac{M}{M_o}$$

Where :

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

W = Cost of work done during the period under reckoning to which the escalation / de-escalation relates as indicated in clause-2.4 of the Additional Terms & Conditions of the contract.

B = Component of material expressed as percentage of the total value of the work adopted from the Table -1.

M =Average All India Wholesale Price Index for all commodities for the period to which escalation/de-escalation relates as published by the RBI Bulletin, Ministry of Industry & Commerce, Govt. of India.

Mo = All India Wholesale Price Index for all commodities as published by the RBI Bulletin, Ministry of Industry & Commerce, Govt. of India, relating to the last date on which the price bids or revised price bids whichever is later were stipulated to be received.

2.3 Escalation/ De-escalation on POL : The amount to be paid to the contractor for the work done shall be adjusted for the increase or decrease in the cost of POL and the cost shall be calculated quarterly in accordance with the formula given below :

$$V_f = W \times \frac{C}{100} \times \frac{F - F_o}{F_o}$$

Where :

V_f = Variation in the cost of fuel, oil and lubricants increase or decrease in the rupees to be paid or recovered.

W = Value of work done during the period under reckoning to which the escalation/ de-escalation relates as indicated in clause 2.4 of the Additional terms & Conditions of the contract.

C = Component of POL expressed as percentage of the total cost of the work taken from Table 1.

F = Average Index Number for wholesale price for the group of 'Fuel, Power, Light & Lubricants' as published by the Economic Adviser, Ministry of Industry, Govt. of India for the period to which the escalation/deescalation relates.

F_o = Index number of wholesale price for the group, Fuel, Power, light & lubricants as published by the Economic Adviser, Ministry of Industry, Govt. of India prevalent on the last date of receipt of price bids or revised price bids whichever is later.

2.4 While calculating the value of "W" the following may be noted : The cost on which the escalation will be payable shall be reckoned as 85 % of the cost of work as per the bills to which escalation relates, and from this amount the value of materials supplied or services rendered at the prescribed charges under the relevant provisions of the contract, and proposed to be recovered in the particular bill, shall be deducted before the amount of compensation for escalation or de-escalation is worked out. In the case of materials brought to site for which any secured advance is included in the bill, the full value of such materials as assessed by the Engineer In Charge (and not the reduced amount for which secured advance has been paid) shall be included in the cost of work done for operation of this clause. Similarly, when such materials are incorporated in the work and the secured advance is deducted from the bill, the full assessed value of the materials originally considered for operation of this clause should be deducted from the cost of the work shown in the bill, running or final. Further the cost of work shall not include any work for which payment is made at prevailing market rates.

2.5 In the event the price of materials and/ or wages of labour required for execution of the work decreases, there shall be downward adjustment of the cost of work so that such price of materials and/or wages of labour shall be deductible from the cost of work under this contract and in this regard the formulae herein before stated under this clause shall mutatis/mutandis apply provided that no such adjustment for the decrease in material price and/ or wages of labour before mentioned would be made in case of contracts in which the stipulated period of completion of the work is less than six (6) months.

2.6 Application of Price Variation Clause during extended period of Contracts. The Price Variation Clause as stated above will be applied for extended time frame of a contract by following the principle stated as under,

i) *Normally, if and when it is understood that a contract is not going to be completed within the scheduled time period, the contract is kept operative by extending the time of completion provisionally. During this provisional extended period the operation of the Price Variation Clause will remain suspended.*

ii) If and when it is decided at the end of successful completion of the work that the delay was due to causes NOT attributable to the Contractor, then the Price Variation Clause will be revived and applied as if the scheduled date of completion has been shifted to the approved extended date.

iii) If it is decided at the end of completion of the work that the delay was due to the fault of the Contractor, then the Price Variation Clause will not be revived and NO PAYMENT will be made to the Contractor on this account. Additionally the Clause related to Compensation for Delay will be applied.

No payment will be made by applying “FROZEN INDICES “under any circumstances

Table – 1

Value of A, B & C in the escalation formula in the additional terms & conditions for Civil Works :

Sl. No.	Particulars	A % (Labour component)	B % (Material component)	C % (POL component)	REMARKS
1.	For building works	25	75	Nil	
2.	For Road works	15	80	05	
3.	For external sewerage, external water supply, and external electrification	10	90	Nil	
4.	For external water supply, external sanitary and external electrification (through labour rate contract)	75	25	Nil	
5.	For steel structural works	15	85	Nil	
6.	For steel structural works with Deptt. free supply of rolled steel sections (through labour rate contract)	75	25	Nil	
7.	For Coal Handling Plant Civil Works	25	75	Nil	
8.	For under-ground civil works such as Incline Drivage, Shaft Sinking etc.	35	65	Nil	

For all other works not listed above, the component of labour, material and POL of the total cost of work shall be as specifically indicated in the tender document.

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ADDITIONAL SAFETY MEASURES TO BE TAKEN BY THE CONTRACTORS

SAFETY CODE

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground or from solid construction except such short period work as can be done safely from ladder. When a ladder is used an extra Masdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable foot holds and handholds shall be provided on the ladder and the ladder shall be given on the inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).

- a. Scaffolding or staging more than 12' above the ground or floor, swing or suspended, from an overhead support to created with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured at least 3 feet high above the floor or platform of such scaffolding or staging and ends thereof with only such openings as maybe necessary for the delivery of materials. Such scaffoldings or staging shall be so fastened as to prevent it from swaying from the building or structure.
- b. Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or the gangway or the stairway is more than 12 feet above ground level or floor level they should be closely boarded, should have adequate width and should be suitably fenced, as described in (ii) above.
- c. Every opening in the floor of a building or in working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 3' - 0'.
- d. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be provided securely fixed. No portable single ladder shall be over 30 feet in length while the width between side rails in rung ladder shall in no case be less than 11 - 1/2 " for ladder upto and including 10 feet in length. For longer ladders this width should be increased at least 1/4" for each additional feet of length. Uniform step spacing shall not exceed 12". Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor / contractors shall also provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit action or other proceedings at all that may brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action of proceedings to any such person or which may with the consent of the contractor (s) be paid to compromise any claim by any such persons.

Excavating and Trenching

- e. All trends, feet or more in depth, shall at all times be supplied with at least one ladder for each 100 feet in length or fraction thereof. Ladder shall be extended from bottom of the trench to at least 3' above the surface of the ground. The side of the branches which are 5' or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be place within 5 feet of the edge of the trench or half of the trench which ever is more cutting shall be done from top to bottom. Under no circumstances under mining or under cutting shall be done.

Demolition

- f. Before any demolition work is commenced and also during the process of the work
 - i. All roads and open areas adjacent to the work site shall either be closed or suitable protected.

- ii. No electric cable “or apparatus which is liable to be a source of danger over a cable or apparatus used by the operation shall remain electrically charge.
 - iii. All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.
- g. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the persons employed on the site and maintained in a condition suitable for immediate use and the contractor should take adequate steps to ensure proper use of equipment by those concerned.
- a) Workers employed on mixing as fighting materials, cement and lime mortar shall be provided with protective foot ware and protective goggles.
 - b) Those engaged in white washing and mixing or stacking of cement bags or ay materials which is injurious to the eyes shall be provided with protective goggles.
 - c) Those engaged in welding works shall be provided with welders glass.
 - d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sulfurously safe intervals.
 - e) When workers are employed in sewers and manholes, which are in use, the contractor(s) shall ensure that the mobile covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes and the holes so opened shall be cerdoned off with suitable for ling and provided with warning signals or boards to prevent accident to the public.
 - f) The contractor(s) shall not employ men below the age of 18 and woman on the work of painting with products containing lead in any form. Whenever man above the age of 18 are employed for the work of lead painting the following precautions should be taken :
 - 1) No paint containing lead or lead products should be used except in the form or paste and ready-made paint.
 - 2) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubber and scraped.
 - 3) Overalls shall be supplied by the Contractor(s) to the workmen and adequate facilities shall be provided to enable the working psinyrtd to wash during process of work.
- IX. When the work is done near any place where there is risk or drawing all necessary equipments should be provided and kept ready. Prompt rescue of any person in danger adequate provision should be made or prompt first aid treatment of all injuries likely to be sustained during the course of the work.
- X. Use of hoisting machines and tackle including their attachments, uncharged and supported shall conform to the following stands or conditions :
- a) These shall be of good mechanical construction sound materials and adequate strength and free from patent defect and shall be kept in good repair and in good working order.
 - b) Every rope used in jointing or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.
- 2) Every crane driver or jointing appliance operator shall be properly qualified and no person under the age of 21 years should be In-charge of any hoisting machine including any scaffold, which or give samples to the operator.

- 3) In case of every josting machine and of every chain ring hook, shackle swizzle and pulley block used in jointing or lowering or as means mains of suspension of the safe working load shall be ascertained by adequate means. Every hosting machine and all gear referred to above shall be plainly marked with the safe working load. In case of josting machine having variable safe working load each safe working load of the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be beyond the safe working load except for the purpose of testing.
- 4) In case of department machines, the safe working load shall be notice by the Electrical Engineer-in-Charge. As regards contractor's machines the contractor(s) shall notify the safe working load of the machines to the Engineer-in-Charge. Whenever he brings any machine to site of work and get verified by the Electrical Engineer concerned.
- XI. Gearing, transmission, electric wiring and other dangerous parts or hoisting appliances should be provide with such means as will reduce to minimum risk of accidental descent of the load. Adequate precaution should be taken to reduce to the minimum the risk of any part of suspended load becoming accidentally displaced. When workers employed on electrical installations, which are already energized, insulating mats, wearing appeared, such as Globefish Sleeves and boots as may be necessary should be provided. The workers should not wear any rings, watches and carry keys or others materials which are good conductors of electricity.
- XII. All scaffold, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall provided at or near places of work.
- XIII. These safety provision, shall be brought to the notice of all concerned by display on a Notice Board at a prominent place at the work spot. The person responsible by for complaisance of the safety code shall be named therein by the contractor(s).
- XIV. To ensure effective enforcement of the rules, regulations relating to safety precautions, the arrangements made by the contractor(s) shall be open to inspection by the labour officers, Engineer-in-Charge of the department or their representative.
- XV. Not with standing the above clause from (1) to (xiv) there is nothing in these to exempt the contractor9s) from the operations of any other act or rules in force in the Republic of India.

Read over & accepted .

Signature of the Contractor

DECLARATION BY THE CONTACTOR

1. I / We Contractor, hereby undertake that I / We shall pay the labour engaged on the work of Wages as per Minimum Wages Act of Govt. of India / Govt. of Jharkhand and amendment there to applicable to the zone in which the work lies and act accordingly. I/We also undertake to abide by the various laws in force and extend necessary facilities and amenities to the staff and workers employed by me / us.
2. I / We hereby declare that I / We have made myself / ourselves thoroughly conversant with the local conditions regarding all materials and labour on which I / We have based my / our rates for this work. The specification / conditions of this work has been carefully studied and understood by me / us before submitting this tender.
3. I / We hereby promise to get ourselves registered with the labour department as per provision of the laws before commencement of the work.
4. I / We hereby declare that I / We have not even been black listed / debarred from taking work by CCL or any subsidiary of CIL.

Signature of Tenderer.

LIST OF SOME OF THE MANUFACTURING FIRMS WHOSE PRODUCT SAMPLES WERE FOUND TO BE ACCEPTABLE, SUPPLY IS TO CONFIRM TO ISI SPECIFICATION, SUPPLIERS & OTHER MANUFACTURER CONFORMING TO ISI SPECIFICATIONS MAY ALSO BE ACCEPTED BY ENGINEER-IN-CHARGE

1. Oil paints for wood work shall be one of the following make as approved by the Engineer-incharge.
 - (i) Shalimar 'Wood Kota' Brand.
 - (ii) Jenson & Nicholson 'JHILMIL' Brand.
 - (iii) P.C.Chanda & Cos.ready mixed paint.
 - (iv) East India Paints Overall Brand.
 - (v) British Paints 'Castle'.
 - (vi) Maeforiance & C.I.'Woodvala'.
 - (vii) Formite (Hard Closs) Paints.
 - (viii) Holye's paint 'Superior Quality' R/M paint.
 - (ix) Tom the painter's Superior prepared paint.
 - (x) 'Spartan' Adcelance enamalised ready mixed paint. Addisons paints & Chemicals Ltd.
 - (xi) Synthetic Enamel paints of M/s Bombay paints.

2. Tower bolts for door and windows shall be one of the following makes.
 - (i) National Hard Ware, Bombay.
 - (ii) India Hard Ware Industries, Faridabad.

Aluminium

- (i) Aluminium tower bolts & handle shall be manufactured by M/s Lahiri & Co.,Kolkata.
 - 3(a) Flush door shutters shall be of one of the following makes :
 - (i) Sita Board Doors By plywood products, Sitapur, U.P.
 - (ii) Art Door Manufactured by Assam Railways & Trading Co. Ltd. Margherita (Assam)
 - (iii) Anchor and Okal door Manufactured by Central India Board Product,Kolkata-13
 - (iv) 1-1/4" thick commercial Manufactured by M/s N.C.Industries, P.O.Hehal,Ranchi. flush door

 - (iv)(a) Cellular type

 - (v) 1-1/2" thick both sides decorative teak faced

- (vi) Flush Shutters M/s Bihar Wood Land,Piska Road,Ranchi-5
- (b) Kiln seasoned battened By the Premier Wood Craft (Pvt.) Ltd. & braced shutters Lt.,Jassor Road,P.O.Ganga Nagar,24 Paraganas(W.B.)
4. M/s General Electrical Equipment & Co.,Ranchi.
5. M/s Bharat Collapsible Gate Co.,Dhanbad.
6. 'Steelmen' of M/s Steelmen,Piska Road,Hehal, Ranchi -5
7. M/s Steel Co.,Ratu Road, Ranchi.
8. M/s Pradeep Industries, Bus Stand Road, Ramgarh Cantt.

Angle Iron Door Frame :

- a. 'Steelmen' of M/s Steelman, Piska Road, Hehal,Ranchi -5
- b. M/s Steel Co.,Ratu Road, Ranchi -5
- c. M/s Pradeep Industries, Bus stand Road,Ramgarh Cantt.or any other firms of repute approved by the General Manager(Constn.), from time to time steel windows shall conform to ISI specification No.1038 and shall have side hug leaves and top fanlights. 'No placeral shutters to be used'.

- d (1) 'V' Crimp Steel Door Shutters as per Specification of Central Coalfields Limited.
- (2) M.S.Angle Iron Chowkhat conforming to specification and standards of Central Coalfields Limited.
- (3) Rolled section-Steel Windows fabricated from materials of approved manufactures of ISI and conforming to specification and standards of Central Coalfields Limited.
- (4) Pressed Steel door frames conforming to specifications and standards of Central Coalfields Limited.

M/s New Apana
Industries,Kamla Kant
Lane,Ratu Road,Ranchi 1

Temporary Approval

- | | | |
|----|-------------------------------|---|
| 1. | Factory Made Battened | (1) M/s Safe Wood J.C.Road, 1ST Lane,Lalpur,Ranchi – 1 |
| 2. | Popular type play board panel | (1) M/s Bihar Timber Seasoning Plant,Bokaro Steel City,Dist Dhanbad.
(2) M/s Ranchi Timber Seasoning & Treatment Industry,Steel Co.,Ratu Road,Ranchi.
(3) M/s Safe Wood J.C.Road,1ST Lane Lalpur,Ranchi - 1 |
| 3. | Steel Windows | (1) M/s Vijay Luxmi Steel Works,Gola Road,Ramgarh Cantt.,Hazaribagh. |
| 4. | Anglo iron door frame | (1) M/s Vijay Luxmi Steel Works,Gola Road,Ramgarh Cantt.,Hazaribagh. |

- | | | |
|-------|--|--|
| (ii) | Kiln seasoned battened & braced shutters | Manufactured by M/s N.C. Industries, Hehal,Ranchi. |
| (iii) | - do - | Manufactured by M/s Joinery Manufacturing Co. 77/1, Christopher Road,Calcutta – 26 |
| (iv) | - do - | M/s Bihar Timber Seasoning Plant Bokaro Steel City, Dist Dhanbad. |
| (v) | - do - | M/s Bihar Wood Land,Piska Road,Ranchi – 5 |
| (vi) | - do - | Ranchi Timber seasoning & Treatment Industry Steel Co.Ratu Road,Ranchi. |
| (c) | Factory made tongued, Grooved,battened shutters, With Z type fabricated M.S. Angle as braces & ledges. | Manufactured by M/s N.C.Industries,P.O.Hehal Ranchi. |
| (d) | Popular Type particle board, panel shutter. | - do - |
| (e) | Popular type ply board panel shutter. | M/s Bihar Wood Land,Piska Road,Ranchi – 5 |

4. The water proof tarfelt roof covering over the RCC slab shall be got done by one of the following firms or any other firm which are approved by the G.M.(Constrn.).

- (i) Tarfelt” water proofing treatment of M/s Shalimar Tar Product, 6 Lions Range,Calcutta–1
- (ii) “Mathoil” roofing of M/s Gladstone Loyal & Co Ltd.. 4Fairlie Places,Calcutta – 1
- (iii) “Rooflice” water proofing treatment of M/s Laid Insulations Ltd.5 Clive Row P.Box No.2540,Calcutta – 1
- (iv) “Treatment “ Brand roofing treatment of M/s National Lamibetors 1 & 2 old court House:Corner, Calcutta– 1
- (v) “Bito” M/s Indian Tar & Bitumen Products, 88 Stephone House, 4 Dalhousie Square, East Cal.
- (vi) M/s Bitumen products (India) 90, Biren Roy Road,Calcutta – 11

5. Steel Window

The following firms are approved for supply of steel windows NISCO windows of Haryana Iron and Steel Co.

- (1) 23-B-1 Diamond, Harbour Road,Calcutta – 8
- (2) Pioneer Windows of M/s Pioneer Engineers, 32 Cossipore Road,Calcutta - 2
- (3) “HOPE” Windows of House Metal windows Ltd.Transport Department Road,Calcu

SPECIFICATIONS

I. GENERAL

1. In case where the specifications given below are bound with the latest I.S. specifications shall hold good.
2. Wherever reference has been made to Indian Standard or any other specifications the same shall mean to refer the latest specifications being mentioned in the specifications below or schedule of quantities.

II. WORKMANSHIP

The workmanship shall be the best of its kind and shall conform to these specifications the Indian Standard specifications in every respect and where ISI is also silent, latest trade practices shall prevail subject to the approval of the Engineer – I/C.

III. MATERIALS

GENERAL

- a) All materials shall be best of their kind and shall conform to the latest Indian Standard.
- b) All materials shall be of approved quality as per samples and from origins approved by the Engineer-in-charge.
- c) A set of specimen samples of all approved materials shall be kept in bottle or otherwise at site, cost of which to be borne by the contractor.

1. BRICKS

Bricks manufactured in Bull's patent kiln trench only shall be used unless otherwise specified bricks should be uniform shape and colour and must be well burnt so as to give a clear.

Ringing sound when struck and should not break when thrown on the ground or against other bricks. They shall be clean, whole and free from flaws, cracks and under burnt lump and kind specially lime shall have sharp edges and angles and even surfaces. Bricks which when soaked in water for 24 hours absorb more water than one fifty of their dry weight shall be rejected. The burnt bricks shall be 10"x5"x3" in size with usual variation of 1/8 on other side.

The brick shall be manufactured from carefully selected good firm loan with necessary admixture of sand.

2. BRICK AGGREGATE FOR LIME CONCRETE

The brick aggregate shall be from hard well burnt bats and shall not exceed 1-1/2” in size and shall be free from dust clay grass or any other foreign matter.

3. SURKHI

Surkhi shall be made from well burnt bricks and should pass through a sieve of 1-1/2” mesh. In no case over burnt bricks to be used for the manufactures of Surkhi.

4. LIME

Lime stone shall be used in the work. It shall be slaked just before use. All impurities, ashes or pieces improperly or carelessly burnt shall be screened or picked out before slaking and removed at once from the work. Lime should pass through screen 12x12 mesh to the square inch stored in dry place.

5. AGGREGATE FOR CEMENT CONCRETE

Aggregate for cement concrete shall be from trap, quartzite or hard quartzite stone which shall pass through 20mm sieve and rest on 4.75 mm sieve. The aggregate shall be well screened and washed before use and shall be free from foreign matter.

6. CEMENT MORTAR

The mortar shall consist of cement and sand mixed in the proportion defined in the relevant schedule item for the various items of work, only measured quantity shall be used. Sand and cement shall be spread on a clean dry platform in layers one over the other and mix only when the mortar is required for use, and then only water should be added in sufficient quantity to make the materials moist.

7. LIME MORTAR

The mixture shall have slaked lime, Surkhi and sand in the proportion defined in the relevant schedule item for the various items of work. Ground cinders may be used when directed by the EIC . Lime, Surkhi and sand are to be mixed dry on a platform of massonary and then sprinkled with necessary quantity of water and ground in a mortar mill.

8. AGGREGATE FOR REINFORCED CEMENT CONCRETE

Aggregate for RCC shall be from trap, quartzite or hard quartzite stone. The aggregate shall pass through 3/2 mesh and rest on 1/4” mesh screens. It shall be well screened and washed before use and contain no foreign matter.

9. a. M.S. Reinforcement shall be of mild steel and plain rounds conforming to IS 4321966.
- b. Cold twisted bars-shall be conforming to IS 1786-1979.

9.1 STACKING AND STORAGE

Steel reinforcement shall be stored in way as to prevent distortion and corrosion mars of different classifications, sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths as to minimise wastage in cutting from standard lengths.

10. STRUCTURAL STEEL

Shall be mild steel rolled sections and plates conforming in the latest Indian standards IS:226-1970.

