T. N. NO. 03/2026-27 **Sr. No. 06**

Govt. of Maharashtra

WORKS DIVISION
Dr. P.D.K.V., AKOLA

B-1 FORM (Percentage Rate)

TENDER DOCUMENTS

NAME OF WORK

COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)

NAME OF CONTRACTOR

AGREEMENT NO. B1/ /UE/2025-26

UNIVERSITY ENGINEER
WORKS DIVISION
DR. P.D.K.V., AKOLA

1) Name of Work :- COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)

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GOVERNMENT OF MAHARASHTRA

WORKS DIVISION

Original Agreement No. B-1

GENERAL INFORMATION OF CONTRACT

1)	**Name of Work**	:	COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)
2)	Name of Contractor	:	M/s./Shri _____ _____
3)	Date of Tender	:	
4)	Amount of Contract	:	**Rs. 252716/-**
5)	No. & Date of work Order	:	_____
6)	Date of Commencement	:	_____
7)	Time stipulated for completion as per Agreement	:	(60) Days including monsoon period and govt. holidays.
8)	Date of completion as per Agreement.	:	_____
9)	Actual Date of Completion	:	_____
10)	Reference to Sanction of Extension of Time limit.	:	1) _____ 2) _____ 3) _____

Certified that this Original Agreement contains pages from 1 to _____.

Fly Leaves _____ Nos. and Drawings _____ Nos.

B - 1 TENDERS

Shri/M/s. _____Contractor registered in class _____ vide University Engineer, Works Division, _____ with reference to his/their download Tender document form www.pdkv.ac.in web site vide payment gateway dated _____ cost Rs**. 200/-** + GST received as per Pay University Engineer Office, Dr. PDKV Akola receipt.

Accounts Officer
Works Division Dr. PDKVAkola

DETAILS OF WORK

Name of Work : **COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)**

Estimated cost put to tender :- **Rs. 252716 /-**

Earnest Money @ ½ or 1percent subject to minimum of Rs. :- **Rs. 3000 /-**

Term Deposit Receipt of Schedule Bank / State Bank Challan should be attached with the tender at the time of submission.

Total Security Deposit @ 2% : **Rs. 6000 /-**
/-
(at the time of Agreement)

Time stipulated for completion :__(60) Days which will include the monsoon period and govt. holidays, if any.

TO BE FILLED BY THE CONTRACTOR.

I/We have quoted my/our offer in percentage rate in words as well as in figures specifying below/above. I/We further under take to enter into Contract in regular 'B-1' form in WORKS DIVISION.

Scope of Work

Name of Work : COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)

(As per Schedule B attached)

Check List of documents to be submitted with the tender and the general information to the Contractor for Submission of tender.

The following documents should be submitted in **(Envelope No.1)** duly attested by a officer not below the rank of Ex. Engineer of Govt. of Maharashtra in service on the date fixed for the receipt of tender with the forwarding (Covering) letter along with list of all documents/forms/ statement.

Sr. No	Brief details of documents required to be attached.	Whether enclosed or not
1.	Attested copy of the valid registration certificate as a contractor with the Government of Maharashtra in appropriate class.	
2.	Earnest money in the form of Bank Gurantee / FDR Deposit receipt valid for a period of one year issued by a Schedule Bank in the name of **University Engineer**, **Dr. P.D.K.V., Akola** from the date of issue/receipt of tender.	
3	Registration certificate as per Tax deduction at source as per section 51 of Goods and Services Act-2017 as provided under section 51of MGST/CGST Act. Registration will be made available on WWW.gst.gov.infrom20.7.17	
4	Attested copy of valid professional Tax PT/E, PT/R Certificate/ /clearance certificate, PAN Card.	
5	**Receipt of Tender Fee form www.pdkv.ac.in web site**	
6	**a. similar type of work done and work in hand certificate** **b. Bid Capacity** (As per Govt. G.R. dt.17.09.2019) (*applicable for the work of above 3 lakh.)	
7	**Affidavit (On Rs.100/- Stamp Paper)**	
8	Attested Copy of Annual Turnover Certificate of previous three years up-to last audited financial year.	

Note: - Contractor has to quote his offer both in figures and in words at **Page No. 37** in this B-1 tender form.