11. COARSE AGGREGATE

Shall be the best quality crushed or broken hard stone from approved quarries approved by the Engineer-in-charge and shall conform to IS 363-1970

12. COARSE SAND

Shall be either river sand or pit-sand, clean, sharp, strong, angular and composed of hard siliceous materials. The sand shall conform to IS 383-1970. Fineness modulus shall not be less than 2.5. The maximum quantity of silt shall not exceed 8%.

13. FINE SAND

This shall be natural sand from river. Fineness modulus shall not be less than 1.0. The maximum quantity of silt shall not exceed 8%.

14. STONE DUST

It shall be obtained from crushing hard stones and from quarries approved by the Engineer-in-charge. The fineness modulus shall not be less than 1.8. The maximum quantity of the silt shall not exceed 8%.

15. GLAZING GLASS

Shall be patent flinted sheet of glass of approved make of the best quality plain or ground glass, free from flaws, specks, bubbles.

16. MOSAIC TILES

The tiles shall be 20mm thickness and size as specified and shall conform to IS 12371959. The chips used shall be approved colour and must be marble chips. The size of chip shall be 6 to 3mm. The top layer of mosaic tiles shall be not less than 6mm thickness and must be compacted by vibration before pressure is applied. The colour must be permanent and fast to the action of light, alkali and weather and shall be chemically inert and free from adulterants likely to cause chemical action on cement. The weight of 250x250mm mosaic tiles shall be 3kg per tile approximately.

Tolerance on length and breadth shall be plus or minus one millimeter tolerance on thickness shall be plus 5mm.

17. TIMBER

Shall be best quality as specified in the schedule of quantities. Kiln seasoned, free from sap wood, sound, straight, free from laron and loose knots, cracks, shakes and any appearance. Oil lot and any other defect and shall not be placed in position covered in the wall or ground unless it has been approved by EIC. The maximum permission limit of moisture content, shall conform to IS 287-1973.

18. STEEL WINDOWS & DOORS

Shall be made from mild sections as approved free from rolling defects. All steel doors and windows shall conform to IS 1038-1975 unless otherwise provided. Steel section should be cold straightened and such as to be easily punched and welded.

19. Aluminium windows doors and glazings shall be made from extruded aluminium specification and shall be of approved make.

20. Marble stone slab: shall be of the kind specified in the schedule of quantities conforming to samples approved by the EIC. The marble slabs shall be machine cut to required dimensions. The marble slabs

shall be of selected quality, hard, sound, dense and homogeneous in texture, free, from cracks, decay weathering and flaws.

21. Asbestos roofing and accessories etc. shall include sheets, serrated adjustable ridges, ridge finals, barge board, eaves filler pieces, sum ken flange sheets, louvers, north light curves apron pieces, gutters, down pipes and extractors etc. The quality and sizes of A.C. roofing and accessories shall common to the latest Indian Standard IS: 459-1970.
22. CGI sheets : shall be of gauge specified in the schedule of quantities and shall conform to Indian Standard specification No.IS:277:1669 as revised upto date. The sheets shall be free from cracks, split edges, twist, surface flaws, injured galvanizing with uniform corrugations, without any signs of rust or white powdery deposit and shall be clean, bright and smooth. The since coating shall as pond to clause IV as specified in ISI.
23. Paints : These shall be of standard manufacturer approved by Engineer-in-charge conforming to the lattés Indian Standards for various paints.
24. Wate: Shall be clean and free from excessive slinity impurities / ingredients and other harmful matters duly tested in an approved Laboratory declared suitable for construction purpose and as approved by EIC.
25. Testing of materials and works: As and when required the contractors shall arrange to test materials and / or portions of works at his own cost to prove their soundness and efficiency. If after tests and materials, work or portions of work are considered defective or unsound the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the EIC. To prove, that the materials used are as specified the contractor shall furnish with original vouchers on demand.

1. EARTH WORK

1.1. Earth work in Excavation

Excavation shall be strictly as shown in the plans. All excavated earth will be placed not less than 5 feet from the edge of the foundation trench or as directed by the Engineer-incharge. All earth filling in the plinth of foundation basements will be double in not more that 6"layers all watered and Rammed.

- 1.2 Sand Filling : The sand shall be clear and free from any foreign matter. Sand filing shall be done, measured and paid in the same manner as earth filling as described in the foregoing Para 2.8 BOQ.

2. CONCRETE WORK

2.1 Lime Concrete

The concrete shall consist of an aggregate of the proportion mentioned in the schedule of items of approved qualities 1-1/2" gauge and down in the schedule of items of approved quartzite quantities 1-1/2" gauge and down mixed with lime mortar. The concrete shall be mixed on level platform. The aggregate shall be first washed clean, thoroughly wetted and placed to an eve thickness on a platform. Dry mortar mixed in proper proportion as specified in the schedule of quantities shall then be evenly spread over the aggregate and mixed thoroughly using sufficient water to make the more adhere to each piece of the aggregate when the bed for the concrete shall be laid carefully in position in layers not exceeding 6 inches. The basket etc.shall never be thrown from height but gently laid with the basket. Each layer shall be well rammed with heavy wooden hammer or iron hammer till the mortar comes to the surfaces. No water shall be added during ramming but the surface each completed layer shall be watered and roughened before the next layer is added. The concrete shall be well rammed and kept wet after the day's works for such time till it is set and gives no impression of the hammer when dropped over it.

When concrete is to be laid under water or in wet locations hydraulic lime of lime ordered hydraulic shall be used.

The proportion of the concrete will be the same as specified in the schedule of quantities and will be strictly, adhered to. The concrete shall be mixed properly in power driven mixer in such manner as to avoid loss of water. The concrete shall be mixed for minimum period two minutes or until it is of even colour and uniform consistency through out and mixed concrete shall contain 10% extra cement and shall be made on hard, clean and even surface. The cement and sand will be mixed dry until the mixture is uniform in colour. It shall then be spread evenly over the coarse aggregate and mixed thoroughly the water shall then be evenly added and the whole, mixed thoroughly the water shall then be added and the whole mixed thoroughly until mass is uniform in colour and consistency. Concretes shall be handled from the place of mixing to the place of final deposit as rapidly as practicable. The Concretes concealed shall not be disturbed and kept thoroughly damped by means of well matting and sand.

The aggregate shall consist of stone ballast, of quantity approved by Executive Engineer and shall consist of graded size ¾” and downwards as per CPWD specifications or the size as mentioned in the item descriptions.

3. BRICK WORK

3.1 Ordinary Brick Work

The bricks shall conform to the specifications given under Para's of materials of this specification.

- (a) Mortar : The mortar for brick work shall be as specified.
- (i) Soaking : All bricks shall be immersed in water for two hours before put into work so that they will be saturate and will to absorb water from the mortar.
- (ii) No bats or cut bricks shall be used in the work unless absolutely necessary around irregular opening or for adjusting the dimensions of different course and for closer in which case full bricks shall be laid at corners the bats being placed in the middle of courses.
- (iii) Laying : The bricks shall be laid in mortar to line, level and shapes shown on the plans slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar so that they will be completely filled with mortar and no hollows left anywhere. Bricks shall be handled carefully so as not to damage their edge. They should not also be thrown from any height to the ground and should be put down gently. All courses shall be laid truly horizontal and all vertical joints made truly vertical. Vertical joints in one course and the next below shall not come over one another and shall not normally be nearer than quarter for course and the next below shall not come shall be at right angles to the face, fixtures,pluges,frames etc. if any, shall be build in place shown in the plants while laying the course only and not latter by removal of bricks already laid.
Care shall be taken during construction to see that edges of bricks at quoins,sills head etc. are not damaged.

The vertically of the wall and horizontality of the courses shall be checked very often with plumb bob and spirit level respectively.

- (iv) Unless otherwise specified, brick work shall be done in English Bond.
- (v) Joints: Joints shall not exceed 10mm in thickness shall be uniform through out. The joints shall be raked out not less than 12mm deep when the mortar is green so as to proved proper key for the plaster or pointing to be done. Where plastering or pointing is not brick

work shall be cleaned on the same day on which brick work is laid and all mortar dropping removed promptly.

- (vi) Uniform raising : Brick work shall be carried as regularly in all cases where the nature of work will admit, not leaving any part 60cm lower than another. But where building at different levels is necessary the break shall be stepped so as to give letter uniform level and effectual bond. Horizontal courses should be to lone and level and even and face plumb or to batter as shown on the plan.
- (b) Scaffolding : Single Scaffolding shall be used. Holes shall be made good by bricks to match the face work when scaffolding is removed.

(c) Curing : All brick work shall be kept well watered for 14 days after laying.

3.2 Measurements

- (a) Half brick, cavity walls and brick on edge walls shall be measured in sq.m.unless otherwise stated in the schedule of quantities.
- (b) One or more brick thick wall shall be measured in cu.m.The thickness of brick walls in and or more brick thickness shall be measured in multiples of half bricks.

3.3 Brick drip course

It shall be laid above the junction of roof with the wall to shield the cracks at their junction. The upper course of the projecting brick shall be chamfered or rounded off with 7.6cms. Radius. A transverse drip or throating about 1.3cm deep shall be cut on the under side of the projecting bricks.

The drip course shall project 11.4 cms from the face of the wall thereby completely covering the gola and project on beyond if.

Measurement : The drip course shall be measured in running meters correct to a cm. And no deduction shall be made from the wall massonary for the bearing portion of drip course.

4. REINFORCED CEMENT CONCRETE WORK

4.1 General : Reinforced cement concrete work may be cst-in-situ or Precast as directed. Reinforced cement concrete work shall comprise of the following which may be paid separately or collectively as per description of the item of work (a) Form works (b) Reinforcement (c) Concrete (d) Plastering or other finishing on concrete surface.

4.1.1 Scope : This specification covers reinforce cement concrete work both cast insitu or Precast and related work in sections, form work and reinforcement. Special requirements for shall and folded plate construction, architecturally exposed concrete are also included.

4.1.2 Aggregates

IS 383	Coarse and fine aggregates from natural sources for concrete.
IS 2386 (Part I to VIII)	Methods of test for aggregates for concrete.
Concrete	
IS 1199	Methods of sampling and analysis of concrete.
IS 516	Methods of test for strength of concrete.
IS 1881(Part –VI)	Analysis of hardness concrete.
Water	
IS 3025	Method of sampling and test for water used in Industry.
Steel	
IS 432	Mild steel and medium tensile stool bars and hard drawn Steel wire for concrete reinforcement.
IS 1139	Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.
IS 1786	Cold twisted steel bars for concrete reinforcement.
IS 1566	Hard drawn steel wire fabric for concrete reinforcement.

Admixtures

IS 2645	Integral cement water proofing compound.
IS 9103	Admixtures for concrete.

Codes of practice

IS 456	Code of practice for plain and reinforced concrete.
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IS 5696(Part I & II)	Safety code for scaffolds and ladders
IS 1200	Method of measurement of building and civil engineering works

Materials

- 4.2.1 General all manufactured materials shall be new and shall conform to the following requirements unless waived in writing by company.
- 4.2.2 Approval of Materials
Test reports on each manufactured materials shall included a statement certifying that this material is of the same quality as that proposed for this project. Manufacturer's literature on proprietary material shall indicate compliance with standards listed herein.
- 4.2.3 Aggregates
- (a) Aggregates shall be locally best available and shall conform to the following standards unless otherwise approved by architects.
 - (b) IS 383 specification for coarse and fine aggregates from natural sources for concrete.
 - (c) Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregates as well as the combination of sizes when two or more are used, shall conform to the standard.
- 4.2.4 Water used for mixing and curing shall conform to requirements as specified in IS456.
- 4.2.5 A mixture admixtures to be used in concrete when required or permitted shall conform to the appropriate specification given in the reference publication. Admixtures used in work shall be of same composition as used in establishing the required concrete proportion.
- 4.2.7 Coarse Aggregates: Aggregates stockpiles shall be arranged and used in manner avoid excessive segregation to prevent contamination with other sizes of like aggregates. It shall be stacked separately according to nominal sizes of coarse aggregates or stacks of height not exceeding 1.5 meters. Frozen or partially forezen aggregates shall not be used.

Cement : Cement shall be stored in weather tight building bins, or silos which will exclude moisture and contaminates. Storage of cement at site shall be at contractor's expense and risk. In the event of any damage occurring to cement due to fully storage in contractor's shed or on account of negligence on his part, such damages shall be the liability of the contractor.

In case cement is stored and stacked in bags, storing shall be done in weather-tight and properly ventilated structures to prevent absorption of moisture. The bags shall be stacked at least 10 to 20cm. Clear above the floor. A space of 60cm around should be kept between the exterior walls and the stacks. Cement bags should be placed close together in the stock to reduce circulation of air as much as possible bags shall not be stacked more than 10 bags high to avoid lumping under pressure. If the stack is more than 7 bags high arrange the bangs in header and stretcher fashion, that is attentively lengthwise and cross wise so as to tie them together and lessen the danger of toppling over. For extra safety during the monsoon or when it is expected to store the cement for an unusually long period enclose the stack completely in 700 gauge polythene sheet or any other suitable water proof materials. The flap will close on the top of the stack. Care should be taken that the polythene sheet is not damaged any time during use. When removing bags from storage some bags should be removed from two or three tiers back rather than all from one tier. If the rows are thus stepped back, there is less chance of over turning them. When removing cement bags for use apply the first in , first out rule, that is take the oldest cement out first. Each consignment of cement shall be stacked separately therein to permit easy access for inspection and facilitate removal.

Fine Aggregate: Fine aggregates shall preferably be stacked in regular stacks on a hard surface or platform so as to prevent contamination with clay, dust, vegetation and other foreign matter. Fine aggregates stacks should be allowed to drains content before it is used.

Admixtures : Admixtures manufactured in liquid form should be stored in water-tight drums or tanks protected from foregoing. Aggration of these materials during use should be recommended by manufactures.

4.3 Concrete Grades and Quality

4.3.1 Grades : The concrete shall be in grades designated as per Table 4.2

4.3.1.1 The characteristic strength is defined as the strength of material below which not more than 5 percent of the test results are expected to fall.

Table 4.2

Grade of Concrete

Grade Designation	Specified characteristic compressive Strength at 28 days N/MM ²
M – 10	15
M – 15	10
M – 20	15
M – 25	20
M – 30	30
M – 35	35
M – 40	40

4.3.2 Workability of concrete

The concrete mix proportions chosen shall be such that the concrete is of adequate workability for placing conditions of the concrete and can be properly compacted. The definition of the ranges of workability of concrete as measure by either the slump or B-B Test (IS-1199) and the ranges to be generally adopted for different kinds of work unless specified otherwise are given in Table 4.3

Table 4.3

Placing Condition	Degree Workability	Value of workability
Concreting of shallow sections with vibration	Very low	Slump :18mm V.B.12 Sec.
Concreting of lightly reinforced sections with vibration	Low	Slump:10.30mm V.B :12 Sec.
Concrete of lightly reinforced sections without vibration or heavily reinforced sections with vibration	Medium	Slump:30.60mm V.B.3-6 Sec.
Concretion of heavy reinforced sections without vibrations	High	Slump: 60-18mm V.B. 0-3 Sec.

4.3.3 Durability

Unless otherwise specified to ensure durability the concrete shall be proportioned with limitation of minimum cement contents and maximum water cement ratio as given in Table 4.4, different conditions of exposure as specified below :

Table 4.4

Placing Condition	Degree of Workability	Value of workability
Mild	250	0.65

Mild	290	0.55
Moderate	360	0.45
Potentially destructive freezing and thawing severe weathering or subject to chemical (use entrainment as per requirement of ACI 507-72)	290	0.53

4.3.4 Proportioning

The mix proportions shall be selected to ensure that the workability of the fresh concrete is suitable for the condition of handling and placing, so that after compaction it surrounds all reinforcements and completely fills the form work. When concrete is hardened, it shall have the required strength, durability and surface finish.

4.3.4.1 The determination of the proportion of cement aggregates and water to attain the required strength shall be made as follows :

- (a) By designing the concrete mix, such shall be called Design Mix Concrete’.
- (b) By adopting normal concrete mix such concrete shall be called “Nominal Mix Concrete”.

4.3.4.2 Design mix concrete

This mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not than the appropriate values given in Table 4.2. The requirement of minimum cement contents, maximum water cement ratio, entrainment etc. specified from the point of view of achieving durability are also to be adequately considered. Point of view of achieving durability are also to be adequately consider.

4.3.4.3 Target mean strength of concrete

The mix design for different grades of concerts shall be done for the following mean strengths:

Grade Designation	Target mean cube strength at 28 days N/MM 2
M – 10	14.0
M – 15	20.8
M – 20	7.5
M – 25	33.7
M – 30	39.0
M – 35	45.0
M – 40	50.0

4.3.4.4 Nominal Mix Concrete : Nominal mix concrete may be used for concrete of grades M – 10, M-15 and M-20. The proportions of materials for nominal mix concrete shall be in accordance with Table 4.5.

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 & course aggregates.	Proportion of aggregate to course aggregate (by mass)	Maximum water cement ratio by weight.
(1)	(2)	(3)	(4)

M – 10	480	Generally 1:2 but subject to an upper limit of 1:1-1/2 and a lower limit of 1:2-1/2	0.68
M – 15	350		0.64
M – 20	250		0.60

Note :

- I. The proportion of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregate become finer and the maximum size of coarse aggregate becomes large. Graded coarse aggregate shall be used for example for an average grading of fine aggregates (i.e. zone II of Table 4 of IS – 383), the proportions shall be 1:1-1/2, 1:2 and 1:2-1/2 for maximum size of aggregate 10mm, 20mm and 40mm respectively.
- II. Nominal mix concrete is also to meet the requirement of durability. Hence the maximum water cement ratios as given in the above table are to be adequately modified as per Table-4.4 as per the exposure situation.
- III. The mix proportions as given in Table 4.5 are given in component with expressly permitted, the following volumetric mixes may also be used for the respective grades of concrete.

Grade of concrete	Volumetric proportion Cement:Coarse sand Stone aggregate	Maximum water cement ratio
M – 10	1:3:6	0.56
M – 15	1:2:4	0.54
M – 20	1:1-1/2:3	0.46

4.3.4.5 Sampling and strength test of concrete.

4.3.4.6 General : Samples from fresh concrete shall be taken as per IS: 1199-1950 and cubes shall be made, cured and tested at 28 days in accordance with IS:516-1959.

4.3.4.7 In order to get relatively quicker idea of the quality of concrete, option tests on beams for modulus of rupture at 72+2 hours or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength tests. For this purpose the values given in Table 4.5 may be taken for general guidance in the case of concrete mix with ordinary port and cement in all cases 28 days compressive strength specified in Table 4.2 shall alone be the criteria for acceptance or rejection of the concrete.

Table 4.6

OPETIONAL TEST REQUIREMENTS OF CONCRETE

Grade of concrete	Compressive strength on 15cm.Cubes days	Modulus of rupture by beam test min.at 72+2h	At seven days
(1)	(2)	(3)	(4)
	N/mm ²	N/mm ²	N/mm ²
M – 10	7.0	1.2	1.7
M – 15	10.0	1.5	2.1
M – 20	13.5	1.7	2.1

M – 25	17.0	1.9	2.7
M – 30	20.0	2.1	3.0
M – 35	23.5	2.3	3.2
M – 40	27.0	2.5	3.4

4.4 Form Work

4.4.1 General

- 4.4.1.1 Forms shall be used wherever necessary to confine the concrete and shape it to the required dimension. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.
- 4.4.1.2 Additional form work requirements for concrete are described in section 10 finishing of formed surfaces section 11. Architectural concrete, section 12 Precast concrete and section 14 special requirements for shells and folded plate structures.
- 4.4.1.3 Earth cuts shall not be used as forms for vertical surfaces unless required or permitted.
- 4.4.1.4 Shop drawings for form work including the location of shoring and reshoring shall be submitted for approval if required by the Engineer-in-charge.
- 4.4.2 Materials : The selection of materials suitable for form work shall be based on economy consistent with safety and quality required in the finished work. Form work shall be of timber plywood steel fiber glass, reinforced plastics or and other materials as approved by architect whose decision in this respect shall be final. Props and shores shall be of steel, timber posts, bellies or any other materials as approved by Engineer-in-charge.

4.4.3 Removal of Form Work

- 4.4.3.1 When repair of surface defects of finishing is required at an early age, forms shall be removed as the concrete has hardened sufficiently to respect nosiest damaged from removal operation.
- 4.4.3.2 Top forms on stopping surfaces of concrete shall be removed as same as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curing.
- 4.4.3.3 Wood forms for wall openings shall be loosened as soon as this can be accomplished without damaged to the concrete.
- 4.4.3.4 In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after expiry of the following period.
- | | |
|--|---|
| (a) Walls, columns and vertical faces of all in structural members | 21 to 48 hours as may be decided by the Engineer- charge. |
| (b) Slabs (Props left under) 3 days | |
| (c) Beam soffits (Props left under) 7 days | |
| (d) Removal of props under slabs spanning upto 4.5 m | |
| spanning over 4.5 m 14 day | |

4.4.3.5 For cement other than ordinary Portland cement the time for removal of forms shall be as specified below :

- | | |
|---|---|
| (i) Forms supporting sides of | At an age when concrete attains 20% of the beams ,walls and column specified characteristic strength. |
| (ii) Bottoms of slabs upto 4.5 m span | At an age when concrete attains 67% of the specified characteristic strength. |
| (iii) Bottoms of slabs above 4.5 m span | At an age when concrete attains 80% of the specified characteristic strength. |
| (iv) Bottom of beams upto 6 m span | At an age when concrete attains 80% of the specified characteristic strength. |
| (v) Bottoms of beams over 6 m span | At an age when concrete attains 90% of the specified characteristic strength. |

The periods as mentioned above shall be determined by testing cubes at different ages (3 days, 7 days) 14 days, 21 days, 28 days from the same sample of concrete using the particular type of cement testing is to be repeated for every new arrival of cementation.

4.4.3.6 The number of props left under. Their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beams or arch as the case may be together with any live load likely to occur during curing or further construction.