DETAILS OF WORKS (As above) :

Sr. No	Name of work	Estimated amount put to tender	Earnest money 1 % subject to minimum Rs3000	Security Deposit 2%	Cost of form (Non refundable)	Stipulate Period for completion	Last date and time & place of receipt of Tender	Class of Contract or.
1	2	3	4	5	6	7	10	11
1	COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)	Rs. 252716/-	Rs.3000/-	Rs. 6000/- at the time of agreement	**Rs 200 + GST = 236/-**	**60 Days Including** Monsoon period and govt. holidays.	upto 15.00 Hrs. in the office of the U.E. Dr P.D.K.V. Akola	Appro-priate Class

Note : University Reserved the Right to

i) To postpone/change/cancel the above mentioned date, modify the terms and conditions include new items and conditions, split and distribute the work amongst more than one agency etc. in the interest of the Projects/University, without assigning any reason whatsoever.

ii) To cancel the Advt./Enlistment of the Agency against the above tender , anytime without assigning any reason whatsoever for which no claim on any ground shall be entertained.

iii) To accept or reject any or all the applications/offers received as its own discretion, without assigning any reasons whatsoever for which no claim on any ground shall be entertained.

GOVERNMENT OF MAHARASHTRA
WORKS DIVISION
DETAILED TENDER NOTICE FOR CONTRACTOR

1) Sealed tenders in "B-1" (Percentage rate) form are invited from the registered contractor in Appropriate Class with the Government of Maharashtra, P.W.D. for the work of **COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)** . up to 15.00 hours on _____ **(as per tender schedule)** by the University Engineer, Works Division, Dr. PDKV Akola

2) **SITUATION OF THE WORK :-** The work site is located in **Dist. Akola**

3) The estimated cost of work is **Rs. 252716/-**

4) Time limit for completion of the work is **60 Days** Calendar from the date of work order including monsoon period and govt. holidays, if any.

5) **ISSUE OF TENDER FORMS :-** (As per Schedule)
Blank tender forms can be had from the office of the **University Engineer, Works Division, Dr. PDKV Akola** up to during office hours on payment of **Rs. 236 /-** Particulars regarding the work can also be had from the Office of the **University Engineer, Works Division Dr. PDKV Akola** during the office hours.

Completed tender in the manner specified in the following forthcoming paragraphs will be received **upto 15.00 Hours. on or before ----------** in the office of the **University Engineer, Works Division Dr. PDKV Akola.**

7) **VALIDITY** :-
Validity of the tender will be **90** days from the date of opening of the tender and there after until it is withdrawn by notice in writing duly addressed to the authority opening the tender by contractor. Such withdrawal after **90** days shall be effective from the date of receipt of notice by the **University Engineer, Works Division Dr. PDKV Akola**

8) **EARNEST MONEY** :-
i) Earnest money in the form of Bank Gurantee / FDR Deposit receipt valid for a period of one year issued by a Schedule Bank in the name of **University Engineer, Works Division Dr. PDKV Akola** from the date of issue/receipt of tender.

ii) The amount will be refunded to the unsuccessful tenderers on deciding about the acceptance or otherwise of the tender. In case of a successful tenderer, it will be refunded on paying the initial Security Deposit and completing the tender documents in Form "B-1".

9) **SECURITY DEPOSIT** :-

9.1) The successful tenderer whose tender is accepted will have to pay **Rs.-6000/-** towards the Security Deposit. **Rs. 6000/-** is to be deposited in F.D.R. of the scheduled bank/National Saving Certificate duly pledged in the name of the **University Engineer, Works Division Dr. PDKV Akola** towards the initial Security Deposit, within the time limit prescribed in clause-1 of B-1 form agreement, failing which his earnest money will be forfeited to Government.