Concreting and Finishing: Concreting shall be done in thin layers of 100 to 200 mm thickness, covering the entire cross section while placing the concrete for one layer. The slump of the concrete mix shall be limited to 50mm compacting of concrete shall generally be done by ordinary tamping while only small needle type vibrators shall be used with care in place of congestion. In no case the vibrator shall be allowed to touch the reinforcement or the shuttering sides before the lifting operation is started the top of concrete in the shuttering shall be leveled and cleaned by removing extra deposit of concrete by pointed metal brushes. From the lower platform any honey combs and hard spots shall be repaired as soon as the concrete comes out of the forms. All the block outs and embedded materials shall be exposed before concrete hardens.

4.5 Reinforcement

4.5.1 Steel reinforcement shall be either mild steel of tested quality conforming to IS 432 – 1966 or cold worked high strength deformed bars as per IS 1786-1979 in strength grade Fe 415 or hot rolled high yield strength steel deformed bars with minimum yield strength of 425 N/mm² as per IS 1939-1966 (amended 1968 as specified in the drawings. Fabric reinforcement in topping slab or Precast concrete units shall be of hard mild steel wire mesh I.R.C. weld mesh or other equivalent as approved. Bars shall be free from mill scale, excessive rust, oil or paint.

4.5.2 The contractor shall submit bar bending schedule for the approval of the Engineer-in-charge prior to commencement of fabrication. These will indicate the accurate dimensions and bending of bars as required in the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and minimum cover as shown on structural drawings.

4.5.3 All steel shall be rigidly held in place with 18 gauge annealed steel wire. Cement mortar (1:2) cubes, M.S. chairs and spacer bars shall be used in order to ensure accurate positioning reinforcement.

4.5.4 All joints in mild steel reinforcement upto and including 16mm dia shall be overlapped. The length of overlap for tension and compression joints shall be in accordance with typical detail drawing No.SG/1. Joints in mild steel reinforcement above 16mm diameter may be welded if

permitted by the EIC in writing. All joints in deformed bars shall be overlapped strictly in accordance with typical drawing No.SG/1. The laps shall be staged in such a way that the center to center distance of the splices is not less than 1.3 times the lap length as required and at one particular section not more than 50% of the bars are overlapped.

4.5.5 Cover to reinforcement

4.6.1 Construction joints : Construction joints shall be made only where shown on the drawings or approved by the EIC such joints shall be kept to the minimum and shall not be located in valleys. The joints shall be at places where the shear force is the minimum and shall be at right angles to the direction of main reinforcement. In case of columns and walls the joint shall be horizontal and 8 to 15cms. Below the bottom of the beam or slab running into the column or wall head or below the anchor reinforcement of beam and slab coming into the column and wall and the portion of the column or wall between the stopping of level and the top of the slab shall be concerted with beam or slab.

(i) Vertical Joints : At the end of any day's work or run of concrete the concrete should be finished off against temporary shutter stop which should be vertical and security fixed. This stop should be removed as early as weather permits.

(ii) Horizontal Joints: Horizontal joints should be washed down two hours after casting in the manner described above for vertical joints. If the concrete has been allowed to harden excessively surface shall be chipped over its whole surface to depth of at least 10mm and thereafter thoroughly washed. Before fresh concrete is added on the other side of a construction joint the surface of the old concrete will be thoroughly wetted then covered with a thin layer of cement mortar 1:2.

All construction joint in all concrete floors and wall of basement. Water tanks of any other structure in contract with water of earth shall be provided with approved PVC water stops coated on both side with hot asphalt or approved metallic strips. The longitudinal joints in water stops shall be preferable hot wolfed or overlapped at least 8”(200mm).

4.6.2 **Expansion Joint** : Expansion joint shall be provided where required as shown in the drawing or as directed by the EIC. The filler to be used shall be of approved material.

4.6.3 **Inserts** : Inserts of any kind like fan hooks, sleeves pipes, bolts and nuts anchor bolts etc. are to be accurately placed in the concrete (and / or brick work) and concreted over, as and where required and directed. The work “insert” will mean article like anchor beams, sleeves, pipes, bolts, nuts etc.and the weight of which does not exceed 100kgs./pieces.

The contractor shall provide necessary wooden plugs sleeves etc. for his own works, for which no extra payment shall be made. He will provide if so directed any inserts, wooden plugs, sleeves etc. for other contractors for which he shall be paid but in case where the other contractors provide the inserts, he will take proper measures at his own expense not to disturbed their work while concreting.

The required detail for the fan hooks is given in the Engineer-in-charge.

Conduit and plumbing pipes: All electric conduits and all sanitary pipes, water supply pipes and down pipes that lie within concrete slabs, beams or columns shall be laid correctly in place and the EIC approval shall be obtained before the casting of concrete. No cutting of structural concrete will be permitted. All care shall be taken to ensure that conduit pipes are not damaged.

4.6.4 Production of Concrete

4.7.1 **General** : To avoid confusion and error in batching, consideration should be given to using the smallest practical number of different concrete mixes on any site or in any one plant.

- 4.7.1.1** A competent person shall supervise all stages of production of concrete preparation test specimens and site test shall be properly supervised.
- 4.7.1.2** The Engineer-in-charge shall be afforded all reasonable opportunity and facility to inspect the materials and manufacture of concrete and to take any samples or to make any tests. All such inspection sampling and testing shall be carried out with the minimum of interference with the process of manufacture and delivery.
- 4.7.2** Ready Mixed Concrete : Except as otherwise provided ready mixed concrete shall be provided mixed and transport in accordance with specification for ready mix concrete “ASTM”

4.7.3 Site Mixed Concrete

4.7.3.1 Batching

- (a) In proportioning concrete, the quantity of both cement and aggregate should be determined by mass. Where the mass is determined on the basis of mass of cement per bag a reasonable number of bags should be weighed periodically to check the net mass. Where the cement is weighed on the site and not in bags it should be weighed separately from the aggregates. Water should be other by volume in calibrated tanks or weighed. Any solid measured admixture that may be added, may be measured by mass : liquid and paste admixtures by volume or mass. Batching plant where used should conform to IS –4925 1968. All measuring equipments should be maintained in clean serviceable condition, and their accrue periodically checked.
- (b) Except where it can be shown to the satisfaction of the EIC that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions when required. The different sizes being staked in separate stock piles. The materials should be stock piled for several hours preferably a day a day before use.
- (i) The contractor shall maintain at site a number of platforms. Balances similar to the balances used for weighting luggage at railways platforms capable of weighting upto 200 kg. to the nearest 500 grams. The balance shall be used for weighing cement bags and occasional boxes of sand and coarse aggregate as specified below :
- (ii) The contractor shall provide the mixer operator with two standard measures one of 5 liter and one of liter capacity for measuring the water to be added to the mix.
- (iii) The quantity of water to be added to the mix shall be approved by the EIC or their representatives and may be adjusted by them as frequently as necessary in order to allow for the moisture content of fine and case aggregate and workability desire. On no account shall the contractor allow more water to be added to the mix than that specified. A mix containing such excess water may be rejected by the EIC or their representatives and not allowed for use in the work.
- (iv) Sand and coarse aggregate shall be measured by volume. The sizes of measuring boxes or the depth to which they are filled or both shall be adjusted to obtain the correct weight of each material specified by the Engineer-in-charge.
- (v) Every fifth or tenth measuring box of sand or of coarse aggregate shall be weighed on the balance to ensure that filling of boxes is being uniformly done adjustments shall be made from time to time in the amount of each box filled to take into account variation in moisture content and bulking of sand in accordance with IS 2386 (part-III) 1963.

- (vi) More frequent weighing of boxes, particularly of sand if found to vary considerably in moisture content and bulking may be required by the Engineer-in-charge and shall be done by the contractors without additional cost.
- (d) It is important to maintain the water cement ratio constant at its correct value. This end, determination of moisture contents in both fine and coarse aggregates shall be made as frequently as possible, the frequency for a given job being determined by the EIC according to the weather conditions. The amount of the added water shall be adjusted to compensate for any observed variations in the moisture contents.

For the determination of moisture content in the aggregates IS:2386(part-III) 1963 may be referred to. To allow for the variation in mass of aggregate due to variation in their moisture content, suitable adjustment in the masses of aggregates shall be made. In the absence of exact data, only in the case of nominal mixes the amount of surface water may be estimated from the values given in table 4.9.

Table 4.9

Surface Water Carried by Aggregate

A Aggregate	Approximate quantity of 2 surface water percent by mass 1 M	
Very wet sand		
Moderately wet sand	7.5	120
Moist sand	5.0	80
* Moist gravel or crushed	2.5	49
* Coarser the aggregate, Less the water it will carry		
*Coarser the aggregate, less the water it will carry	1.25-2.5	20-40

- (e) No substitutions in materials used on the work or alternations in the established proportions except as permitted for accounting bulkage of fine aggregate and moisture contents in the fine and coarse aggregates shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

4.7.4 Mixing : Concrete shall be mixed in a mechanical mixer. 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 be taken as 2 ½ to 3 minutes.

Note 2 : In exceptional circumstances such as mechanical breakdown of mixer, work in remoter areas or when the quantity of concrete work is very small, hand mixing may be permitted subject to adding 10 percent extra cement. When hand mixing is permitted, it shall be carried out on water-tight platform and shall be taken to ensure that mixing is contained until the concrete is uniform in colour and consistency.

4.7.5 Workability of the concrete should be controlled by direct measurement of water content. Workability should be checked at frequent intervals (see IS 1199 1965).

4.7.6 Work in extreme weather conditions : During hot or cold weather, the concreting should be done as per the procedure set out in IS:785(part-I) 1975 (part-II)

4.8 Placing of Concrete

4.8.1 Preparation before placing

- 4.8.1.1 Hardened concrete and foreign materials should be removed from the inner surfaces to the conveying equipment.
- 4.8.1.2 Form work shall have been complete: Snow ice and water shall have been removed Reinforcement shall have been secured in place, expansion joint material anchors and other embedded items shall have been positioned : and the entire preparation shall have been approved.
- 4.8.1.3 Semi porous sub grades shall be sprinkled sufficiently to imelinate suction and porous sub grades shall be sealed in a approved manner.
- 4.8.1.4 Concrete shall not be placed on frozen ground.
- 4.8.2 Conveying
- 4.8.2.1 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or less of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
- 4.8.2.2 Conveying equipment shall be approved and shall be of size an design such that detectable setting of concrete shall not occur before adjacent is placed. Conveying equipment shall be cleaned at the end of each operation of work day. Conveying equipment and operations shall conform to the following additional requirements.
- (a) Truck mixers, agitators and non-agitating units and their manner of operation shall conform to the applicable requirements of Specifications for Ready Mixed concrete” (ASMTTC 94).
- (b) Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against under drying rise in temperature. An approved arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged in to a hopper or though a befell.
- (c) Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal not less that 1 vertical to 3 horizontal. Chutes more than 6 meters long and chutes not meeting the slope requirements may used provided they discharge in to a hoper before distribution.
- (d) Pumping or pneumatic conveying equipment shall be of a suitable kind adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 50mm.
- (e) Concrete shall not be conveyed through pipe made of aluminium or aluminium alloy.
- 4.8.3 Depositing
- 4.8.3.1 General : Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hard end sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction.

Joints shall be located as shown in the structural drawings or as approved. Placing shall be carried on at such a fate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reaching has reached and elevation rendering their service unnecessary. They may

remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.

- 4.8.3.2 Placing : Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.
- 4.8.3.3 Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.
- 4.8.3.4 Consolidations : all concrete shall be consolidated by vibration spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 450mm apart. At each insertion the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surfaces.
- 4.8.4 Protection
 - 4.8.4.1 Unless adequate protection is provided and approval is obtained, concrete shall not be placed during rain, sleet or snow.
 - 4.8.4.2 Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.
 - 4.8.4.3 Special precautions are to be taken during rainy season so that freshly placed concrete can adequately be covered and protected by keeping sufficient number of tarpaulins.
- 4.8.5 Bonding
 - 4.8.5.1 When specified the surface of joints shall be prepared in accordance with one of the methods specified in the section on joints and embedded items.
 - 4.8.5.2 The hardened concrete of construction joints and of joints between footings and walls or columns, between walls or columns and beams or floor they support, joints in unexposed walls and other not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.
 - 4.8.5.3 The hardened concrete of joints in exposed work joints in the middle of beams, girders, joints and slabs and joints in work designed to contain and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 12mm thick on horizontal surface. The fresh concrete shall be placed before the grout has attained its initial set.
 - 4.8.5.4 Joints receiving an adhesive shall have been prepared and adhesive applied in accordance with the manufacturer's recommendations as prior to placing of fresh concrete.
 - 4.8.5.5 Surfaces of joints which have been treated with a chemical retarder shall be prepared in accordance with the manufacturer's recommendations prior to placing of fresh concrete.
- 4.9 Curing and Protection

Beginning immediately after placement, concrete shall be protected from premature drying excessively hot or cold temperature and mechanical injury, and shall be maintained with minimum moisture loss at a relatively constant temperature for the period necessary for hydration of cement and hardening of the concrete. The materials and methods of curing shall be subject to approval.

4.9.2.1 Preservation of moisture

4.9.2.2 For concrete surface not in contact with forms, one of the following shall be applied immediately after completion of placement and finishing.

- (a) Pending or continuous sprinkling.
- (b) Application of absorptive mats or fabric kept continuously wet.
- (c) Application of sand kept continuously wet.
- (d) Continuous application of steam (not exceeding 65 C) or mist spray
- (e) Application of waterproof sheet materials, conforming to specifications for waterproof sheet materials for curing concrete (ASTM C 171).
- (f) Application of other moisture-retaining covering as approved.
- (g) Application of curing compound conforming to specifications for liquid membrane forming compounds for curing concrete (ASTM C 309)

The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water seen which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other materials is to be bonded unless it is proven that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded application.

4.9.3 Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured until the end of the time prescribed in section 4.9.4 by one of the methods of section 4.9.2.1

4.9.4 Curing in accordance with 4.9.2.1 to 4.9.3 shall be continued for at least 7 days in case of all concrete except high early strength concrete for which the period shall be at least 3 days. Alternatively, if tests are made on cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the specified strength. If one of the curing procedures of sections 4.9.2.1 (a) through (d) is used initially, it may be replaced by one of the other procedures of section 4.9.2.1 any time after the concrete is 1 day old, provided the concrete is not permitted to become surface dry during transition.

4.10 Finishing of formed surfaces unless otherwise specified after removal of form. The surface of concrete shall be given one or more of the finishes specified below in locations designated by the contract documents.

4.10.1 Cement plaster finish : The concrete surface shall be properly roughened immediately after the shuttering is removed, taking care to remove any laitance completely without disturbing the concrete. The roughening shall be done by hacking before the surface is plastered, it shall be cleaned and wetted so as to give good bond between concrete and plaster. After surface preparation, the exposed formed surface of RCC work shall be plastered with cement mortar 1:3 (1 cement : 3 sand) of thickness not less than 6 mm to give a smooth and even surface true to line and form.

5. Wood Work and Joinery

5.1 Timber

- (a) Unless otherwise specified, all timber for frames and shutters for doors, windows, ventilators cupboards etc. shall be best quality sound, well seasoned C.B.ballarshash or timber as specified in the schedule of quantities and shall be free from knots, shakes, fissures, flaws, sun cracks and other defects. The planed surface shall be smooth be smooth and fee from blemishes and discolorations.
- (b) All timber for carpentry and joinery in tough with massonary or concrete shall be coal tarred or crested before fixing. All rough frame work in partitions suspended coiling and engineering to walls etc.shall be treated with approved wood preservatives as per manufacturers instruction and specifications. The rates quoted shall provide for such treatments.
- (c) Timber member shall be fabricated out of kiln seasoned timber.
- (d) Carpentry work : The timber shall be properly, planed and in workman like manner joints shall be true and fit properly, assembled accurately and clamped together so as be square, flat and close jointed. The combed joints shall have two tonggeson each member to be \jointed and shall be glued and pinned together with wooden pages. Pages shall engage all goes and not shall be less than 6mm thick.

In mortise and tannin joints all tenons shall not be less than 12mm thick and shall be the full width of the member. Tenons shall be glued into the mortises. Through tenons shall in addition be pinned with wood dowels of not less than 6mm dia or with non ferrous mental dowels of not less than 6mm dia. Alternatively through tenons may be wedged if the mortises are tapered.

- 5.2 Holdfast : Three holdfasts shall be fixed to each to each post of the door frame and two to each posts of the window frame. The M.S. Holdfasts shall be of the size 30mm x 40mm x 5mm and shall be fixed to the frames by means of screws and / or bolts and nuts but not nails the gear and of the hold fast shall be fixed in to jambs with cement concrete 1:3:6 blocks of dimensions or as directed. Horns in frames shall be cut and shall not be used as holdfasts.

Whenever asked for raw plugs or bolts as directed shall be used for rough grounds framing hangers etc.

5.3 Workmanships

- (a) The workmanship shall be first class and to the approval of the EIC. Scantlings and boarding shall be accurately sawn and shall be accurately sawn and shall be required width and thickness. All carpenter's work shall be wrought except where otherwise described. The workmanship and joinery shall be accurately set out in strict accordance with the drawings and shall be framed together and securely fixed in approved manner and with properly made joints. All works is to be properly tenoned, shouldered, wedged, pinned etc.and properly glued with approved quality glue to the satisfaction of the Engineer-in-charge.
- (b) Screws : All screws to be used in wood work and joinery shall be of brass or as specified or a directed by the Engineer-in-charge.
- (c) Tolerances : 1:5mm will be allowed for each wrought face of the sizes specified except where described as "finished" in which case they shall hold to be the full dimensions.
- (d) Protection : All wood work and joinery edges of timber frames etc.shall be protected from being damaged during construction by providing rough timber casings securely fixed and other adequate protective measures.
- (e) It is decided by the Employer to provide anti-termite treatment, the building contractor shall coordinate his work suitable as directed by the Engineer-in-charge.

- (f) Door / Window frames shall have cut rebates. Planted rebates shall not be permitted.
- (g) Where door frames are fixed flush with plaster to wall teak wood cover mould 40c12mm as per drawing shall be provided all round where the plaster is flush with the frame, painted or finished as in doors and rates quoted shall include for the same.
- 5.4 Wooden flush door shutters : Flush shutter shall be of commercial or teak veneered types specified in the item of approved make and quality. An approved sample shall be deposited in the site office for reference. The shutters will be provided with T.W. lapping be finished sickness of the shutter shall be as mentioned in the item.
- 5.5 Paneled shutters : Thickness of styles and rails shall be as specified with solid 16mm thick wood panes for shutter shall be of patterns and size as specified. Whenever possible each panel shall be in single width piece. But where two pieces are used. Width of each piece should not be less than 12.5cm. In order to avoid wiping splitting and cracking, normally piece not exceeding 20cm. In width should be used. When made from more than one piece, the pieces shall be joined with a continuous to and grooved joint and glued together and reinforced with metal dowels. The grains of solid panel shall run along the longer dimension of solid panel. Panels shall be framed into groove to the full depth of the groove leaving an air space of 1.6 of the groove . moldings to the edge of panel openings shall be scribed at the joints and the faces shall be closely fitted to the sides.
- 5.6 Tolerance : The finished work with a tolerance of + 2mm in thickness and in width of styles and rails shall be accepted.
- 5.7 Fixtures and fastenings : Unless otherwise but wings specified in the schedule of quantities each shutter shall be hind with brash or other metal but things of approved quality, size and make with brass or other metal scares and the contractor's rate shall cover for providing and fixing hinges to the shutters.
- 5.8 Glazed Shutters : They shall be similar to paneled shutters except that such portions as directed shall be glazed with sheet or ground glass as specified styles and rails shall be rebated 12mm to receive glass, such bars shall be molded and rebated and mitred on sides to receive the glass. Glass panes shall be fixed with putty and beading.
- 5.9 Fittings : All hardware fittings and fixture shall be as per schedule of fittings of heavy quality as approved by the Engineer-in-charge.
- 5.10 Schedule of Hardware Fittings
- (a) General : The fitting shall be iron brass aluminum or as specified. These shall be well made smooth and free from sharp edges, flaws well made smooth and free from sharp edges, flaws and other defects, screw holes shall be counter sunk to suit the head of the wood screws. All hinge pins shall be of steel with revetted heads.
- (i) Iron fitting shall be bright finished or black enameled or copper oxidized.
- (ii) Brass, fitting shall be bright finished (brass) oxidized or chromium plated.
- (iii) Aluminium fittings shall be bright finished anodised in choice shade or as specified. The screw used shall be of the same metal and finishing as the fittings and shall be of the required size for aluminium fittings anodised steel screws shall be used. Screws shall be driven with a screw driver and not hammered.
- (b) Butt Hinges : Shall be heavy quality of mild steel, brass oxidized, aluminium or as specified. But hinges shall be cranked. Brass and steel but hinges hall conform to IS 285-1966 M.S. But hinges

shall be made from sheets. Aluminium and brass hinges shall be extruded type and made from extruded sections.

- (c) Tower Bolt : shall be of mild steel brass oxidized or aluminium as specified.
- (i) Steel tower bolts: Shall be of the size specified, the plate and straps shall be rivetted the barrel bolt shall be cast including the knot.
- (ii) Brass tower bolts : The bolt with knot shall be cast and rolled and shall be made in one piece.
- (iii) Aluminium Tower Bolts : Shall be made out of extruded sections. Knot shall be screwed to the bolt and riveted at the back.
- (d) Sliding door bolted (Aldrop) These shall be of metal as specified and shall have smooth sliding action. M.S. and brass sliding bolts shall conform to IS Brass sliding bolts shall be made from rolled brass. The hasp and the bolt shall be in one piece. The fixing and staple bolts shall be cast 6mm studs and shall be threaded, provided with round washers and nuts of square or hexagonal shape.
- (e) Handles :
- (i) Iron Handles : Shall be of the size specified and shall be made out of sheet steel pressed into oval section. They shall conform to IS 208-1972 and shall be fixed with 2.5cm long wood screws.
- (ii) Brass Handles : Shall be of specified pattern made out of cast brass. They shall conform to IS 208-1972 and shall be fixed with 2.5cm long wood screws.
- (iii) Aluminium Handles : Shall be of size specified finished bright or anodised made out of cast aluminium to shape and pattern required. These shall be fixed with 2.5cm long wood screws.
- (f) Mortise Lock : Mortise lock with latch and a pair of lever handles shall have steel casing and brass bolts and shall be right or left handed as required. It shall be of approved make and quality. The lock for single leaf door shall have plain face and for double leaf a lever handles with spring shall be mounted on plates and shall be bright brass finished or chromium plated or oxidized as approved.
- (g) Mortise Latch : Mortise latch with one dead bolt and pair of lever handles shall have steel casting and brass bolt, right or left handed as required. It shall be of approved make and quality. The latch for single leaf door, shall be mounted on finished brass bright chromium plated or oxidized as approved.
- (h) Floor Door Stopper : Shall be of shape pattern plates of and size specified of cast brass with rubber cushion. It shall be brass finished bright. Chromium plated or oxidized as approved. The length of the plate shall determine the size of floor door stopper.
- (i) Hooks and eyes : Shall be of mild steel or hard drawn brass and shall conform to IS :207 1964. The size of hooks and eyes shall be determined by the length of hook from out to out.
- (j) Fan light catch : Shall be of M.S. or cast brass and shall be brass finished bright , chromium plated or oxidized approved. Steel spring of the catch shall be capable of taking a minimum load of 1kg before it is fully pressed.
- (k) Safety hasp and staple : Shall be of mild steel or cast brass and shall conform to IS:363 1970 M.S. Hasp and staple shall be finished black, stove enameled. Brass hasp and staple shall be bright finished or chrome plated or oxidized as approved. The king pin in both cases shall be of mild steel with rivetted heads. This shall be determined by the length of the bigger leaf of the hasp.

(I) **Flooring And Finishing**

Cement concrete flooring : shall be laid in thickness and with cement concrete as specified in the schedule of quantities laid in panes either made by fixing A.C. of glass strips or on class strips as specification the schedule of quantities or with wooden removable forms. Before laying floor concrete the sub-grade shall be properly cleaned trimmed to give required thickness of filler and near cement slurry applied to give proper bond of floor with the sub-grade. The cement concrete shall be laid and finished with towels and finished with a coat of neat cement on top to give a smooth and homogenous surface. No extra mortar shall be laid over the concrete to make the floor in level or for drying the concrete for applying the cement slurry.

The joints shall be straight both ways i.e. along the length and width. No surplus mortar on the adjoining panel shall be allowed to spill from the other panel. The measurement shall be of exact length and breadth from wall face to wall face.

Cement skirting and dados : shall consist of 20mm or as specified in the schedule of quantities thick cement plaster 1:3 cement and coarse sand mortar applied to wall face and finished with a floating coat of neat cement including of junctions with floors as directed.

The measurement shall be from inside of skirting to inside of skirting and height above floor vertically measured.

Mosaic floors cast in situ : shall consists of bottom layer of required thickness of cement concrete 1:2:4 and top layer of white or gray cement as specified mixed with marble chips of approved quality, colour and gauge as specified in BOQ.

The floor shall be rubbed with machine, electric cally driven with carborandum stones and finally washed with Tatri and then wax polished to give a smooth and shining surface. The floor shall be in panels with strips of required materials. Strips shall be laid true to line and level.

Measurements shall be from wall face to wall face.

Mosaic skirting and dados : shall consists of 20mm or specified over all thickness. Bottom layer of cement plaster 1:3 cement coarse sand mortar shall be applied to wall face and roughed on top to received the second layer of white or gray cement as specified with marble chips of approved quality, colour and gauge with necessary grooves or strips of required description as specified and founding of junctions with floors.

The finished surface shall be rubbed manually with carborandum stones and finally washed with Tatri and then polished to give a smooth and shining surface.

The measurements shall be inside to inside of skirting and dado and height shall be measured vertically from floor to top of skirting and dado.

Terrazzo Tile Flooring : There shall be approved make and colour and of level surface. These shall be laid on 25mm lime mortar bedding cement floated. The joints shall be filled with cement of the same colour and the surface polished with 3 operations of Machine polish. Skirting tiles shall be embedded in cement mortar 1:3 (1cement : 3coarse sand) of sufficient thickness – skirting tiles shall be polished from factory. A finishing polishing coat shall be as for mosaic floors.

in slopes and as directed with invisible joints firmly bedded in lime sand mortar of the required ratio 25mm thick and cement floated. Measurements shall be from wall face to wash face.

10.5 Polished kota stone skirting and dados same as kota stone flooring except that these shall be embedded in cement mortar 1:3 (1 cement :3 coarse sand) of sufficient thickness with invisible joints measurements shall be from inside of skirting to inside of skirting and height measured at right angle to the floor from top of floor to finished level.

10.6 White Glazed Tile Flooring :

(a) Glazed tiles, shall be of approved Indian make unless otherwise specified in the description of item. The tiles shall be flat, true to shape, free from cracks crazing spot, chipped edges corners thickness and of size as specified in the items of work or as directed by the Architect and the tiles shall conform to IS: 777-1970.

(b) Preparation of surface and laying : The sub-grade concrete or RCC slab shall be cleaned wetted and mopped. The bedding for the tile shall be 12mm average thick but not less than 10mm at any place consisting of cement mortar 1:3 (1cement : 3coarse sand) or as specified mortar shall be spread, tamped, and corrected to proper levels and allowed to harden. Over the bedding mortar near gray cement slurry of honey lake consistency shall be spread @3.3kg of cement for a square meter. Tiles shall then be laid in the grout and gently tapped with a wooden mallet. The joints shall be as thin as possible and in straight line as to suit the required pattern. Where full size tile cannot be laid, it shall be cut (Sawn) to required size and edges rubbed smooth to ensure a true and straight joint. The floor shall be checked with a straight edge to obtain a true surface. The floor tile near the wall shall enter 10mm. Under the skirting dado finish.

(c) Pointing and finishing: The joints shall be cleaned of the gray cement grout with wire brushes to a depth of 5mm and all dust and losses mortar removed. The joints shall then be flush painted with white cement and floor kept wet for 7 days. The floor shall not sound hollow when topped with a wooden mallet.

6.4 White Glazed Tiles in skirting and dados

(a) Glazed tiles shall be the same as per Para 10.12(a)

(b) Preparation of surface. The joints of brick work shall be raked out to a depth of at least 15mm. In case of RCC walls the surface shall be roughened hacked and roughened with wire brushes. The surface shall be cleaned thoroughly washed with water and kept wet.

(c) laying : The surface shall be plastered with cement mortar 1:3 (1 cement : 3 coarse sand) or as specified to an average thickness of 10mm and allowed to harden. The plastered surface shall be roughened with wire brushes or by scratching diagonal lines 1.5mm deep at 7.5 centers both ways.

The back of tiles shall be buttered with gray cement slurry and edges with white cement slurry and set in the bedding mortar. The tiles shall be lightly tamped and corrected to proper plane and lines. Tiles shall be set in required pattern with as fine as possible joints. Top of dados skirting etc shall be truly horizontal and joints truly vertical. Where full tiles cannot be used. Cut (swan) tiles of required size shall be provided as in flooring. The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven (7) days.

6.5 White Washing : Scaffolding where required shall be with double supports. Where ladders are used. Gunny bag pieces shall be tied on their top to avoid damaged and scratches. For ceiling stage scaffolding shall be erected.

The wash shall be prepared from fresh white limit stone thoroughly slaked, mixed and stirred with sufficient water to make a thick cream which shall be screened through a clean coarse cloth

five ounce of gum shall be mixed with hot water per cft of cream. Water shall then be added @gallon per 2lbs. to produce a milky solution.

Three or more coats shall be applied on new surface to give a uniform finish removing mortar drops, scrapping of scales and repairing all holes. Measurement shall be same as for plaster.

- 6.6 Distemping : Distemper shall be of approved distemper or other approved manufacture to be decided by the Architects. The distemper shall be mixed in clean water using 1/2 point for of distemper as per manufacturer's specifications and shall be stirred till the mixture attains an even consistency.

The surface shall be cleaned, and holes repaired, all irregularities and inequalities sand as per smooth and wiped clean to present a fine smooth surface and shall be completely dried before distemping is started.

The mixture shall be applied with a brush in long parallel strokes evenly so as not to leave any visible brush marks. The treated surface shall be allowed to dry and harden. Then the 2nd coat shall be allowed to be applied on the 1st coat. If a uniform surface is not achieved then the 3rd coat shall be applied.

- 6.7 Cement Paints: Paint shall be of approved manufacture approved by the Engineer-incharge before painting is commenced on surface, all dirt and foreign materials shall be completely removed. The surface shall be wetted by sprinkling water with fine spray. The surface shall be sprayed several times with a few minutes intervals between each spraying to allow moisture to few soak into the surface. Cement paint solution shall be applied to the surface with wire brushes in number of coats to get uniform finish after the first coat of paint has hardened, it shall not be wetted again before the application of the 2nd coat. At least 24 hours should elapse between the two coats. Similarly required number of coat (minimum three) shall be given to get a uniform colour. It shall be kept dam at least for seven days.

- 6.8 Measurement : The same way as for dry distemper. Oil bound distemper: All plaster surface shall be thoroughly cleaned and shall received 4 coats. First coat of primer size shall be applied after the primary coat of white lime is properly scrapped off. The second coat and 3rd shall be of oil bound distemper of approved colour shade and quality mixed with manufacturer's petrifying liquid. After these operations if the work is not to the satisfaction of the Engineer-in-charge then one or more coat shall be applied without extra cost till a smooth and even surface is achieved and approved by the EIC.

- 6.9 Plastic Emulsion Paint : The surface shall be prepared as specified for oil paints. First a priming coat of primer as specified by the manufacturer shall be applied and scrapped off. The 2nd and 3rd coats of plastic emulsion paint of approved shade and manufacture shall be applied to achieve an even surface. If the finish is not to the satisfaction of the Engineer-in-charge then more coats shall be applied to achieve smooth and even surface.

- 6.10 Stucco Paint : The surface to be painted shall be free from dust and rubbed smooth with sand paper or pumice stone to the satisfaction of the Engineer-in-charge.

A priming coat of primer as specified by the manufacturer shall be applied and scrapped off. The second and third coats of snowcem paint of approved shade and manufacture shall be applied to achieve an surface. If the finish is not to the satisfaction of the Architects, then more coats shall be applied to achieve smooth and even surface.

- 6.11 Oil Paint : Surface to be painted shall be dry, free from dust and dirt and rubbed by means of sand paper or pumice stone to the satisfaction of the Engineer-in-charge. The paint shall be ready mixed synthetic enamel or oil paint approved make and manufacture. The primary coat shall be ready mixed of approved make and manufacture and shall be applied even with brushes. After the primary coat is applied and perfectly dried all holes. Cracks etc. shall be filled with putty and

the surface sand papered. Then a second coat of approved shade and manufacture shall be evenly applied and allowed to dry. The third coat shall be care fully applied as and when required, to achieve smooth and even surface.

6.12 French Polish : The work shall be first cleaned and a scrapped through with glass paper. It then will be painted with a “Filter” composed of whiting and Mentholated spirit and sand papered. A thin coat of French polish shall then be applied and sand papered. Subsequent coats of French polish shall be applied till the proper finishing is achieved to the satisfaction of the Architects.

6.13 Wax Polish : The work shall be done in the same way as for French polish with the exception that wax polish will be used instead of French Polish.

7.00 ALUMINIUM DOORS & WINDOWS

7.01 Standard sizes, Tolerances and Designations

Sizes : The types and the overall sizes of aluminium doors, windows and ventilators shall be as given in IS:1948.

The dimensions as shown in IS:1948 are overall heights and widths to the outside of frames of aluminium doors, windows and ventilators. These sizes are derived after allowing 1.25 cm clearance on all the four sides for the purpose of fitting the doors, windows or ventilators into modular openings.

Tolerances : The sizes for door, window or ventilator frames shall not vary by more than ± 1.5 mm.

Designation : Doors, windows and ventilators shall be designated by symbols denoting their width, type and height in succession in the following manner.

Width : It shall be indicated by the number of modules in the width of opening.

Type : It shall be indicated by the following letters of alphabet.

C = Centre-hung shutters.

F = Fixed glass panes.

H = With horizontal glazing bars.

S = Side hung shutters, and

T = Top hung shutters.

Height : It shall be indicated by the number of modules in the height of opening.

Example : A window of a width of 10 modules (97.5 cm) and height 9 modules (87.5 cm), having horizontal glazing bars and side hung shutters is designated by 10HS9.

Composite doors, windows or ventilators shall be designated in the following manner.

A 12 module wide and 21 module high horizontally glazed side hung door couple on its two sides with two side hung horizontally glazed windows 6 module wide and 12 module high is designated by :

6HS12

12HS21/6HS12

Two 10 module wide and 12 module high horizontally glazed side hung windows coupled side by side with two fixed glass pane ventilators at top, each 10 module wide and 6 module high is designated by :

10HF6/10HF6

10HS12/10HS12

19.02 Materials

Aluminium Alloy Extruded Sections : Aluminium alloy used in the manufacture of extruded window sections shall correspond to IS Designation HE9-WP of IS:7331956 specification for Wrought Aluminium and Aluminium Alloys, Bars, Rods and Sections (For General Engineering Purposes). Hollow aluminium alloy sections used shall conform to IS Designation HV9-WP of IS:1285-1958, specification for Wrought Aluminium and Aluminium Alloys, Extruded Round Tube and Hollow Sections (For General Engineering Purposes). Dimensions and weight per metre run of the extruded sections shall be as given in IS:1948.

Coupling Sections : Aluminium alloy coupling sections used shall conform to IS Designation HV9-WP IS:1285-1958 specification for Wrought Aluminium and Aluminium Alloys, Extruded Round Tube and Hollow Sections (For General Engineering Purposes). They shall conform to the dimensions shown in IS:1948.

Glass Panes : Glass panes shall weight at least 7.5 kg/sqm and shall be free from flaws, specks, or bubbles. All panes shall have properly squared corners and straight edges. The sizes of the glass panes for use in doors, windows and ventilators shall be as given in IS:1948.

7.03 Fabrication

7.03.1 Frames : Frames shall be square and flat, the corners of the frame being fabricated to a true right angle. Both the fixed and opening frames shall be constructed of sections which have been cut to length, mitred and welded at the comers. Where hollow sections are used with welded joints, argon-arc welding or flash but welding shall be employed (gas welding or brazing not to be done). Subdividing bars of units shall be tenoned and riveted into the frame.

7.03.2 Side-Hung Shutters : For fixing aluminium alloy hinges, slots shall be cut in the fixed frame and the hinges inserted inside and may be riveted to the frame. The hinges shall normally be of the projecting type 677 mm wide.

The Aluminium alloy for cast hinges shall conform to IS Designation A-5M of IS:617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes and for extruded section of hinges to IS Designation HE10-WP or HE30-WP of IS:733-1956 Specification for Wrought Aluminium and Aluminium Alloys, Bars, Rods & Sections.

The pins for hinges shall be of stainless steel of non-magnetic type or of aluminium alloy HR30. Irrespective of hinges being anodised or not, the aluminium alloy pins shall be anodised to a minimum film thickness of 0.025 mm and shall be sealed with oil, wax or lanolin. Non-projecting types of hinges may also be used, where agreed to by the EIC.

Friction hinges may be provided for side hung shutter windows, in which case peg stay as mentioned hereinafter may not be required. The working principle of the friction hinge shall be as illustrated in IS:1948.

The handle for side hung shutters shall be of cast aluminium conforming to IS Designation A- 5-M of IS:617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes and mounted on a handle plate welded or riveted to the opening frame in such a way that it could be fixed before the shutter is glazed. The handle should have anodized finish with minimum anodic film thickness of 0.015 mm. The handle shall have a two point nose which shall engage with and aluminium striking plate on the fixed frame in a slightly open position as well as in a fast position. The height of the handles in each type of side hung shutters shall be fixed in approximate positions as indicated in IS:1948.

The peg stay shall be either of cast aluminium conforming to IS Designation A-5M of IS 6177-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purpose or folded from IS Designation NS4 aluminium alloy sheet conforming to IS 737-1955 Specification for Wrought Aluminium and Aluminium Alloys Sheet and Strip. It shall be 300 mm long, complete with peg and locking bracket. The stay shall have holes for keeping

the shutter open in three different positions. The peg and locking bracket shall be riveted or welded to the fixed frame.

7.03.3 Doors : The outer fixed frame shall be of section A1-FX8. The shutter frame shall be of either hollow sections A1-HFX5 and A1-HFX6 or of solid sections A1-HFX5 and A1-FX6. Details of construction shall be as per IS:1948.

The kick panels shall be of 1.25 mm aluminium alloy sheet conforming to IS Designation NS3-1/2H of IS:737-1955 Specification for Wrought Aluminium and Aluminium Alloys Sheet and Strip and shall be screwed to the frame and the glazing bar.

7.03.4 Hinges & Fittings : Cast or extruded aluminium alloy hinges for doors shall be of the same types as in the windows but of larger size. The hinges shall normally be of the 50 mm projecting type. Non-projecting type of hinges may also be used. The handle for doors may be of the design indicated in IS:1948. A suitable lock for the door operable either from inside or outside shall be provided. In double shutter doors the first closing shutter shall have a concealed aluminium alloy bolt at top and bottom. It shall be so constructed as not to work loose or drop by its own weight. Single and double shutter doors may be provided with a three way bolting device. Where this is provided in the case of double shutter door, concealed aluminium bolts may not be provided.

7.03.5 Composite Units : The doors shall be coupled to windows or side lights by extruded aluminium sections made from aluminium alloy conforming to IS Designation HE-9-WP of IS:733-1956 Specification for Wrought Aluminium Alloy, Bars, Rods and Sections (for General Engineering Purpose). The coupling member should conform to the dimensions indicated in IS:1948.

7.03.6 Weather Bar : Where a coupling member is fitted over an external opening shutter, the coupling member should incorporate an integrally extruded weather bar as indicated in IS:1948.

7.03.7 Finish : Aluminium doors, windows and ventilators may be supplied in either matt, scratch brush or polished finish. They may also be anodized, if so required by the EIC. If colour anodizing is to be done then only approved fast shades should be used.

A thick layer of clear transparent lacquer based on methacrylates or cellulose butyrate shall be applied on aluminium doors, windows and ventilators by the suppliers to protect the surface from wet cement during installation. This lacquer coating shall be removed after installation is completed.

Glazing : Glazing shall be provided on the outside of the frames. If required glazing clips may be provided as extra fittings by mutual arrangement between the purchaser and the supplier.

Four glazing clips may be provided per glass pane, except for door type 8HS21 where the glazing clips shall be six per glass pane. In case of doors, windows and ventilators without horizontal glazing bars the glazing clips shall be spaced according to the slots in the vertical members, otherwise, the spacing shall be 30 cm.

GENERAL SPECIFICATIONS FOR PLUMBER'S WORK

The material to be used in sanitary and water and supply works shall conform to the following makes and specification:

1. European pattern W.C.set (shanks in English make and Orissa, Hind E.V.D.in Indian make) or specified in the item of make or equivalent comprising of white porcelain water closer ('S' of 'P' trap) with.
 - (a) 8 gallon mosquito proof G.I.flushing cistern ELC (Elephant Brand): or
 - (b) White porcelain gallon mosquito proof low level cistern with chromium plated handle.
 - (c) (i) 3 gallon mosquito proof G.I.low level cistern with handle.

- (ii) 1 1/4 "G.I. telescopic fresh pipe with buffer clamp, cast iron holder bat clamp and coupling and 1 1/2 " lead pipe.
- (iii) (a) Single mahogany, Polished teak wood seat (reinforced with iron pipes at the back) C.P.hings screws, bolts, rubber buffer.
(b) Plastic seat Bestolite make with all the fittings.
- (iv) Wooden blocks and screws for fixing W.C.in floor and putty joint with flush pipe and soil pipe.
- (v) 1/2 " lead connection pipe 18" long with brass coupling and plumber joint at both ends.
- (vi) 1" dia over flow G.I. pipes with mosquito proof cover.
- 2. Indian pattern W.C.set (Hind Orissa) or as special feed in the item of work or equivalent comprising of white porcelain W.C.pan fitted with :
 - (i) 3 gallon cast iron high pressure mosquito proof flushing cistern cast iron brackets, E.L.C.(Elephant Brand) Monsoon or equivalent with G.I. chain with aluminium handle.
 - (ii) 1 1/4 " G.I. flush pipes C.I.holder bat.
 - (iii) One pair foot rest of white glazed earthen ware of standard pattern in India type W.C.pan.
 - (iv) 1 1/2 " lead connection pipe 18" long with brass couplings and plumber joints at both ends including fitting and fixing in proper position joining, cutting and making good damages and providing 3" cement concrete with jhma knoa 1" gauge (1:4:8) around the pan and the trap.
 - (v) 1/2 "lead connection pipe with brass coupling and plumber joint at both ends.
 - (vi) 1" dia over flow G.I. pipe with mosquito proof cover.
- 3. ` Wash hand basin set 22" x 16" (shank for English make Orrissa, Hind for Indian make). White preelainm wash hand basin with 2 nos. cast iron brackets painted white 1/2 "C.O.waste fittings, C.P.chain and rubber plug with.
 - (a) 1 1/2 "lead waste pipe with coupling and plumber joint.
 - (b) 1/2 "lead connection pipe with brass coupling and plumber joint at both ends 18" long.
- (c) Teak wood blocks and screws for fixing brackets 1 1/2 "M.S. or C.P.brass trap Standing Urinal (Specified in the item of wok or equivalent of)lipped from standing urinal basin (corner of flat back) white porcelain 1" head waste pipe pipe 2'-0" long 1/2 "lead flush pipe 9" pipe long 1/2 "C.P.stop cock for flushing, screws wooden block compete.