9.2) **PERFORMANCE SECURITY ;-**

ADDITIONAL PERFORMANCE SECURITY ;- After opening of financial Bid (Envelope No. 2) if quoted offer of the lowest tenderer (L-1) is found below the estimated cost of the department then, L-1 tenderer should deposit submit the required **"Additional Performance Security"** within period of eight days from the date of opening of financial Bid (Envelope No. 2) in the form of **Demand Draft/FDR/Bank Guarantee**. **The L-1 tenderer should take cognizance that this time limit of 8 working days will not be relaxed/extended for any reason.**

If L-1 tenderer should not submit **Additional Performance Security** as stated above, then his offer will be considered as "Non-Responsive" and Second lowest's (L-2) tenderer will be called for negotiations. If such L-2 is agreed to execute the work below than the rates than L-1 then such L-2's revised offer will be considered for acceptance of the tender.

A) ***If L-1 tenderer's offer is below more than 1 % to 10 % of the estimated cost put to tender*** then he should submit **Demand Draft/FDR/Bank Guarantee** amounting to **1%** of the estimated cost of the department towards **Additional Performance security.**

B) If L-1 tenderer's offer is more than 10 % below upto 15% of *the estimated cost put to tender* then he should submit **Additional Performance security of 1 %** for **every percent** after **10 % below** percentage **in addition to** the cost of **1%** performance security mentioned above clause A for quoting below offer**.**
(eg. If ***L-1 tenderer's offer is*** 15 % below the estimated cost *put to tender*, then he should submit 15 - 10 = 5 % Additional Performance security + 1% Additional Performance security = 6 % amount of the *cost put to tender* as a total Additional Performance Security.)
C) ***If L-1 tenderer's offer is more than 15 % below the estimated cost put to tender*** then he should submit **Additional Performance security 2 %** for **every percent** after **15 % below** percentage **in addition to** the cost of **6%** Additional performance security mentioned above clause A & B. (eg. If *L-1 tenderer's offer is* 19 % below the estimated cost *put to tender*, then he should submit [1% for below upto 10% plus 5% for below upto 15 % & two times for remaining percentage i.e. (19-15) 4 % X 2 =8 %] Total (1+6+8 =) 14 % amount of the *cost put to tender* as Additional Performance Security.)
1) Such **Demand Draft/FDR/Bank Guarantee** shall strictly issued only by the Nationalized Bank or Scheduled Bank in favour of in the **University Engineer, Works Division Dr. PDKV Akola** and shall be valid for the minimum period of three months.
2) The Demand Draft should bear the MICR and IFSC Code Number of the issuing bank.
3) The **Demand Draft/FDR/Bank Guarantee** shall be submitted in the office of the concerned **University Engineer, Works Division Dr. PDKV Akola**. In **"sealed envelope"** within **stipulated period of eight working days as mentioned above.** The tenderer shall

write the 'Name of Work,' 'E- Tender No.' and 'Tender Notice No.' on such sealed envelope addressed to the concerned University Engineer.

4) If it is found that the **Demand Draft/FDR/Bank Guarantee** as above submitted by the tenderer is False / Forged Or Tenderer treated as **"Non Responsive"** then the Earnest Money submitted by such tenderer shall be forfeited and his registration as a contractor of WORKS DIVISION **will be suspended for the period of One year.** For this concerned Superintending Engineer shall have the full rights.

5) The work order to the successful contractor shall be issued only after the encashment of his **Demand Draft/FDR/Bank Guarantee** by the concerned University Engineer.

6) The amount of Additional performance security of successful contractor shall be refunded within the period of three months after the date of completion of said work successfully.

Note: - For calculating the amount of ADDITIONAL PERORMANCE SECURITY contractors offer will be calculated in percentage rounded upto two decimal points only.

11) **TENDER PROCEDURE** :-

A) **Blank Tender Forms** :
Blank Tender Forms can be download from **the www.pdkv.ac.in** as Stipulated in the Tender Notice.

B) **Manner of submission of tender and its accompaniments**:
Tender to be submitted in two separate sealed envelopes.

a) **Envelope No.1 :**

The first envelope clearly marked as "Envelope No. 1" shall contain the following documents.

(i) Attested copy of the valid **Registration certificate** as a contractor with the Government of Maharashtra in appropriate class.

(ii) **Earnest money** in the form of Bank Guarantee / FDR Deposit receipt valid for a period of one year issued by a Govt. Nationalized Authorized Bank / Schedule Bank in the name of **University Engineer, Works Division Dr. PDKV Akola** from the date of issue/receipt of tender.