4. G.I.Pipe / Fittings

- (a) G.I.pipes shall be of medium quality (Blue band class-B conforming to the Indian Standard specifications IS 1239/1956. The fittings may be either galvanized wrought iron and galvanised malleable iron.
- (b) All exposed G.I. pipes should be fixed truly vertical or horizontal as the case may be and should remain clear at least 1/2 "of wall every where and should be fixed by C.I holder bat clamps at suitable places. Rate for pope and fittings should include cost of holder bat.
- (c) V.I.water pipes and fittings laid underground shall not be less than 2 ft.deep from frond level. Rate will include necessary excavation in trench in any kind of soil or rock, top dressing site clearing etc.

5. H.C.I.Soil and Vent Pipes and Fitting

- (a) All pipes and fittings shall be to the medium grade free from flow and the interior should be clean and smooth and painted inside and outside while hot with August smith solution or other approved non-corrosive paint. The access door of fitting shall be on proper design. All joints will have to make with spun yarn and melted lead properly packed with caulking tools as per standard practice and as given below: Quantity of lead and yarn per joint for cast iron pipes:

Dia.of pipes	Lead	Yarn
80mm	1.8kg	0.10kg
100mm	2.2kg	0.18kg
125mm	2.6kg	0.20kg
150mm	3.4kg	0.20kg

- (b) In case of exposed work the rate for all pipes and fittings will include making joint spun yarn and lead fixing nail G.I. bolts and wooden pins. Exposed pipes will have ears.
- (c) In case of underground work the rate will include excavation any kind of soil or rock, depth not exceeding 5-0" laying, jointing with spun yarn and lead refilling the trenches, ramming, consolidation top dressing, site clearing etc.complete.
- (d) While mentioning sizes of pipes and fittings the internal diameter will always be meant.

6. Asbestos Cement Pipes and Fittings

All materials will be Asbestos Cement Ltd.or equivalent. All joints have to be made with Asbestos rope and cement mortar. Exposed pipes will have to be fitted with 1"x8" M.S.flat clamp with bolts and nuts. All other works will be similar to H.C.I. pipe work.

- 7. Cast and fittings (Water Mains)
 - (a) All C.I. pipes and fittings shall be of 'B' class and to be in and to be in accordance with latest British Standard specification.
 - (b) The price tendered laying pipes and fittings are to include the excavation in any kind of soil or rock to a depth not less than 3 carrying lowering, laying excavation joints holes, making lead caulked joints with fine lead and spun yarn in case of C.I.S.& S. pipes and fitting and with bolts nuts and 1/8" thick rubber washer in case of C.I. flanged pipes and fittings refilling the trenches, consolidating the fill, cutting of pipes and fittings where necessary, providing warning signs and barricading site clearing etc.complete.

8. Lead Caulked Joints for C.I.S.and S.Water mains and H.C.I. pipes

Size of pipes	Weight of Lead	Weight of Yarn
2"	4lbs	2 Oz
6"	8lbs	5.1/2 Oz

9. Lead Pipe Work

The lead pipe is to be seamless and hydraulically drawn of uniform bore from pure lead of full weight and substance throughout. The rate will include cutting of pipes to proper size and shape, plumber joints, brass coupling making necessary bends and offset etc. complete.

10. Brass Fittings

Bibcock, stop cocks, valves etc. shall conform to latest. Before fittings samples should be submitted and got approved for the same from the EIC.

11. S.W.Pipes and Fittings

- (a) All pipes must be new, perfectly sound, free from free crake and imperfections of glaze cylindrical, straight in length of standard nominal diameter and length and depth of socket and barrel made of hard but stone ware of dark and thoroughly salt glazed inside and outside.
- (b) All pipes shall be jointed with tarred gasket and cement mortar made of 3 parts of sand and 2 parts of cement by volume.
- (c) The prices tendered of for laying pipe to include excavation in any kind of soil or rock to required depths, lowering, jointing, testing concerting, filling trenches in layers not exceeding 9" watering, consolidating the back fill, providing warning signs and barricading, shoring, if necessary, site clearing etc.all complete.

12. Inspection Pit and Manholes

- (a) Inspection pit will be (2' - 0" x 2 - 0") internal size or as specified, brick masonry chamber made with 10" thick Ist class brick in cement mortar 1:6:3" thick cement concrete invert benching 1/2 " cement plaster (with Cico 3% by wt.of cement (1:4) in side smoothly finished

with neat cement, rounding corners, 3" R.C. slab cover, 18" dia C.I. water seal pit cover (18" clear opening, with 56 lbs) all complete (the rate will include excavation in any kind of soil or rock, filing, site clearing etc. complete).

- (b) Manholes will be of 2'-6"x2'-0" internal size or as specified etc. as in inspection pits, but with necessary 3/8" dia step iron where necessary.

13. Sluice Valve Chamber

Sluice valve chambers on internal size 2'-6"x3'-0"x4'-0"x10' thick 1st class cement brick work (1:6) 3" cement concrete floor (1:4:8) placed 3" below the bottom of sluice valve inside with 1/2 "cement plaster top cover made with 2'x10" 3'-5", 16 gauge thick M.S. sheet Stafford with flat iron bars M.S. handle properly hinged and complete with locking arrangements.

14. Ferrule and stop cock box with necessary chamber

6" square G.I. surface box 9" deep weighting not less than 10 lbs with hinged lid will be put on masonry chamber. Top of box will remain flush with the finished level. The chamber (9"x9" inside) will be 3" thick cement concrete floor (1:4:8) below stop cock or ferrule 5" thick brick work with cement mortar (1:6) inside finished with cement plaster (1:4).

15. Testing of water pipes and fittings

Except where gravity test from a service reservoir is permitted the water main and distribution pipes where completed are to be tested in section by pumping water into them upto a pressure equal to 25% above the maximum working pressure at the expense of the contractor.

16. Testing of soil pipes and fittings

Smoke test shall be applied if found necessary by the EIC and for this purpose the contractor shall supply and maintain a proper smoke test machine on the work site and test will be carried out the expense of the contractor.

17. Water for construction

Arrangement of water supply for all works and for testing shall be made by the contractor at their own cost.

(A) All rates quoted will include all cutting walls, floors, roof, cornice, surface drains etc. and making good all damages.

18. Testing Sewers

All sewers will be tested for water tightness under ahead not less than 6' in shallow sewers and equal to the depth below the ground in case of sewer over 5'-0" depth. No sewers will be considered to have been completed until such tests have been made and passed by the Engineer-in-charge.

NOTE

The foreign makes of materials mentioned in the above specifications shall be provided only in cases where the schedule of quantities attached to the contract specifically provides for the same, or where the particular materials is not manufactured in India. In all other cases Indian make materials shall be used.

19. Polythene Pipes and Fittings

- 19.1 Polythene Pipes :** The pipes shall be of low density or high density black polyethylene tubes of approved make of nominal sizes, smooth, clean and reasonably free from grooving and other

defects, suitable for use in cold water services. They shall conform in all respect to the relevant IS or BIS.

The details of nominal outer diameter, approximate weight and working pressures at 20° C for normal gauge low density pipes of different bores are given below :

Nominal Bore

in mm

Nominal outside dia in

mm

Approx weight in

Kg/100m

Working Pressure

Kg/sq cm Head in meter

25 mm 32 mm (provisional) 26.80 (provisional) 5.62 56

32 mm 40 mm (provisional) 32.79 (provisional) 4.57 46

40 mm 48 mm (provisional) 43.15 (provisional) 4.57 46

50 mm 69 mm (provisional) 78.90 (provisional) 4.57 46

Polythene pipes may be bent cold to a radius of not less than eight times their external diameter of pipes. Bends of smaller radius may be made by hot bending.

In hot bending the pipe shall be heated by immersion in boiling water or by application of blow lamp flame; the flame shall be used with care, taking about 3 minutes to heat the pipe.

The flame shall be applied only between the limits of the bend. When thoroughly softened the pipe shall be bent to the desired radius using bending spring inside the bore and held until the pipe becomes completely cold.

GENERAL SPECIFICATION FOR ROAD WORKS

1.00 CONCRETE PAVEMENTS

Construction of concrete pavement shall generally be in accordance of IRC:15:1970 "Standard Specifications and Code of Practice for Construction of Concrete Roads". Reference may be made to IRC:43-1972 for tools, equipment & applicances required for the work and for the proper upkeep thereof.

1.01 Material & Mix Proportion

All materials i.e. cement, coarse aggregates, fine aggregates and water shall be checked for specification requirements in advance of their use in the work. Proportioning of different aggregate fractions shall be so controlled that the combined aggregate grading falls within the specified limits of gradation.

Mix proportions for concrete shall be pre-determined on strength basis using representative samples of materials proposed to be actually utilised in the work. While proportioning, adequate allowance should be made for the expected strength in the field, subject to the allowable tolerances. Where cement from more than one source is to be used, proportions for the mix shall be determined for each cement. All materials required for the work shall be stored and handled in a manner so as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of its quality and fitness for work.

1.02 Processing & Construction

1.02.1 Weather & Seasonal Limitations

Unless special precautions as specified are taken, concreting shall not be done during extreme weather conditions, e.g. during monsoon months and when atmospheric temperature in shade is above 40o C or below 4.0o C. IRC:61-1976 may be referred for guide lines for construction of cement concrete pavement in hot weather.

1.02.2 Preparation of Base

The base to receive the cement concrete shall be checked for line, grade and cross section. All irregularities beyond the permitted tolerances shall be rectified. Where concrete is to be laid over an absorbent surface, the later shall be kept moist in saturated surface-dry conditions or covered over by a water proof Kraft/Polyethylene sheeting as specified so as to prevent absorption of water from the concrete mortar. Where required, the strength of the base shall be checked by carrying out plate bearing test.

1.02.3 Fixing of Form Work

The form work shall be of correct shape, free from bends & kinks and sufficiently rigid to maintain its shape and position under the weight and working conditions of the laying and 116 compacting equipment. It shall be set to true lines and gradients and securely fixed in position to prevent any subsequent disturbance during compaction. Trueness of the form work from the specified profile shall be checked and any deviation greater than 3 mm in 3 m rectified. No deviation shall be allowed at the joints.

1.02.4 Mixing and Placement of concrete

Unless otherwise permitted, the coarse and fine aggregates shall be proportioned by weight in an approved weigh batching plant. The weighing mechanism shall be regularly checked for accuracy, once daily before the work starts, over the full working range by means of standard set of weights.

Where volume batching is permitted, every effort should be made to minimise variations in batching by following standard filling procedure. Also the volume of fine aggregated in a batch shall be duly corrected for bulking.

Cement may be measured either by weight or by bags. Where cement is used in full bags, frequent checks shall be made to see that the bags contain the full specified weight of cement and any shortage of weight made good. Alternatively, 10% of the bags in a consignment shall be weighed in advance and batch weight of materials adjusted on the basis of average weight for the consignment. Water may be measured by volume using standard measures. The designated water cement ratio shall be strictly adhered to and due adjustments made in the water to be added on account of free moisture content in the aggregates.

The mixing of concrete shall be done in a power driven mixer of approved type that will ensure a uniform distribution of materials throughout the mass. The minimum mixing time shall be fixed in relation to the mixer type and capacity and adhered to strictly.

Workability of concrete shall be checked as specified by performing "Slump Test" or "Compacting Factor Test" in accordance with IS:1199. The allowable tolerances from the specified value for workability shall be : Slump ± 12 mm Compacting factor ± 0.03 Necessary adjustments in water content, keeping the same water cement ratio, shall be made if variations beyond permitted tolerances are observed so as to bring workability within the specified limits.

Immediately after mixing, the concrete shall be transported for placement in such a manner that segregation or loss of constituent materials is avoided in transit.

Concrete shall be placed on the prepared base between the formwork in such a manner as to avoid segregation and uneven compaction. Concrete shall not be dropped from a height greater than 90 cm and shall be deposited within 20 minutes from the time of discharge from the mixer. It shall be laid in a horizontal layer as near to the final position as possible thereby avoiding all unnecessary rehandling.

The concrete shall be compacted fully using vibrating screeds and/or internal vibrators as specified. The vibrating screeds and internal vibrators shall conform to IS:2506 and IS:2505 respectively. Compaction shall be so controlled as to prevent excess mortar and water working on to the top due to over vibration.

During compaction, any low or high spots shall be made up by adding or removing concrete.

The concrete surface shall be tested for trueness with a 3 m straight edge while the concrete is in plastic stage. Any depressions or high spots showing departure from the true surface shall be immediately rectified. All these operations shall be completed within 75 minutes of mixing.

After correcting the surface for profile but just before the concrete becomes non-plastic, the surface shall be finished by belting, brooming and edging as specified.

Where the concrete is to be laid in two layers, the second layer shall be placed within 30 minutes of compaction of the lower layer.

1.03 Control of Concrete Strength

The strength of concrete shall be ascertained either from cube or beam specimens as specified. For this purpose, during the progress of work, cube / beam samples shall be cast for testing at 7 and 28 days. Sampling and testing shall be in accordance with IS:1199-1959 and IS:516 respectively.

1.04 Joints

All materials required for the joints, viz. tie bars, dowel bars, expansion joint filler boards and joint sealing compound shall be checked for specification requirements before their incorporation in the work. The sealing compound shall conform to IS:1834.

Dowel bars shall be placed parallel to each other and parallel to the surface and centre line of the pavement. The allowable tolerances in this regard shall be : ± 1 mm in 100 mm for dowels of 20 mm and smaller dia. ± 0.5 mm in 100 mm for dowels of dia greater than 20 mm.

All joint spaces & grooves shall be of specified dimensions.

During concreting special care shall be exercised to dowels and in the vicinity of joints.

At the end of the curing period before opening to traffic, the joint grooves shall be cleaned thoroughly and sealed as specified in IRC:57-1974. Care shall be taken to ensure that the sealing compound is not heated beyond the specified temperature.

1.05 Curing of Concrete

Curing shall commence soon after the finished pavement surface can take the weight of the wet burlap, cotton or jute mats normally employed for initial curing, without leaving any marks thereon. The mats shall extend beyond the pavement edges at least by 0.5 m and be constantly wetted. Initial curing shall be for 24 hours or till the concrete is hard enough to permit labour operations without damage. Final curing, after removal of the mats, etc. shall be carried out by wet earth, ponding of water or other means specified. Where water is used for curing it shall be ensured that the entire pavement surface is kept well saturated throughout the specified curing period. But where water is scarce or pavement is on a steep gradient, impervious membrane curing shall be adopted as per details specified.

1.06 Reinforcement

Reinforcing steel, where required to be provided, shall be checked for specification requirements before using in the pavement. Reinforcement shall be placed as specified. Due care shall be taken to ensure that the reinforcement is not displaced during concrete operations.

2.00 ROAD WORKS & PAVEMENTS

Quality control of construction materials and product is an essential requirement for obtaining improved and uniform standard of roads. It is common knowledge that quality control, besides leading to constructions of improved quality and uniformity and ensuring a more economical utilisation of materials, also afford a significant reduction in costs, in terms of lower costs of vehicle operation, transportation and maintenance. The

extra cost of exercising quality control being only a fraction of the resulting benefits, is a highly economical proposition.

2.01 Control of Materials

The quality control tests on materials are essentially to be carried out on the materials brought to site to ensure that the materials being incorporated in construction are of specified quality. All the materials brought to the site shall be stacked and stored as specified so as to prevent deterioration or intrusion by foreign matter and to ensure the preservation of their quality and fitness for work. Materials which have been improperly stored or have been stored for long periods shall be retested where their suitability for incorporation in the work is in doubt.

Earth Work - Materials and Process :

The soil / earth to be used for making up the embankment shall be free from lumps and root rubbish which might affect the stability of the embankment. The selection of materials for construction of embankment shall be made after conducting necessary soil surveys and laboratory investigations as recommended by "Indian Roads Congress" in IRC-36-1970.

2.02 Test Procedures

The procedure for testing of different materials and work shall be in accordance with relevant standards of "Bureau of Indian Standards". Where specific procedure of testing is not indicated the tests shall be carried out as per prevalent accepted engineering practice to the direction of the Engineer Incharge.

The following tests may be conducted depending on the type of soil selected for use:

Gradation/Sand content
Plasticity Index
Standard Proctor Test
CBR Test
Natural Moisture Content
Dry Density of Compacted Layer

2.03 Sub-base Course

Water Bound Macadam : For use as sub base, WBM shall be constructed with oversized aggregates of 40-90 mm size. The materials used and the work shall conform to the requirements of IRC 19-1972.

All materials used in WBM construction, viz. coarse aggregates, screenings and binding materials shall be checked in advance of their incorporation in the works for specification requirements either at the quarry or at site.

Arrangement for lateral support and confinement of aggregate shall be checked before starting to spread of materials. If necessary the surface shall be scarified and reshaped to the required grade and camber.

The following points shall be carefully attended to while executing the work :

- i. Quantity and uniformity of spread of materials shall be checked by template. Segregation of coarse and fine aggregates shall be avoided.

Rolling operations shall begin from edges, proceeding gradually to the centre while lapping each preceding rear wheel track by one half width. At horizontal curves, rolling shall be carried out when it causes a wave like motion due to softness of the subgrade/sub-base. Irregularities that develop during rolling shall be rectified either by adding or removing aggregate. In no case shall screenings be added to make up depressions. Rolling shall be discontinued when the aggregates are partially compacted with void space sufficient to permit application of screenings. However, where screenings are to be used, compaction shall be continued until the aggregates are thoroughly keyed.

Screenings shall be applied in three or more applications to fill interstices while dry rolling is continued.

It should be ensured that the sub-base/sub-grade does not get damaged due to addition of excessive quantities of water during construction.

Binding material, if required, shall be added after the application of screenings. It shall be introduced at a uniform rate in two or more applications accompanied by copious sprinkling of water so as to form a slurry which could be swept with brooms to fill the remaining voids. Rolling shall be continued till full compaction is achieved.

Normally no traffic shall be allowed till the mecadam sets.

The finished surface shall be checked for line, gradient and regularity.

2.03.1 Control Tests

The following quality control tests on the materials and the work shall be conducted

- a. Los Angles Abrasion / Aggregate Impact Value.
- b. Grading of Aggregates and Sand.
- c. Flakiness Index of Aggregates.
- d. Plasticity of binding material.
- e. Control of grade, camber, thickness and surface finish.
- f. Crushing strength.

2.03.2 Rectification of Surface Irregularities

Where the surface irregularities of water bound mecadam bases are outside the tolerances, the same shall be rectified by removing to full depth of the affected area, which should not be less than 10 sqm and relaying with fresh materials. In no case shall depressions be filled up with screening or binding materials.

2.03.3 Allowable Tolerance

Except for hill roads, the allowable tolerances in respect of horizontal alignment are recommended to be as follows :

- i. Carriage way edges ± 25 mm
- ii. Edges of the roadway & lower layers of pavements ± 40 mm IRC-36-1970 may be referred for further details for controlling horizontal alignment.

2.04 Stone Soling

Stone soiling, as a rule is gradually becoming out moded as a sub-base owing to its inferior load spreading properties as well as the liability to sink into poor or slushy subgrades. However, where it is still used, control on the materials and works should be exercised as described below :

2.04.1 Materials :

The stones shall be granite, lime stones, trappe, quartzite etc. as specified, reasonably free from laminations, foreign matter, unsound and weathered fragments and be in a clean condition. The filler/binding material shall be sand or morrum or any other granular material having a plasticity index of not more than 6.

2.04.2 Preparation of sub-grade :

The sub grade shall be checked for lines, grades, cross sections in camber, cant etc and dimensions. All irregularities beyond the permitted tolerances shall be rectified as specified. Soft and yielding places and ruts shall be corrected and rolled until firm. The objective is to achieve a well built pavement conforming to the required standards of riding quality.

2.04.3 Soling work :

The following points shall be kept in view during execution:

The stones shall be laid and seated properly by hand as specified.

All voids should be filled, first by wedging in spalls and then with filler materials accompanied by sprinkling of water, brooming and rolling.

Rolling shall commence at the edges, progressing gradually towards the centre parallel to the centre line of the road except at super elevated portion where it shall proceed from the inner edge to the outer.

2.04.4 Checking :

The finished surface shall be checked for line, grade and regularity.

2.04.5 Control tests and their frequency :

The tests for Aggregate Impact Value, Los Angeles Abrasion Value and Plasticity Index of filler material shall be carried out as per IS:2386 (Part IV & Part V). One test per 200 cum of soiling stone and one test per 25-50 cum of filler material should be conducted.

2.05 Bituminous Surface Course

The bituminous surface course may be any of the following type :

Single and two coat bituminous surface dressing.

Surface dressing using pre-coated aggregates.

Thin bituminous premix carpet.

Asphatic concrete surfacing.

2.05.1 Single and two coat Bituminous Surface Dressing

The construction of bituminous surface dressing in single coat shall be in accordance with the specifications laid down in IRC-17-1965 whereas IRC-23-1965 shall be followed for two coats bituminous surface dressing.

Materials

The materials namely aggregates and binder should be as specified below:

Bituminous materials : The bituminous materials shall conform to the requirement as specified and provided for in the proposal and satisfy the related specifications of IS:73- 1961, IS:2131961, IS:217-1961 and IS:454-1961.

Cover materials or aggregates : The cover materials shall consist of crushed stone, crushed slag; crushed and fairly cubical fragments free from disintegrated pieces, salt, alkali, vegetable matter, dust and adherent coatings. Various tests as specified in IRC-17- 1965 shall be conducted as per procedure laid down in IS:2386 and IS:6241 for ascertaining physical requirements.

Progressing and Construction

- a. Preparation of base : All depressions or pot holes in the base on which surface dressing is to be laid shall be properly made up and compacted to the required lines, grades and sections. The surface shall be thoroughly cleaned of any caked earth and other matter before the binder is applied.
- b. Construction of bituminous surface dressing :**

No surface dressing work shall be carried out if Atmospheric temperature in shade is 16°C or less, or Base is damp, or Construction materials are damp or the weather is foggy, rainy or dusty.

 - ii. The work should be so organised that no traffic or dust sets on the cleaned or bituminous painted base.
 - iii. The specified quantity of approved binder shall be sprayed at the appropriate application temperature, preferably using mechanical sprayers. The rate of spray of binder shall be frequently checked and regulated to be within 2.5% of the specified rate of application. Excessive deposits of binder shall be immediately removed.
 - iv. Immediately after application of the binder, cover aggregates of approved quality shall be spread uniformly at the specified rate. If necessary, the surface shall be broomed to ensure uniform spreading of aggregates.
 - v. Cover aggregates shall be immediately rolled with roller of approved weight. Rolling operation shall continue till all aggregate particles are firmly embedded in the binder.

Excessive rolling resulting in the crushing of aggregates shall be avoided. The second coat, if specified, shall be applied immediately after laying of the first coat. g. Generally, no traffic shall be allowed on the finished surface for 24 hours. If allowed, its speed shall be restricted to 16 Km/h during this period. If cut back bitumen has been used, the finished surface shall be closed to traffic till the binder is adequately cured.

2.05.2 Surface dressing with pre-coated aggregates

The construction of surface dressing with pre-coated aggregates shall generally be carried out in accordance with IRC-48-1972. The construction is similar to conventional surface dressing except the cover aggregates are highly pre-coated with binder.

2.05.3 Thin bituminous premix carpet

Thin bituminous premix carpet may be constituted from open graded or closely graded mixes as specified. Where the mix is open graded, the carpet is generally provided with a seal coat. The construction of open grade premix surfacing shall be in accordance with IRC-14-1970.

Materials

A. Binder : The binder shall be one of the following :

- i. A straight run bitumen of suitable penetration grade complying with IS:73.
- ii. A cut back bitumen of suitable viscosity complying with IS:217 or IS:454 or other approved cut back.

B. Coarse/Fine Aggregates : The aggregates used shall be in accordance with IRC-14-1977. Construction of premix carpet While executing , the following points shall be kept in mind:

- i. Mix proportion of constituent materials shall be as specified, binder content in the mix shall be checked periodically and regulated to be within 2.5% of the specified quantity.

- ii. Tack coat, where necessary, shall be applied uniformly over the prepared base at the specified rate.
- iii. Mixing shall preferably be done in mechanical mixers.
- iv. Where straight run bitumen is used, the aggregates should be suitably heated prior to mixing with binder. The binder heated to appropriate temperature should be mixed with aggregates until the later are thoroughly coated.
- v. The mixed materials shall be spread evenly with rakes or spreaders to specified thickness and camber.
- vi. Rolling shall start immediately after the material is spread. The wheels of the roller shall be kept moist to prevent the premix from adhering to the wheels and being picked up but in no case shall the use of fuel lubricating oil be allowed for this purpose.
- vii. Where specified, a seal coat comprising premix sand or liquid seal and fine aggregates shall be evenly applied and rolled.
- viii. When straight run bitumen is used, traffic may be allowed immediately after the carpet has cooled down to the surrounding temperature but with restricted speed of 16 Km/h for the next 24 hours. However, no traffic shall be permitted till the binder is cured if cut back bitumen is used as binder.
- ix. Various tests as specified in IRC-14-1977 shall be carried out for quality checks.

2.05.4 Asphaltic Concrete Surfacing

The construction of asphaltic concrete surfacing shall be in accordance with the requirement of IRC-29-1968.

Materials

All materials, viz. bituminous binder, filler, fine and coarse aggregates, shall comply with the specifications laid down in IRC-29-1968.

Preparation of base

This shall be done strictly in accordance with the provisions in Clause 6 of IRC-29-1968. It is imperative that the asphaltic concrete mix be manufactured by using a hot mix plant of adequate capacity to yield a mix of proper and uniform quality.

Construction of asphaltic concrete surfacing

While carrying out this type of construction, the following points shall be properly attended to :

- a. Gradation of combined aggregates and binder content shall satisfy the design criteria of the relevant IRC specification.
- b. The design mix proportions arrived at in the laboratory shall be based on representative samples of materials actually available at site and shall be followed to the maximum extent possible. In the event there is a change in the materials available at site, a fresh job mix formula shall be arrived at. In all cases variation from the job mix formula shall be within the specified limits.
- c. Tack coat where necessary shall be applied over the prepared base at the specified rate before laying the surfacing.

- d. Mixing plant shall be of adequate capacity to yield a mixture of proper and uniform quality. It should have necessary accessories such as aggregate feeder, dryer, weight or volume batcher, heater, binder, binder measuring unit, filler feeder unit and mixing unit.
- e. Quantities of various sizes of aggregates shall be fed to the dryer in such proportions that the resulting combination complies with the job mix formula. This shall be strictly followed on small plants with no gradation control unit.
- f. The temperature of binder at the time of mixing shall be in the range 150o C to 177o C and of aggregates in the range 155o C - 163o C. Care should be taken so that the difference in temperature between the aggregates and the binder does not exceed 14o C .
- g. Mixing time should be shortest possible to obtain uniform distribution of the binder and a homogeneous mix.
- h. Binder content with mix shall be checked periodically to ensure that the same conforms to specification. A variation in binder content of $\pm 0.3\%$ by weight of total mix shall however be permissible.
- i. The mix shall be carried to the site by tipper trucks and spread and compacted to obtain a carpet of required thickness. Spreading shall be done by self-propelled mechanical pavers provided with screeds for spreading, tamping & finishing the mix true to grade, line and cross section. The temperature of mix at the time of laying shall be in range 121o C to 163o C.
- j. Soon after laying of the mix, rolling shall be started with 8-10 tonnes rollers at a speed 5 KMPH. Rolling operation shall progress with the drive wheels of the roller in the direction of the paving, starting from the low side of the spread and proceeding towards the high side. The initial breakdown pass shall be made as soon as possible i.e. as soon as the roller can be operated without its wheel picking up the mix. When adjoining lanes are placed, the same rolling procedure shall be followed after compaction of the fresh mix at the longitudinal joint with 15-20 cm of the roller width (with the remaining roller width on the previously compacted lane). The mix shall be further compacted and surface finished with pneumatic and tandem roller. The final rolling shall be continued till the mix is fully compacted and little or no roller marks are left on the surface. The density shall not be less than 95% of the lab density. During rolling, the roller wheels shall be kept moist to prevent the mix from adhering to the wheels and being picked up but in no case shall the use of fuel / lubricating oil be allowed for this purpose.
- k. Longitudinal joints and edges shall be constructed true to the delineating lines parallel to the centre line of the road. All joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with hot bitumen before placing fresh material. Transverse joints shall be staggered.
- l. Traffic shall be allowed on the surface only when the carpet after final rolling has cooled down to the ambient temperature.
- m. The finishing surface shall be checked for line, grade & regularity.

Control tests & their Frequency

Quality control tests on materials and the work and their frequency shall be as specified in IRC29-1968 . The test procedures shall be as described in IS:2386, IS:73. IS:1203 and IS:1205.

2.08 Bituminous Materials

Bitumenous binders used in pavement construction works include both bitumen and tar. Bitumen is a petroleum product obtained by the distillation of petroleum crude. The bitumen is brought to sufficient fluidity or viscosity before use in pavement construction by any one of the following three methods :

- i. by heating in the form of hot bitumen binder.
by dissolving in light oils, in the form of cut back bitumen.
by disposing bitumen in water, in the form of bituminous emulsion.

Bitumen is available in a variety of types and grades. The grades of bitumen used for pavement construction work of roads and air fields are called paving grades and those used for water proofing of structures, industrial floors etc. are called industrial grades. The paving bitumen available in India is classified into two categories.

- a. Paving bitumen from Assam Petroleum, denoted as A-type and designated as A-35 grade, A-90 grade etc.
- b. Paving bitumen from other sources denoted as S-type and designated as S-35 grade, -90 grade etc.

Before considering the control tests for bitumen, it is appropriate to explain certain terms which are commonly used in flexible pavements.

2.08.1 Cut back pavement

It is identified as the bitumen, the viscosity of which has been reduced by a volatile diluent. For use in surface dressing, some types of bitumen macadam and soil bitumen stabilisation, it is necessary to have fluid binder which can be mixed at relatively low temperatures or at atmospheric temperature. Hence, to reduce/decrease the viscosity of the bituminous binder at low temperatures, the binder is blended with a volatile solvent. After the cut back mix is used in construction work, the volatile gets evaporated and the binder develops the binding properties. The viscosity of the cut back and the rate at which it hardens on the road depend on the characteristics and quantity of the bitumen and volatile oil used as the diluent. Cut back bitumens are available in three types, namely Rapid Curing (RC), Medium Curing (MC) and Slow curing (SC). BIS has further classified the bitumen into six grades on the basis of initial viscosity with designations RC-0 to RC-5, MC-0 to MC-5 and SC-0 to SC-5. RC, MC & SC cut back bitumens of these various grades should comply with the requirements specified in IS:217.

2.08.2 Emulsion

A bitumen emulsion is a liquid product in which a substantial amount of bitumen is suspended in a finely divided condition in an aqueous medium and stabilised by means of one or more suitable materials. An emulsion is a two phase system consisting of two immiscible liquids, the one being dispersed as finite globules in the other. The asphaltic bitumen or refined tar is broken up into globules and kept in suspension in water. A small proportion of an emulsifier is used to facilitate the formation of dispersions and to keep the globules of dispersed binder in suspension. The function of this emulsifier is to form a protective coating around the globules of binder resisting the coalescence of the globules. Normally soaps, surface active agents and colloidal powders are used as emulsifiers. For normal road emulsions, usually 0.5-1.0 % emulsifier by weight of finished emulsion is taken. The average diameter of globules of bitumen is about 2 microns. When emulsion is applied to the road, it breaks down and the binder starts coating the aggregates, though the full binding power develops slowly as and when the water evaporates. The first sign of break down of emulsion is shown by the change in the colour of the film from chocolate brown of the emulsion to black colour of the bituminous binder. The main advantages of emulsion are that :

- i. they can be used without heating for preparing mixes.
- ii. they are particularly useful for patch repair work and can be used even when the surface is wet or it is raining.

Three types of emulsified bitumen are prepared :

- a. Rapid Setting Type (RS) is a setting emulsified bitumen used for penetration and surface treatment.
- b. Medium Setting Type (MS) is used for plant mixes with coarse aggregates and

- c. low Setting Type (SS) is used for fine aggregate mixes.

2.06.3 Road Tar

Tar is the viscous liquid obtained when natural organic materials such as wood & coal are carbonised or destructively distilled in the absence of air. Based on the material from which tar is derived, it is referred to as "Wood Tar" or "Coal Tar". Coal tar being superior has been and is being used more widely for road work. The three stages for the production of road tar are :

- i. Carbonisation of coal to produce crude tar.
- ii. Refining or distillation of crude tar and
- iii. Blending of distillation residue with distillate oil fraction to give desired road tar.

BIS has classified road tars into five grades : RT-1 to RT-5, based on their viscosity and other properties.

RT-1 is used for surface painting under exceptionally cool weather as this has very low viscosity.

RT-2 is recommended for standard surface painting under normal Indian climatic conditions.

RT-3 may be used for surface painting, renewal coats and premixing chips for top course and light carpets.

RT-4 is generally used for premixing tar macadam base course.

RT-5 may be adopted for grouting purposes.

SPECIFICATION/GENERAL CONDITIONS FOR ELECTRICAL WORKS

1. The installation shall generally be carried out in conformity to the Indian Standard specifications and code of practice for electrical work, but where the specifications, attached to the tender differ from these specifications, these specifications shall be folded.
2. In case where the I.S. specifications and these specifications are found wanting, the work shall be carried out as per relevant latest code of practice recommended by B.S.S.
3. In addition, the installation shall comply in all respects with the requirements of Indian Electricity Act.1970, amended upto date and Indian Electricity Rules.1956 there under and the special requirements, if any of the State Electricity Board.
4. The successful tenderer shall give all notices required by the said Act etc. He shall also undertake to provide test certificate and get the installation approved by the authorities. The tenderer must include in their rates any fee to Govt.and arrange all sanction from Governing bodies etc.as required.
5. All materials fittings, appliances etc used in the Electrical Installation shall conform to the latest relevant Indian Standard Specifications, where ever these exist in the absence of I.S.specifications, relevant B.S.standard shall be applicable.
6. All cables and flexible cords shall be accompanied by the makers test certificates stating the class and giving result of the insulation test.
7. In case of materials for which standard specification do not exist, the materials shall be approved by the consultant.

8. No wiring shall be laid under the floors unless it is absolutely inescapable. In case this is unavoidable it should pass through class 'B' water tight galvanized iron pipes and not through ordinary conduit. No extra payment shall be made on this account.
- 9(a) Point wiring shall consist of branches wiring for final sub-distribution board together with the controlling switch (or push) as for as and including the ceiling rose or any other approved termination of socket outlet. In case of more than one light point is controlled by the same switch, the wiring upto the ceiling rose or any other approved terminations of the first light point including the switch shall be considered as a primary point, loop wiring from light to light shall be considered as a secondary point and the distinguishing rate shall be quoted.
- (b) A three pin socket outlet point shall include the earth continuity bare copper conductor of no.14 SWG from the earth pin to the terminal or bus at the final distribution center.
- (c) Wiring shall be done in 'Looping system and phase or live conductor shall be looped at switch box and natural condition from light, fan or socket outlets.
- 10(a) In estimating the current to be carried out by any conductor, incandescent jumps, shall be rates at 100 watts, the ceiling fans shall be rated at 80 watts, table fans and ordinary socket points at 60 watts, flourscent lamps of 4 ft.at 50 watts and 2 ft. at 25 watts and power socket outlet at 1000 watts, unless the actual values are specified.
- (b) Lights fans, and socket outlet may worked on a common circuit. Such sub circuits shall not have more than a total of 8 points of lights, fans and sockets outlets. The load of such circuits shall be restricted to 800 watts. The number of socket outlets shall not be more than two per circuit.

As regards power sub-circuits, the outlet shall be provided according to the load design for these circuits, but in no case shall these be more than two outlets on each circuit.

11. Rates

The rate for wiring light, fan and plug points given in the schedule of wok attached with the tender, shall be irrespective of the length of points. Circuit wires of these points shall also form part of the point rate. The conductor for final sub. Circuit for points shall have a nominal cross section area not less than 3/.036" (2.5mm²) copper conductor or equivalent aluminium conductor for light and fan circuit and 7/.36"(4mm²) for power sub-circuit wiring of same phase shall be drawn in same conduit in case of general light and power wiring separate conduit shall be laid for each services such as light/power/emergency light/power, telephone, music,T.V.,F.A. and P.A. system etc. No extra payment other then point rate will be made to the contractor.

- (a) The contractor shall prepare fabrication and detailed working drawings and obtain the approval of the EIC. All work shall be carried out only on approval of these drawings. However approval of the drawings does not relieve the contractor of his responsibility to meet with the intent of the specifications.

The virtual completion certificate will not be issued till the drawings are submitted.

12. Erection of conduit

- (a) The conduit shall be properly and tightly screwed between the various lengths and to the boxes to which it runs and terminal so that the wiring is continuously and effectively projected therewith it s entire length. No part of the conduit shall by under mechanical stories and the whole conduit system shall be electrically and mechanically continuous throughout.

- (b) Corners shall be turned by means of easy bends or sets made could without altering the section of opening the same. The radius of every conduit bend shall be such as to allow compliance with regulation B-32 of the I.E.E. Regulations for bends in cables and in addition the inner radius of the bend shall not be less than 2.5 time the outside diameter of the conduit.
- (c) Where conduits are connected by means of a socket the ends of the conduits shall but together in the center of the socket and except in the case of running joints, no exposed threads shall be visible after erection.
- (d) Where running joints are used, they shall be thoroughly coated immediately after erection with zinc chromate primer and then painted. Where the finish of the conduit is damaged in erection it shall be immediately made good with an approved metallic paint. All vice marks shall be removed and the conduit well protected where the paint galvanized has cracked or flaked.

13. Position of lighting, distribution Boards and switchgears

- (a) The recommended positions of the lighting points control switches distribution boards and switchgears as shown on the layout drawing will be adhered to as far as practicable.
- (b) Should there be any discrepancy or incomplete description, ambiguity or omission in the drawings and covering the same draw attention of the Architect/consultant.
- (c) Before commencement of work, the exact final position of all points switch boxes and the distribution boards shall be as included by the tenderer from the Architects representative.

14. Samples

The contractor shall submit 2 sets of samples of accessories and apparatus, he propose to use in the installation to the EIC for approval drawings or samples as required shall be submitted by the contractor and this specifications shall not be departed from without and written instructions from the EIC.

(a) Conduit Wiring

All metallic conduits shall be heavy gauge resistance welded and screwed electrical thread, manufactured in accordance with IS:1655 : 1972.

- (b) No smaller size than 20mm diameter conduit shall be employed unless otherwise specified and conduits accessories shall be stove enameled.
- (c) All conduits shall be of ample size to give easy “drew in” and “out” of all the cables in the conduits and the number of conductors shall not exceed that laid down as per appendix
 - (i) IS and shall leave 40% free space for ventilation purposes.
- (d) Care shall be taken to ensure that all conduits are adequately protected while stones on site prior to erection and no damaged conduit shall be used.
- (e) All ends of conduits shall be reamed and filled to remove rough edges and inside surface of conduits shall be smooth and free from burrs and all other defects.
- (f) Conduits showing traces of rust shall be wire brushed and painted with an approved metallic paint.

Accessories

- (a) All conduit accessories shall be of malleable iron sheet steel.

- (b) All fittings and gaddles shall be stove enameled or galvanized to match the conduits specified for the various areas.

B.S.Circular Boxes

- (a) Circular conduit boxes shall be of malleable iron complete with heavy duty covers manufactured in accordance with latest ISS.
- (b) Normal or half normal manufactured bends and sockets or inspection elbows or Tee pieces will not be permitted.
- (c) For surface work the boxes shall be raised back pattern type, designed for use with distance saddles to give clearance of approximately 6mm between the back of the conduit and the fixing surface.
- (d) Boxes with 50mm center fixing holes shall be employed and box cover fixing screws shall be round head brass.

2. DRAW-IN-BOXES

- (a) Draw-in-boxes shall be of malleable iron and the maximum number of entry holes shall be generally limited and not exceed 4 in any case.

3. ADAPTABLE BOXES

- (a) Adaptable boxes shall be of 14 gauge pressed steel where enameled conduit is specified and of galvanized iron where galvanized conduit is specified.
- (b) Minimum size box to be used shall be 75mm square by 50mm deep for cables upto 6 Sq.mm or conduits upto 25mm diameter and not smaller than 150mm x 75mm x 75mm deep of large cables or conduits.
- (c) Boxes of the weather proof of water tight patterns, as applicable shall be employed in all situations exposed to dampness.

4. STOPPING PLUGS

Stopping plugs shall be the hexagon headed type.

5. BRASS BUSHES

All bushes shall be manufactured from best quality brass male type and hexagon headed of standard light.

6. LOCK NUTS

Lock nuts shall be of steel drop forged castellated hexagon type.

7. CRAMPETS

All crumpets shall be of the heavy type and of the correct size for the conduit being fixed.

8. FLANGED COUPLING

- (a) Flanged couplings shall be of the machined faced type and complete with lead compression washers.
- (b) Thread less couplings and connectors will not be permitted.

9. COMPRESSION WASHERS

Compression washers for ensuring continuity at conduit connections shall be the steel shock proof type.

SADDLES

- 10.** All saddles used to secure surface conduits shall be of the malleable iron distance type that will secure conduits not less than 5mm. Clear of the surface. The saddles tops shall be fixed by means of round headed brass screws.

11. PREPARATION OF CONDUIT

- (a) The inside surface and ends of conduits and fittings used in connection therewith, shall be smooth, cut square and free from burrs and all other defects. Reamers shall be used on the ends of all conduits after screw threads have been cut and all grease enamel etc.removed.
- (b) All threads shall be clean and free from rust. Powered soap stone, tallow or prepared compounds shall be used as lubricants to facilitate the pulling in of conductors. Oil grease shall not be used.
- (c) Tallow or other approved lubricant shall be used where threads are cut.

13. TERMINATION AT SHEET METAL BOXES ETC.

- (a) Where conduit terminates at turning or sheet metal boxes of any description that are not provided with an integral cast spout, a flanged coupling with lead integral cast spout, a flanged coupling with lead washer and male brass hexagon bush shall be used.
- (b) Where a number of conduits are brought to a central point of permanent access. Press steel adaptable boxes shall be used. The boxes shall be of sample size to take all conduits without crowding the conduit terminating by means of a socket bearing on the outside of the box, and a hexagonal head smooth bore male brass bush screwed into the socket from the inside of the body, the bushing being made up sufficiently tight to draw the socket into firm electrical contact with the box.

15. Contact with other Services

All conduits shall be kept clear of other services, except where intentionally earthed or banded. Conduits shall be fixed to prevent contact with same at the following minimum spacings.

- (a) 150mm (6") away from hot water services.
- (b) 50 mm (2") away from all other services.

16. Protection of Open Conduit Ends

- (a) Particular care shall be taken during the progress of the works to prevent the ingress of dirt and rubbish such as plaster droppings into erected conduits. A run of conduit which has become so clogged shall be entirely free of these accumulations or will be replaced.
- (b) All unused conduit entries shall be blanked off in an approved manner and where conduits terminate in adaptable boxes, all removal box covers shall be firmly secured to provide complete enclosures.

17. Removal of Moisture etc.

It is considered necessary by the Engineer-in-charge the conduits shall be swabbed out by drawing by swabs of rag through the conduit to remove all moisture prior to any cable being drawn in.