(iii) Attested copy of valid **professional Tax PT/E, PT/R** Certificate, with attested copy of **PAN Card**.

(iv) Original valid **GST registration certificat**e from Goods and Services Act-2017 under section 51 of MGST/CGST Act GST-Tax Department.

(v) All Xerox copies submitted in connection with the tender shall be attested by a officer not below the rank of Ex. Engineer. Otherwise their tender will not be considered & Envelope No. 2 will not be opened.

(vi) Attested Copy of **affidavit** Sworn before Executive Magistrate / Notary regarding completeness, correctness and truthfulness of documents submitted online along with Tender on **Rs.100/- Stamp paper** as per prescribed Proforma given in Annexure. A

(Pg no 23)

(vii) Copies of all declaration regarding the work shall be self attested..

(viii) Unemployed Enggr. Kota (SUBE) is not consider in the tender process of Dr. P.D.K.V., Akola. Hence Every Tender is consider as a regular tender & all tenderer should submit EMD and no relaxation in EMD.

(ix) **Bid Capacity Criteria** :- The Prospective Bidder will be qualified only if their available bid capacity is more than the Cost put to the Bid of the work as per notice inviting Bid. The available bid capacity will be calculated base on the following formula:

Available Bid Capacity = 2 * (A * N) – B

Where,

A = Maximum value of Civil Engineering works executed in any one year during the last 3 years which will take into account the completed and ongoing works.

B = Value of existing commitments and works (Ongoing) to be completed During the next 60(days) Period of completion of the works for which bids are invited

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

(x) Copies of Completed work with work done & work in hand certificate of last 5 years duly attested by a officer not below the rank of Ex. Engineer.

(xi) Attested Copy of **Annual Turn Over** Certificate to be required upto last audited previous **three years.**

D) <u>Envelope No. 2: Tender</u>

The second envelope clearly marked as "Envelope No. 2" shall contain only the main tender including the common set of conditions/stipulation issued by the department after the pre-tender conference. A tender submitted without this would be considered as invalid and non responsive.

The tenderer should quote his offer on Schedule "B" of tender as percentage of estimated rates at the appropriate place of tender documents, to be submitted only in Envelope No. 2. He should not quote this offer anywhere directly or indirectly in Envelope No. 1. The contractor shall quote for the work as per details given in the main tender..

E) <u>Submission of Tenders</u> :-

Download tender document from www.pdkv.ac.in website and submitted The two sealed envelopes No. 1 and No. 2 shall be again put together in one common cover and sealed. This sealed cover shall be marked on the left hand top corner. Tender for the work as stated @ Sr. No.1 on page No _____The full name and address of the tenderer shall be written on the bottom left hand corner. If submitted by the post the sealed envelope marked as above shall be enclosed in another cover properly addressed and shall be sent by Registered post acknowledgement due.

The date and time for receipt of Envelope containing tender shall strictly apply in all cases. The tenderers should ensure that their tender is submitted before the expiry of the date and time. No delay on account of any cause will be entertained for the late receipt of the tender. Tender offered or received after the date and time is over, will either not be accepted or if inadvertently accepted, will not be opened and shall be returned to the tenderer unopened.