18. Completion Prior to Wiring

- (a) All conduit installations must be completed and erected in their entirety before they are wired and must be fully rewirable from outlets to distribution boards or trunking system etc. to which they connect.
- (b) No wiring of any part of the installation shall commence until instructions are received to do so from the Engineer at such times as he is satisfied that the wiring will not be damaged due to building operations.

19. Method of Installation Concealed Conduits

- (a) For concealed work, the whole of the conduit shall be installed such as manner that rewiring can be carried out from the outlet boxes and switch boxes only.
- (b) Draw-in-boxes will only be permitted in special instances approved by and at the direction of the Engineer.
- (c) All general conduit installation requirements set out above shall apply to concealed work.

20. Fixing Conduit and Accessories

- (a) Where concealed conduits are to be covered in walls, floors etc. they shall be fixed by approved methods using pipe hooks spaced not more than 1.50m apart and shall be firm against structure along their length without spring.
- (b) Switch boxes and socket boxes etc. shall be securely fixed by firmly grounded in position prior to plastering or screeding.
- (c) Where conduits are concealed in wall chase, they shall be recessed in such a manner that they will be finally covered by the full thickness of plaster and/or rendering to a minimum depth of 12.5mm.

21. Inspection and Approval

No conduits shall be buried in concrete or plaster etc. until the work has been inspected by the Engineer-in-charge.

22. Protective Painting

All conduits, boxes and conduit fittings which are to be buried in concrete or behind plaster shall immediately after being fixed in position, be thoroughly coated with red oxide paint.

23. Extension Collars

Extension collars of suitable depth shall be used as necessary to leave all boxes absolutely flush with the finished wall or ceiling surface.

24. Conduit in Situ Concrete and Floor Screeds

Conduits run in floors shall be installed in one or more of the following ways, and as may be appropriate to the type of floor construction actually adopted.

- (a) In the middle third of the floor.
- (b) In the screeding of top of the construction floor.
- (c) Laid direct on the shuttering.

Where conduits are specified to run in floor screeds, the electrical contractor must carefully check the proposed secured depth at the position before installing conduits and shall wherever possible arrange to cross conduits where there is sample thickness of screed. If a isolated positions the crossing of conduits in shallow screeds can not be avoided arrangements may be made to set the lower conduit into a shallow chase performed in the slab subject to the approval of the Engineer-in-charge.

For flush work, conduit boxes for lighting fitting, switches and other accessories shall be installed to finish flush with the finished surface.

26. Surface Conduits

- (a) Wherever conduits have to be run on the surface of walls or ceilings, particular attention must be paid to neatness and all conduits shall be run in as conspicuous manner as possible.
- (b) Where conduits are installed in a straight runs, draw boxes shall be provided at centers not greater than 10 mtr.(30ft.)and on runs with not more than 2 right angled bends, boxes shall be provided at centers not greater than 10 mtr.(33ft.) No boxes shall be provided in voids, where access can not be readily contained.
- (c) Exposed conduits shall be installed throughout with runs parallel or perpendicular to walls or structural members with right angled turns consisting of boxes specified herein, or symmetrical bends, conditions exposed to the weather shall be so installed and equipped as to prevent water from entering the conduit. All exposed threads shall be given two coats of protective bitumastic or rust preventive paint.
- (d) Conduit which has become crushed or reformed in any way shall not be used.
- (e) The crossing of surface conduits shall not generally be permitted and to avoid such crossings adaptable boxes shall be used at junctions. Where the possibility exists, of a multiplicity of separate conduit runs, tracking may be used, subject to the approval of the Engineer.
- (f) All surface conduits shall be fixed by means of malleable iron distance saddles, unless otherwise directed by the Engineer so that the conduit stands not less than 6mm (204'')clear of the surface.
- (g) The spacing of saddles shall be at 0.750 mtr. centres for 20mm , and above diameter conduit sizes. In addition, saddles shall be fixed at each side of any bend, or set. The saddles shall be 200mm from the bend of set. The saddle shall secured by means of steel counter sunk screws and meta plastic type plugs, minimum size being 40mmx0.8. In the case of galvanized installations the screws shall be made of brass.
- (h) No fixing shall be made to building boards or to plaster but only to concrete/brick work, timber studding and breeze or tile partitions.
- (i) The holes in brick work or concrete for fixing plugs shall be neatly drilled by mean of masonry drill of the appropriate size.
- (j) Where conduits are run on steel work, they will be fixed by means of saddles or caddy clips in a manner meeting with the approval of the consultant prior to the installation being carried out. Other method of fixing may be agreed in special circumstances, but approval must first be obtained from the consultant.

27. Self Drawing

- (a) Conduit shall not be laid to falls and shall be installed so that they are self draining in the event of progress of moisture due to condensation or any other reason.

- (b) A suitable drainage hole shall be drilled in the bottom of the lowest conduit box in every meter of horizontal run.

28. Inspection Boxes etc.

- (a) Small circular boxes shall be used for inspection and point boxes on conduits, upto and including 25mm diameter where inspection boxes are necessary for conduits larger than 25mm diameter, the through pattern type shall be used, unless otherwise directed by the consultant.
- (b) Where several conduits are run together, adequately size adaptable boxes, common to all runs shall be used, meeting with the approval of the Engineer, to avoid inserting inspection boxes in the individual runs. Where it is necessary to segregate wiring, metal fillets shall be securely fixed within the box.

29. Fixing of Boxes

- (a) All boxes except, those for external works shall be securely fixed by means of counter sunk screws, minimum size 40mm No.8 using approved type raw plugs.
- (b) At least one screw shall be used for mining standard circular conduit boxes and two screws for large conduit boxes and adaptable boxes upto 150mmx100mm. Size.
- (c) In all cases the fixing holes shall be suitable for counter sunk screws, so that the screws heads do not project into the boxes and all screw driver burrs shall be removed before cables are drawn in.
- (d) For external work and other particularly damp situations, galvanized cast iron, water proof boxes either external fixing lugs shall be used.
- (e) In addition to the external fixing, the boxes shall be supported by saddles spaced not more than 150mm. On each side of the box. Fixing holes shall not be drilled in the box.

30. Holes in Adaptable Boxes

Wherever boxes are fitted for conduit entry, the holes shall be positioned correctly to permit all conduits to enter without sets or bends of any description.

31. Hot Spots

- (a) In the case of conduits run to “hot spots” e.g. immersion heaters, room, heater insert thermostat, etc. a conduit box shall be fitted adjacent to the termination point and other flexible or solid conduit, as specified shall continue to the termination point.
- (b) The box will be used as cable change box to facilitate change of wiring locally to the apparatus.

32. Recess to Surface

- (a) Where flush conduits are required to terminate at surface mounted equipment, the conduit shall terminate at a flush box and the back of the equipment shall be drilled and bushes entry. The equipment should fully cover the flush box and 2B.A.brass screws shall be used between the equipment and the box in addition to any other means of fixing or earthing arrangement.
- (b) The alternative arrangement to the above, shall be by means of fixing a terminal extension box to the flush conduit box in which case a break joint ring shall be fitted between boxes.

33. Flexible Metallic Conduit System

- (a) Except where otherwise specified, final connections to all motors, machines and other movable apparatus shall be made by means of flexible pipe conduit.
- (b) All flexible conduit shall be water proof and sheathed internally/externally with PVC of approved manufacture and all fittings shall be of the appropriate type and as recommended by the manufacturers.
- (c) Flexible pipe conduits shall be installed in such a manner to the conduit will suspend naturally and that no stress will take place due to bends and sets being created against the lay of conduit. Connections will be at both ends, by means of adaptors sweated on to the flexible pipe conduits.

34. Earthing

- (a) Separate 14SWG minimum copper bare earth wire is to be drawn in each conduit for earthing the general light and power outlet upto 230 volts and 2 for 415 volts. Earth conductor size shall be in accordance with I.E. Rules, Table D-2.

PVC rigid conduit pipe

Heavy duty PVC rigid pipe shall be properly and tightly connected jointed between the various length and to the boxes. All PVC accessories shall be used except outlet boxes.

- (b) The earth conductor shall be terminated by means of drilling two holes in the conduit box, the earth wire shall pass through one hole to the outside of the x 2B.A. round headed brass screws which shall be bolted into the second hole. Two washers and two nuts shall be used with each screws.
- (c) A similar arrangement to the above shall be used at the termination to the equipment or by any other approved manner, meeting with the approval of the Engineer.

CONDUIT BOXES

Where the change from solid conduit to flexible conduit a standard conduit box shall be limited between the two of conduit. The conduct coupling shall be screwed into the spouted entry of the conduit box and the use of covers will not to permitted.

FLOOR TRUNKING AND WIRE WAY DUCT

The floor trunking shall be rust proof made out of 2mm thick mild steel sheet and of required size having partition in center or without portion with a common cover shall be provided for drawing power outlet and telephone wire knock out holes at every 600mm. Intervals on the over of trunking. These shall be provided for easy water tight tape off. Junction and floor service boxes shall be provided at convenient placed for main cable entry. Fly over for floor trunking shall be provided for cross connections batted joints shall be provided for jointing length conduit wiring outlet shall be provided as required. Conduit wiring outlet shall be proved as required conduit wiring outlet shall consist of an oval steel bush M.S. washer steel collar stopping plug wooden cap and metal screws, power outlet, telephone outlet, box shall be fixed on the surface of the floor. Floor outlet box and floor trunking shall be coupled through 25mm dia conduit nipple. A trapesidal power telephone out let box shall be provided on the floor. The wire mesh duct shall have stove enameled paint of approved shade.

SWITCHES SOCKET AND REGULATORS

- (a) S.P. tumbler/pipe switches switch socket will be flush type, mounted on metal switch plates bridge inside the box, groups of switches shall be mounted in the same box.

- (b) Fan regulators, where required, shall be flush type located in the same box as light, switch wherever possible. The regulators shall be tested before installation to ensure proper gradation of fan speed.
- (c) All socket outlet in the kitchen or in any other areas specified shall be metal clad with earth terminal and metal caps in a sheet metal box unless otherwise specified.

WIRE WAY DUCTS

1. Wire way duct shall be made out of 14SWG 2mm M.S sheet in suitable length a 'C' shape rectangular through with their open mouth stiffened with 12mm wide a 14SWG pipes of suitable length back welded below the lips of the ducts.
2. For the purpose of supports to different cables in the ducting, 3 row of 'Z' shape or as specified in bill of quantity 16SWG thick sheets are welded in the duct to make compartments. The suitable opening for making out the cables to the out goings conduits or ducts shall be made as required. These ducts shall have channel shape capping may out at 16SWG sheet with 8mm right angle shape lip at each side.
3. Suitable rubber gaskets shall be provided between the ducting and its capping to make it dust and varmint proof.
4. The duct capping shall be kept light on to the ducting with the help of screws, top and bottom sides of the ducts suitable and approved intervals.
5. The ducting shall be made electrically continuous by providing and fixing bends, tee connections for different length of ducts as required at site.
6. The M.S.ducting shall have stove enameled paint of approve shade.
7. Suitable arrangement for run in two numbers of earth wires and fixing it a suitable intervals shall also be made as required.
8. For purpose of couplings to adjacent ducts, 50mm wide, 4mm thick and coupling rings are to be fabricated and provided at site. It shall be fixed as slip in and fit into each pipe by approximate depth of 25mm. Suitable arrangement for tightening coupling ring with the duct with the help of 3/16 cheese head screws and washers etc. shall be made as per details shown in the drawing.

DISTRIBUTION BOARDS

These shall be surface/recess type distribution boards complete with required number of miniature circuit breakers (MCB) or fuse fittings as the case may be.

These distribution boards with enclosure, bus bars, neutral link and earth link shall be of the original manufacturers only as indicated in the approved lists. The sheet metal work shall have stove enameled paint of approved shade.

The MB's shall be fully connected with the wire way ducting or conduits to make it electrically and mechanically continuous with the help of check nuts, bushes or flange plates as desired by Engineer-in-charge.

All DB's shall be required to be connected with incoming sub main cable and cut going circuit wiring with Dowel's approved equivalent crimping lugs for wires of 4mm² or bigger sizes cables lugs shall be crimped with proper tools at site.

DB's shall be fixed on the walls or flushed with wall in approved manner and damage to wall made good as per original.

Damage to the original paint to the DB's, if any shall be made good as desired by Engineer-in-charge.

DB's shall be dust and vermin proof and shall be fabricated out of 2mm. Thick CRCA sheet steel and shall be stove enameled. These shall have hinged over and MCB's/fuse fittings shall not be operatable without opening these covers. Phase barrier and surrounded sheet also also be provided in DB blank spaces (Spares) shall be covered with blanking plates.

- (a) The MCB shall have quick break trip free mechanism with thermal overload and magnetic short circuit tripling devices. The mechanism shall be such that the circuit can not be held closed against a fault. The thermal device shall prevent reclosing of a circuit when a fault of over load persist.

The contact shall be silver tungsten or other suitable material to give long contract life Multiple units shall have common inter tripping mechanism.

All the fuse fittings should be of high grade phenolic moulding and must be non hydrosopic and nonflammable and shall comply to IS: 2208.

There should be rack for storing spare fuses inside the DB label for indicating the designation of each circuit shall be provided inside the DB.

Iron clad plug sockets, 1 phase add 3 phases (as specified in some of the items in this section) shall be completed with enclosure of original manufacturer, including supply and connection MCB, plug top and earthing etc. as required. Wiring connection shall be made with the help of suitable crimping down wells lugs for 4mm 2 or higher class sizes of cables/wire.

LIST OF BIS CODES TO BE FOLLOWED

1. CARRIAGE OF MATERIALS :

4082-1967 Recommendations of on stacking & storage of construction material at sites.

2. EARTH WORK:

Method of measurement of earth work.

Safety code for Blasting and related drilling operations.

Antitermite measures in building

(Pt. I to III)

3. MORTAR:

Atmospheric condntions for testing.

Ordinary, rapid hardening and lo wheat protland cement (33 grade)

Coarse and fine aggregate dfrom natural source for concrete.

205-1992 Portland slag cement.

Specification for test sleeves.

Standard sand for testing of cement.

205-1992 Building limes.

205-1992 Potland pozzolana cement.

205-1992 Sand for plaster.

205-1992 Methods of tests for pozzola-nic materials.

Sand for masonary mortar.

205-1992 Preparation and use of masonry mortar.

205-1992 Methods of test for aggregates for concrete.

2386 (Pt.I) particle size and shape.
2386 (Pt.II) Estimation of deleterious materials and organic impurities.
2386 (Pt.III) Specific gravity, density, voids, water absorption and bulking.
205-1992 Broken brick (burnt clay) fine aggregate for use in the lime mortar.
205-1992 Fly Ash.
3812 (Pt.I) Fly Ash for use as pozzolana.
3812 (Pt.II) Fly Ash for use as admixture for concrete.
3812 (Pt.III) Fly Ash for use as fine aggregate for mortar and concrete.
205-1992 Methods of physical tests for hydraulic cement.
205-1992 Lime pozzolana mixture.
205-1992 Methods of test for building lime.
(Pt. 1 to 10) Methods of Test for building lime.
205-1992 Method and sampling for test of water.
205-1992 Rapid hardening _aneled_ cement.
205-1992 Hydrophobic cement.
205-1992 43 grade ordinary _aneled_ cement.
129

4. CONCRETE WORK :

205-1992 Coarse and fine aggregate from natural sources for concrete.
205-1992 Code of practice for plain and reinforced concrete.
205-1992 Method of test for strength of concrete.
205-1992 Method of sampling and analysis of concrete.
205-1992 Bitumen felt for water proofing and damp proofing.
1200 (Pt.II) Method of measurement of cement concrete work.
205-1992 Method of test for aggregate of concrete.
2386 (Pt.I) Test for particle size & shape.
2386 (Pt.II) Test for estimation of deleterious materials and organic impurities.
2386 (Pt.III) Test for specific gravity, density, voids water absorption & bulking.
2386 (Pt.IV) Mechanical properties.
205-1992 Specification for integral water proofing compounds.
205-1992 Specification for cinder aggregate for use in lime concrete.
205-1992 Fly Ash.
3812 (Pt.I) Fly ash for use pozzolane.
3812 (Pt.II) Fly ash for use as admixture for concrete.
3812 (Pt.III) Fly ash for use as fine aggregate for mortar and concrete.
205-1992 Admixtures for concrete.

5. RCC WORK:

432-1982 (Pt.I) Mild steel and medium tensile bars and hard drawn steel wire for concrete reinforcement.
432 (Pt.II) Mild steel and medium tensile bars.
205-1992 Code of practice for plain and reinforced concrete.
205-1992 Methods of test for strength of concrete.
205-1992 Structural steel.
1199 –1959 Methods of sampling and analysis of concrete.
205-1992 Hard drawn steel wire fabricator concrete reinforcements.
205-1992 Cold twisted steel bars for concrete reinforcement.
205-1992 Method for bend test.
205-1992 Method for tensile testing of steel product.
1200 (Pt.III) Method of measurement of cement of form work.
205-1992 Code of practice for bending & fixing bars for concrete reinforcement
205-1992 Batch type concrete mixes.
205-1992 Code of practice for prestressed concrete.
205- _ Code of practice for design & construction of foundations.
2911 (pt.1/Sec.1) Driven cast in situ concrete piles.

2911(Pt.1/Sec.2) Underreamed pile foundations.

2911(Pt./Sec.3) Drawn pre-cast piles.

2911(Pt.III) Bored cast in situ piles.

130

6. BRICK WORK :

205-1992 Specification of bldg. Lime.

205-1992 Common burnt clay bldg. Bricks.

1200(Pt.III) Method of measurements of brick work.

205-1992 Code of practice for brick work.

205-1992 Classification of burnt clay solid bricks.

12894-1990 Fly ash lime bricks.

3495-1973(Pt.I to IV) Method of test for clay building work.

205-1992 Method for sampling of clay building work.

205-1992 Method for sampling of clay building bricks.

7. STONE WORK

1121-1974(Pt.I) Methods for determination of compressive, transverse and shear Strength of natural building stones.

205-1992 Methods for determination of specific gravity and porosity

205-1993 natural building stones.

205-1992 Methods for petrographical examination of natural building stones.

205-1992 Methods of test for water absorption natural building stones.

205-1992 Specification for lime stones.

205-1992 Dressing of natural building stones.

1200(Pt.VI) Method of measurement of stone masonry.

1597-1967(Pt.I) Code of practice for construction of Rubble stone masonry.

1597-1967(Pt.II) Code of practice for construction of ashlar masonry.

205-1992 Glossary of Terms relating to quarrying and dressing.

205-1992 Construction of hollow concrete block masonry.

4101(Pt.I) Code of practice for external facings and veneers.

4101(Pt.II) Code of practice for external facings and veneers (cement conc. Facings)

12440-1988 Specifications for pre-cast concrete stone masonry block.

8. WOOD WORK

204-1991(pt.I) Specification for tower bolt.

204-1992(Pt.II) Specification for non ferrous metals.

205-1992 Specification for door handles.

205-1992 Recommendations for max. permissible moisture of timbers used for different purposes.

1003(Pt.I) Timber _aneled and glazed shutter (door shutters)

.

1003(Pt.II) -do- (window & ventilator)

1200 (Pt.XIV) Method of measurement of bldg. & Civil Engg. Work glazing.

1200(Pt.XII) -do- (Wood & Joinery work)

205-1992 Specification of steel butt hinges.

205-1992 Non-ferrous metal butt hinges.

9. ALUMINUM WORKS

IS – 733 Specification for wrought aluminum and aluminum alloys, bars, rods and sections.

IS – 1285 Specification for wrought aluminum and aluminum alloys, extruded round tube and hollow sections.

IS – 1948 Size of aluminum doors, windows and ventilators.

- IS – 617 Specification for aluminum and aluminum alloy ingots and casting.
- IS – 6177 Specification for aluminum and aluminum alloy ingots and casting.
- IS – 737 Specification for wrought aluminum and aluminum alloys sheets and strip.
And other relevant IS Code like IS – 1868, IS – 12823, IS – 6315 etc.

PROCEDURE AND SYSTEM OF E-TENDERING :

- i. In addition to the existing rules and practices regarding giving publicity of tenders through newspapers, the complete bid documents along with notice inviting tender shall be published on the website of the company. It shall be ensured by the concerned department that the parties making use of this facility of website are not asked to again obtain some other related documents from the department manually for purpose of participating in the tender process i.e. all documents up to date should remain available and shall be equally legally valid for participation in the tender process as manual documents obtained from the department through manual process.
- ii. The complete bid documents should be available on the website for the purpose of downloading and tender submitted on such downloaded bid documents shall be considered valid for participating in the tender process.
- iii. The company must give its website address in the advertisement/NIT published in the newspapers.
- iv. The company shall not be responsible for any delay/difficulties/ inaccessibility of the downloading facility for any reason whatsoever. The downloading facility shall be available during the period of sale of tender paper.
- v. The bidders who will download the tender documents from the website of the company, will be required to pay the cost of tender documents (application fee) by bank draft as per NIT at the time of submission of tenders.in a separate envelope marked PART- III
- vi. The bidders will be required to submit an undertaking that they will accept the tender documents as available in the website and their tender shall be rejected, if any tampering in the tender document is found to be done at the time of opening of tender.
- vii. The bank draft towards the cost of tender documents (application fee) and the undertaking of the tenderer as at sl. No.vi) shall be submitted in a separate envelop marked “cost of tender documents and the undertaking” and not with part-I/EMD
- viii. In case of any discrepancy between the tender documents downloaded from the web site and the master copy available in the office, the latter shall prevail and will be binding on the tenderers. No claim on this account will be entertained.

ANNEXURES

**SPECIMEN OF LETTER OF CONTRACTOR'S ACCEPTANCE OF PROVISIONAL REDUCTION
OF RATE FOR SUBSTANDARD WORK.**

No.

dt.

To

.....
.....

Sir,

Subject: (Complete name of work).....

Reference: Your letter No.....