As Per Government Circular -2016 CR-320/Road-1 Mantralaya Mumbai Dt.01.07.2016 Self
Certification and Bituman Invoice should be submitted with each & work runinnig Account
bill .
(Please see the Cicular on www.maharashtra.gov.in Computer Code 201607011233411318)
1.15 Instructions given by the Govt. Vide Marathi circular No. Misc.-2016/C.No. 20/Bldg.-2/Dt. 28-
04-2016 regarding E-MB & E-Billing system is applicable to this tender.
Work measurement in Electronic measurement book and Submision of Contractors monthly bill in electronic billing system . Reference Govt. Circular Public Works Deptt. Manatralay,
Mumbai . No. Misc. 2016/ case no. 20/ Bldg.2/ Dt. 28/04/2016 , 24.06.2016 & 2.9.2016.
1. As per clause 10 of this B1 contract , it is responsibility of the contractor to submit the bill
monthly to the Engineer-in-charge.
2. To discharge this responsibility the contractor shall
a) appoint system Integrator.
b) system Integrator shall be Registered at ITCC Nagpur.
c) System integrator shall provide his services to the department as and when required.
d) Data generated through E Bill Payment will be the property of the Department and acess
will be only to the Department .
e) No claim of what so ever nature will be entertained by the department.
f) Payment to the system Integrator will not exceed 0.02% of the contract amount which will include payment towards generating of E Bill.
h) In support of the bills, required measurements , drawings, quality control reports (field
lab and VQCC as per clause of Additional General condition), site supervision data (Scada
shall be submitted in electronic form, the data so submitted shall have a facility to Tightly
integrate it with the contract conditions , provision in the Maharashtra Public Works manual, Maharashtra Public Works Account Code (Updated to date of Submission of this
tender) and current general engineering practices (issued though various govt. resolutions,
govt. circulars Chief Engineers Circulars etc. issued up to date of submission of this tender.)
followed in WORKS DIVISION.
i) The Submission of e-bill shall be in the web based format.
j) The offer of Contractor shall be inclusive of all . He shall not be paid separately, his offer
shall be inclusive of all cost required for submitting bill in e-format mentioned as above.
k) The measurement of this work shall be recorded in Electronic Measurement Book.
l) The Unique I.D. code generated while processing of this tender shall be the E Measurement Book Number

Contractor shall submit a certificate to the effect that "All the payments to the labour/staff are made in bank accounts of staff linked to Unique Identification Number (AADHAR CARD)." The certificate shall be submitted by the contractor within 60 days from the commencement of contract. If the time period of contract is less than 60 days then such certificates shall be submitted within 15 days from the date of commencement of contract

F) Opening of tenders :-

On the date specified in Tender Notice following procedure will be adopted for opening of the tender:

Envelope No. 1

First of all, Envelope No. 1 of the tenderer will be opened to verify the documents as per requirements. If the various documents contained in this envelope do not meet the requirements of the Department, a note will be recorded accordingly by the tender opening authority and the said tenderer's envelope No. 2 will not be opened.

Envelope No. 2

The Envelope shall be opened if contents of Envelope No. 1 are found to be acceptable to the Department. The tendered rates in percentage above/below the estimated rates shall then be read out.

12) Important Points to be noted by the Tenderer :

(A) (i) On receipt of Online downloaded blank tender form the tenderer should ensure that no correction or over writings or erasers is left out to be attested by the University Engineer.

ii) The offer in percentage should be written both in words and in figures in the tender form. In case of deviation, the lowest percentage either in words or figures will be considered.

iii) No alternations and additions in the form of tender and in the schedules and no additions in form of special stipulations are permitted. If any of these is found, the tender may be summarily rejected.

iv) The offer shall be inclusive of all prevailing taxes octroi, Royalty charges etc. to be paid by the tenderer for the work and the claims for payment on any such by the tenderer for the work and the claims for payment on any such account shall not be entertained.

v) In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, and in the event of absence of any partner, it shall be signed on his behalf by a person holding a power of attorney authorizing him to do so.

vi) All the pages correction/additions and pasted slips should be signed by the tenderer.

vii) The tenderer shall be deemed to have studied all plans/specifications /terms/conditions of the tender and made himself /themselves acquainted with the site conditions and availability of labour, basic materials, water, electricity etc. before submitting the tender. A Declaration to this effect shall be signed by the tenderer in the form attached with the tender.

viii) The Contractor's offer shall include all Insurance Policies as stated in Additional Tender condition at Sr No 12 (A) on Page No ___ of tender Document. No claim on this account will be entertained.

B) In case any clarification is required, the tenderer may obtain it personally or in writing well in advance from the University Engineer. In any case, the tenderer will be responsible to bind himself/themselves to the terms and conditions and specifications of the tender once submitted by him/them.

C) The tender is liable for outright rejection if on opening, it is found that

i) Any one or more of the mandatory documents required as per para 11 is or are missing.

ii) Any corrections, additions or alterations are made by the tenderer on any page of the tender.

iii) Any pages or pasted slips is or are missing.

iv) The tenderer has not signed at required places.

v) The contractor having three works of Dr. P.D.K.V., Akola University in hand shall not eligible for Submission of 4th Tender.