I/We have carefully read the terms and conditions offered in your letter dated..... and they are acceptable to me/us.

Pending the decision of the Engineer in Charge of the final rates of payment against the items of work specified in the statement attached to your above letter, which will be final and binding.

I/We agree to the same being paid at the provisional rates indicated against each of the said item of work for the above work as mentioned in your statement.

Yours faithfully,

Contractor(s)

ANNEXURE II

PROFORMA OF BANK GUARANTEE FOR REMOVAL OF PLANT & EQUIPMENT FROM THE SITE OF COAL INDIA LIMITED/SUBSIDIARY COMPANY.

In consideration of Central Coalfields Limited (hereafter called “the Company” which expression shall repugnant to the subject or context includes its successors and assigns) having agreed to under the terms & conditions of the Contract No..... dated..... entered into between the company and M/s..... having its Office at..... (hereinafter called “the Contractor”) to permit the Contractor to remove the plant & equipment as fully described in the Schedule of the Hypothecation Deed dated..... executed by the Contractor in favour of the Company from the site to any other works of the Contractor on its furnishing the Bank Guarantee for Rs..... we, the Bank (hereinafter referred to as the said Bank) having its Registered Office at do hereby undertake and agree to pay the Company to the extent of Rs. on demand stating that the amount claimed by the Company is due and payable by the contractor for its failure in bringing back the said plant & equipment or any part thereof to the site and to unconditionally pay the amount claimed by the company on such demand without any demur to the extent aforesaid.

We, the Bank agree that the Company shall be the sole judge as to whether the said contractor has failed/neglected in bringing back the plant & equipment to the site and the amount has become due for such failure and the decision of the company in this behalf shall be final and binding on us.

We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect upto..... and any claim received after the said date shall in no case be bind the Bank.

Notwithstanding anything contained herein the liabilities of the said Bank under this Guarantee are restricted to Rs..... and this Guarantee shall come into force from the date thereof and shall remain in full force and effect till unless the written demand or claim under this guarantee is made by the company with us on or before..... all the rights of the Company under this guarantee shall cease to have any effect and we shall be retrieved and discharged our liabilities hereunder.

We, the said Bank lastly undertake not to revoke this guarantee under its currency except with the previous consent of the Company in writing and agree that any change in the constitution of the said Contractor or the said Bank shall not discharge off the liabilities hereunder.

This Guarantee is issued by Sri..... who is authorized by the Bank.

Under jurisdiction of Court only.

ANNEXURE III

PROFORMA OF BANK GUARANTEE IN LIEU OF SECURITY DEPOSIT.

M/s. Central Coalfields Limited,
RAJRAPPA AREA

Dear Sir,

1. In consideration of M/s. Central Coalfields Limited having its Registered Office at Darbhanga House, Ranchi. (hereinafter called “the Company” which expression shall unless repugnant to the subject or context includes its successors and assigns) having agreed under the terms and conditions contained in letter No..... dated..... issued in favour of M/s. for (hereinafter referred to as “the contract” to accept the Deed of guarantee as herein provided for Rs..... from the Schedule/ Nationalised Bank in lieu of security deposit to be made by M/s..... (hereinafter called “the Contractor”) or in lieu of deduction to be made from the contractor’s bill, for the due fulfillment of the terms and conditions contained in the said contract by the contractor, we the Bank (hereinafter referred to as the said Bank) having its Registered Office at..... do hereby undertake and agreed to pay the company to the extent of Rs..... on demand stating that the amount claimed by the company is due and payable by the contractor for the reasons of failure/negligence in performing the terms and conditions contained in the contract by the buyer and to unconditionally pay the amount claimed by the company on demand without any demur to the extent aforesaid.
2. We..... Bank agree that the company shall be the sole judge as to whether the said contractor has failed/neglected in performing any of the terms and conditions of the said contract and the decision of the company in this behalf shall be final and binding on us.
3. We the said Bank further agree that the Guarantee herein contained shall remain in full force and effect upto and any claim received after the said date shall in no case bind the Bank.
4. The Company shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee or indemnity from time to time vary any of the terms and conditions of the said contract or to extend the time of performance by the said contractor or to postpone any time and from time to time any of the powers exercisable by it against the said contractor and either to enforce or to forbear from enforcing any of the terms and conditions governing the said contract or securities available to the company and the said Bank shall not be released from its liability under these presents.
5. Notwithstanding anything contained herein the liability of the said Bank under this guarantee is restricted to Rs..... and this Guarantee shall come into force from the date hereof and shall remain in full force and effect till Unless the written demand or claim under this guarantee is made by the Company with us on or before all rights of the company under this guarantee shall cease to have any effect and we shall be relieved and discharged from our liabilities hereunder.

We the said Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing and agree that any change in the constitution of the said contractor or the said bank shall not discharge our liability hereunder.

This guarantee issued by Sri who is authorised by the Bank.

Under jurisdiction of court Of law

ANNEXURE IV

**PROFORMA OF BANK GURANTEE FOR PERFORMANCE SECURITY
OF THE CONTRACT**

To

.....

.....

Re: Bank Guarantee in respect of Contract No.....

Dated..... Between (name of the)

and (name of the Contractor)

M/s. (Name and address of the Contractor) (hereinafter called “the Contractor” with M/S. (name of the Company) (hereinafter called “the Company”) to execute (name of the contract and brief description of work) on the terms and conditions contained in the said contract.

It has been agreed that the Contractor shall furnish the Bank Guarantee from a Nationalised bank for a sum of Rs..... as security for due compliance and performance of the terms and conditions of the said contract.

The (name of the Bank) having its Office at..... has at the request of the Contractor agreed to give the Guarantor hereinafter contained.

We, the Bank (hereinafter called “the Bank” do hereby unconditionally agreed with the Company that if the contractor shall in any way fail to observe or perform the terms and conditions of the said contract or shall commit any breach of its obligation thereunder, the Bank shall on demand and without any objection or demur to pay to the company the said sum of Rs..... or such portion as shall then remain due with interest without requiring the Company to have recourse to any legal remedy that may be available to it to compel the Bank to pay the sum, or failing on the company to compel such payment by the contractor.

Any such demand shall be conclusive as regards the liability of the Contractor to the company and as regards the amount payable by the Bank under this Guarantee. The Bank shall not be entitled to withhold payment on the ground that the Contractor has disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between the company and the Contractor regarding the claim.

We, the Bank further agree that the Guarantee shall come into force from the date hereof and shall remain in force and effect till the period that will be taken for the performance of the said Contract which is likely to be day of but if the period of Contract is extended either pursuant to the provisions in the said contract or by mutual agreement between the contractor and the company the Bank shall renew the period of the Bank Guarantee failing which it shall pay to the company the said sum of Rs..... or such lesser amount of the said sum of Rs..... as may be due to the company and as the company may demand.

This Guarantee shall remain in force until the dues of the company in respect of the said sum of Rs..... and interest are fully satisfied and the Company certifies that the Contract has been fully carried out by the Contractor and discharged the guarantee.

The Bank further agrees with the company that the company shall have the fullest liberty without consent of the Bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said contract or to extend time for performance of the said contract from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the contractor and to forbear to enforce any of the terms and conditions relating to the said Contract and the Bank shall not be relieved from its liability

By reason of such failure or extension being granted to the Contractor or to any forbearance, act or omissions on the part of the company or any indulgence by the Company to the Contractor or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect or relieving or discharging the Guarantor.

The Bank further agrees that in case this Guarantee is required for a longer period and it is not extended by the Bank beyond the period specified above the Bank shall pay to the company the said sum of Rs..... or such lesser sum as may then be deemed to the Company and as the Company may require.

Notwithstanding anything contained herein the liability of the Bank under this Guarantee is restricted to Rs..... the guarantee shall remain in force till the day of and unless the guarantee is renewed or claim is preferred against the bank within six months from the said date all rights of the Company under this guarantee shall cease and the Bank shall be relieved and discharged from all liabilities hereunder except as provided in the preceding Clause.

This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

The Bank has under its constitution power to give this Guarantee and Sri..... who has signed it on behalf of the Bank has authority to do so.

Dated., this day of

Signature of the authorized person

For and on behalf of the Bank

Place

Under jurisdiction of court only.

(This is applicable for Turn Key Contracts Only)

ANNEXURE- V

PROFORMA OF BANK GUARANTEE FOR MOBILISATION/ LUMP -SUM ADVANCE.

M/s. Central Coalfields Limited,
RAJRAPPA AREA

Dear Sir,

In consideration of M/S. M/s. Central Coalfields Limited, having its Registered Office at Darbhanga House, Ranchi (hereinafter called “the Company” which expression shall unless repugnant to the subject or context includes its successors and assigns) having agreed under the terms and conditions of the contract no..... dated..... entered into between Coal India Limited/Subsidiary Company and M/s..... having its Registered Office at (hereinafter called “the Contractor” to make mobilization advance lump-sum advance to the tune of Rs..... subject to submission of the Bank Guarantee for equal amount from any Nationalised Bank(referred to as the said Bank)having its registered Office at do hereby undertake and agree to pay the company to the extent of Rs..... on demand stating that the amount claimed by the Company is due and payable by the contractor for the reasons of non refund and / or non-recovery of the amount with interest thereon and to unconditionally pay the amount claimed by the company on such demand without any demur to the extent aforesaid.

We..... Bank agree that the company shall be the sole judge as to whether the said contractor has failed/neglected in performing any of the terms and conditions of the said contract and the decision of the company in this behalf shall be final and binding on us.

We the said Bank further agree that the Guarantee herein contained shall remain in full force and effect upto and any claim received after the said date shall in no case bind the Bank.

The Company shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee or indemnity from time to time vary any of the terms and conditions of the said contract or to extend the time of performance by the said contractor or to postpone any time and from time to time any of the powers exercisable by it against the said contractor and either to enforce or to forbear from enforcing any of the terms and conditions governing the said contract or securities available to the company and the said Bank shall not be released from its liability under these presents.

Notwithstanding anything contained herein the liability of the said Bank under this guarantee is restricted to Rs..... and this Guarantee shall come into force from the date hereof and shall remain in full force and effect till Unless the written demand or claim under this guarantee is made by the Company

with us on or before all rights of the company under this guarantee shall cease to have any effect and we shall be relieved and discharged from our liabilities hereunder.

We the said Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the company in writing and agree that any change in the constitution of the said contractor or the said bank shall not discharge our liability hereunder.

This guarantee issued by Sri who is authorised by the Bank.

Under jurisdiction of Court only

ANNEXURE. VI

PROFORMA FOR AFFIDAVIT TO BE SUBMITTED BY THE TENDERER

Non Judicial Stamp Paper.

AFFIDAVIT

I, -----, Proprietor/ Partner/Legal Attorney/ Accredited Representative of M/S -----, solemnly declare that :

1. We are submitting Tender for the Work -----
----- against Tender
Notice No.----- dtd -----
2. None of the Partners of our firm is relative of employee of Central coalfields limited.
3. None of the Partners of our firm has either individually or collectively has been involved in any criminal offences.
4. All information furnished by us in respect of fulfillment of eligibility criteria and qualification information of this Tender is complete, correct and true.
5. All documents/ credentials submitted along with this Tender are genuine, authentic, true and valid.
6. We shall abide by the prevailing contractual norms of the company.
7. If any information and document submitted is found to be false/ incorrect any time, department may cancel my Tender and action as deemed fit may be taken against us, including termination of the contract, forfeiture of all dues including Earnest Money and banning / delisting of our firm and all partners of the firm etc.

Seal of Notary

ANNEXURE-VII.**PROFORMA FOR EXECUTION OF AGREEMENT.****STAMP PAPER.**

This agreement is made on day of between (Name of Company) having its registered office at (hereinafter called the 'COMPANY' which expression shall, unless repugnant to the subject or context, include its successors and assignees) of the one part and (Name of the Contractor) carrying on business as a (partnership/proprietorship/ Ltd. Co. etc.) firm under the name and style (hereinafter called the 'said Contractor' which expression shall, unless the context requires otherwise include them and their respective heirs, executors, administrators and legal representatives) of the other part.

Whereas the Company invited tenders for the work of “.....” and whereas the said Contractor/Firm submitted tender for the said work and deposited a sum of Rs..... as Earnest Money and whereas the tender of the said contract has been accepted by the Company for execution of the said work.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

- 1) In this agreement words and expressions shall have the same meaning as are respectively assigned to them in the tender papers hereinafter referred to.
- 2) The following documents which are annexures to this agreement should be deemed to form and be read and construed as part of this agreement viz.
 - i) Annexure-A Tender Notice (Page .. to ..)
 - ii) Schedule –A General terms & conditions. Special conditions and General technical specification (Page to ...)
 - iii) Schedule-B The probable Quantities and Amount (Page ... to ...)
 - iv) Schedule-C Negotiation letters –
 - v) Schedule-D Letter of Acceptance/Work Order (Page .. to ..)

3) In consideration for the payment of the sum of Rs.....(W/O Value; both in words and figures) or such other sum as may be arrived at under the clause of the specification relating to Payment by items measurements at unit prices by the Company, the said Contractor shall, subject to the terms & condition contained herein execute and complete the work as described and to the extent of probable quantities as indicated in Schedule B with such variations by way of alteration, addition to or reduction from the said works

4. The company has converted a sum of Rs. only, from the amount of Rs. deposited by the said contractor as Earnest Money, into ‘Initial Security Deposit’ of 1% of the awarded work value. The excess/balance amount of earnest money shall be adjusted in the RA Bill(s).

5. The said contractor hereby convenants with the company that the Company shall retain a sum of Rs. or such sum as may be arrived at based on the executed value of the work, as security deposit for the fulfilment of the contract to the satisfaction of the Company.

IN WITNESS WHEREOF THE parties herein have set their hands and seals the date and year above written.

1 Partner. Signature

2 Partner Signature

On behalf of M/S.....

The Contractor, as one of the constituted attorney,

In the presence of –

1. Name _____ Signature
Address :

Occupation :

Signed by Srion behalf of Signature

(Name of Company) in presence of -

1. Name : Signature
2. Address: .

=====
Non Judicial Stamp Paper Of Rs.5/-

AFFIDAVIT

1. I Partner/Legal Attorney /
Proprietor / Accredited Representative of M/s
..... solemnly declare that :

2. I/We are submitting tender for the work
.....
..... against Tender Notice No.
..... Date

3. I/We shall abide by CMPF/any other appropriate PF authority's clause of Tender Documents and ensure implementation of the same and Misc. Provisions therein and allied scheme framed there under in respect of the workers deployed by me / us.

Seal of Notary

Signature of the Tenderer

Date

DECLARATION

We have read the tender document and the enclosed NIT and understood all provisions and specifications in totality. All terms and conditions are acceptable to us. We do not have any terms and conditions of our own.

Seal :

Signature of the Tenderer

Date :

PART – II OF TENDER TENDER DOCUMENT ISSUE DETAILS

Name of work -

Tender Notice no. & date –

Date and time of submission of tender –

Date and time of opening of Part – I –

Date and time of opening of Part – II – To be intimated later to eligible bidder.

Cost of Tender Document – Rs. + 12.5% (VAT)

ISSUE TO / SUBMITTED BY :

NAME OF TENDERER :

POSTAL ADDRESS

e-mail address

Telephone No.

Mobile No.

For General Manager
BCW,1 AREA

OFFER OF LOWEST ACCEPTABLE RATES

B.O.Q for the work of " Development and maintenance of new parico side with some petty job under Kathara GM Unit(Ws) at Kathara.

Estimate no. GM(KTA)/SO(C)(Ws)/Estt./11-12/ dated
Part A'

Sl.No.	Description	Quantity		Rate		Amount
1	Providing and fixing M.S. grills of required pattern in frames of windows with MS flats, square or round bars etc. all compl. Fixed to openings/wooden frames with rawl plugs screws etc.	612.75	kg	64.40	kg	39461.10
2	Providing and fixing in position collapsible steel shutters with vertical channels 20x10x2mm and braced with flat iron diagonals 20x5mm size with top and bottom rail of T-iron 40x40x6mm with 40mm dia, steel pulleys complete with bolts, nuts, locking arrangement, stoppers, handles, incl. Applying a priming coat of approved steel primer.	7.15	sqm	2592.70	sqm	18537.81
3	Kota stone slabs 25mm thick in riders of steps, skirting, dado and pillars laid on 12mm (average) thick based laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar	20.16	sqm	694.40	sqm	13999.10
4	Kota stone slabs 25mm thick in riders of steps, skirting, dado and pillars laid on 12mm (average) thick cement mortar 1:3 and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete.	13.66	sqm	676.75	sqm	9244.41
5	Painting with synthetic enamel paint of approved brand and manufacture to give an even shade. Two or more coats on new work.	31.66	sqm	35.35	sqm	1119.18
6	Providing and laying in position cement conc. of specified grade excl. The cost of centering and shutter. All work upto plinth level 1:2:4 (1 cement 2 coarse sand :4 graded stone agg. 20mm nominal size)	0.17	cum	3257.45	cum	553.77
7	Demolishing RCC work manually / by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of EIC.	0.17	cum	537.55	cum	91.38
8	Half brick masonry with bricks of class design. 75 in foundations and plinth in cement mortar 1:4 (1 cement:4 coarse sand).	0.44	sqm	270.35	sqm	118.95
9	12mm cement plaster mix 1:6 (1 cement:6 fine sand).	8.64	sqm	67.65	sqm	584.50
10	Finishing wall with water proofing cement paint of required shade: New work (two or more coats applied at the rate 3.84 kg/10 sqm.)	10.00	sqm	30.80	sqm	308.00
				Total	Rs.	84018.20

Part B'

SI.No.	Description	Quantity		Rate		Amount
1	Earth work in excv. By mechanical means(Hydraulic excavator)/manual means over areas(exceeding 30cm in depth 1.5m in width as well as 10sqm on plan) incl. Disposal of excv. Earth, lead upto 50m and lift upto 1.5m disposed earth to be levelled and nearly dressed. All kinds of soil.	163.10	cum	101.85	cum	16611.74
2	Supplying and filling in plinth with Jamuna sand under floors incl. Watering, ramming consolidating and dressing complete.	1.58	cum	301.50	cum	476.37
3	Filling available excv.earth (excl. rock) in trenches,plinth, sides of foundations etc. in layer not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, lead upto 50m and lift upto 1.5m	158.16	cum	45.70	cum	7227.91
4	Providing and laying in position cement concrete of specified grade excluding thecost of centering and shuttering- All work upto plinth level:1:4:8 (1cement:4 coarse sand:8 graded stone agg.40mm nominal size).	1.84	cum	2449.00	cum	4506.16
5	Brick work with modular bricks of class designation 75 in foundationa ndplinth in cement mortar 1:6(1 cement: 6 coarses and)	30.38	cum	2049.20	cum	62254.70
6	12mm cement plasteer finished with a floating coat of neat cement of mix 1:4 (1cement:4 fine sand).	98.85	sqm	97.90	sqm	9677.42
7	Providing ,hoisting and fixing upto floor five level precast reinforced cement conc. Work in string courses copings bands bed plates, anchor blocks plain window sills and the like incl. The cost of required centering, shutt. Finishing smooth with 6mm thick cement plaster 1:3 (1cement:3fine sand) on exposed surface compl. Upto but excl. Thecost of reinforcement with 1:2:4(1cement:2 coarsesand:4 graded stone agg. 20mm nominal size.	8.40	cum	4880.15	cum	40993.26
8	Reinforcement for RCC work incl. Straightening,cutting, bending, placing in position and binding all complete upto plinth level . Mild steel and medium tensile steel bars.	840.00	kg	41.50	kg	34860.00
9	Surface dressing of the ground incl. Removing vegetation and in-equality not exceeding 15cm deep and disposal of rubbish, lead upto 50m and lift upto 1.5m all kinds of soil.	455.00	sqm	512.10/100 sqm	sqm	2330.06
10	Brick on edge flooring of class designation 75 including cement slurry etc. complete in cement mortar with F.P.S. bricks 1:4 (1cement :4 coarse sand)	249.00	sqm	326.00	sqm	81174.00
11	Providing and laying in position cement conc.of specified grade excl . The cost of centering and shutt. All work upto plinth level 1:2:4 (1cement 2 coarse sand :4 graded stone agg.20mm nominal size	49.25	cum	3257.45	cum	160429.41
12	12mm cement plasteer mix 1:6 (1cement:6 fine sand.	68.00	sqm	67.65	sqm	4600.20
13	Wall painting with plastic emulsion paint of approved brand and manufacture to give an even shade Two or more coats on new work.	86.20	sqm	40.05	sqm	3452.31
				Total	Rs.	428593.53

Part A + Part B +84,018.20 + 4,28,593.53=5,12,611.73

% agreed rate be quoted

I am agree to execute the work at

% above/below the estimate cost

Dy.GM(C)(Ws)
KTA.Kathara

B.O.Q for the work of Stengthening of PCH Transfer B/C gantry under Sawang Washery

Sl. No.	Description of work	qty.		Rate		Amount
1	Labour and fitting charge feroj departmental structure steel work framed work including cutting hoisting fixing in position and applying apriming coat of approved brand steel primer all complete.	2010.67	kg	11.78	kg	23685.69
2	Structural steel wrok welded in buildt up section trusses, and framed work including cutting hoisting fixing in position and applying a priming coat of approved band steel primer all complete.	8309.92	kg	46.35	kg	385164.79
3	Painting of new stuctural steel workin 3 coats including one coat of priming of red lead or equivelent priming paint of approved brand and two coat of enamel paint of approved brand of any shade as required/directd including cleaniong the surface of all diart and etc. complete.	10.32	mt	404.82	kg	4177.74
4	Dismantling of stuctural steel work includijg athe cost of gases labour charge and stacking the dismantled steel at working site as per inst. Of the vide.	10320.59	kg	0.85	kg	8772.50
						421800.73

% agreed rate be quoted
I am agree to execute the work at

% above/below the estimate cost

Dy.GM ©(Ws)
KTA,Kathara