D) Rate analysis must be given with Signature of contractor within 2 days after opening of tender if the rates quoted are more than below 15%. If the submitted rate analysis is not justifiable or found vague, tender will be rejected.

13) Amendment of Bidding Documents

13.1. Before the deadline for submission of tender, the Employer may modify the tender documents by issuing addenda / corrigendum

13.2. Any addendum / corrigendum thus issued shall be part of the tender documents and shall be communicated in writing or by cable to all the purchasers of the tender documents. Prospective tenderers shall acknowledge receipt of each addendum / corrigendum in writing or by cable to the Employer. The Employer will assume no responsibility for postal delays.

13.3 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at his discretion, extend as necessary the deadline for submission of tender.

14) Acceptance of the tender rests with the competent authority who reserves the right to reject any or all tenders without assigning any reasons thereof.

15) This detailed tender notice shall form part of tender documents.

16) The Income Tax including surcharge @2.00% or percentage in force from time to time or at the rate as intimated by the competent Income Tax authority shall be deducted from the contractor from the gross bill amount of every bill, whether for measured work or advance payment and/or secured advance.

17) The successful tenderer will be required to produce to the satisfaction of the specified concerned authority valid and current licence issued in his favour under the provisions of Contract Labour (Regulation and Abolition) Act 1970 before starting the work. On failure to do so the acceptance of the tender shall be liable to be withdrawn and also liable for forfeiture of the earnest money.

18) Any dues arising out of contract will be recovered from the contractor as arrears of Land Revenue if not paid amicably. Moreover, recovery of Government dues from the contractors will be effected from the payment due to the Contractor from any other Government works under execution with them.

19) Deleted

20) As per the Govt. Resolution No. BCA 2009/CR108/ Labour 7A Mantralalya Mumbai dated 17/06/2010, the workers welfare cess @ 1% will be deducted from the gross bill amount of every bill either for measured work for advance payment and/or secured advance.

21) All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen @ head quarter of University Engineer Dr. PDKV Akola and only the Court @ Head Quarter of University Engineer Dr. PDKV Akola shall have jurisdiction to try and adjudication over them.

22) 1.22 Instructions given by the Govt. Vide Marathi circular No. Misc.-2016/C.No. 20/Bldg.-2/Dt. 28-04-2016 regarding E-MB & E-Billing system is applicable to this tender.

22.1) Tenderer shall quote his offer considering the fact of igst /cgst/sgst act 2017 (time to time amended by Government) No separate payment will be made on a/c of GST, TDS of GST will be made from every bill as per rate prescribed by Government time to time and as when applicable.

22.2) The rates quoted by the Contractor shall be deemed to be inclusive of the labour welfare cess and other taxes (other than GST) that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable low

22.3) 1. Bidder shall quote his rate excluding GST.
2. GST shall be payable on the accepted contract value
3. GST Shall be paid to contractor on the amount of bill of work done as per prevailing rate of GST during the period of work done.

Clause for Royalty charges & Laboratory Testing Charges.

I) Contractor will have to produce in original all Royalty passes in support of payment of Royalty to the Government. If he fails Royalty amount equivalent to the consumption of materials will be recovered from the contractor.

II) Test Shall be Carried out in accordance with the Clause " Sample & Testing of Materials" given under Additional General Condition & Specification of this tender Document.

III) Testing of Materials shall be Carried out as per the frequency specified by the Vigilance & Quality Control Circle Amravati & Shall be Responsibility of Contractor

IV) The Material required for testing shall be sent by the contractor to the specified

Laboratory at his own Risk & Cost.

V) In Case the desired results are not obtained during testing or the material is rejected due to unsatisfactory results the testing chares shall not be paid to the contractor.

VI) It shall be Obligatory on Contractor to produce & Submit original copy of the Test result along with receipt of payment made to the Laboratory for releasing any without testing payment towards testing Charges

VII) Any short fall in the testing as per frequency, will be recovered at three times testing rates.

VIII) Testing charges are mentioned in view of the rates finalized by the Vigilance & quality Control Circle, Pune & it shall be responsibility of contractor to pay the testing charges to the concerned laboratory in accordance with the rates finalized No difference shall be payable to the contractor in case testing charges are revised by the Laboratory.

FORM B-1

WORKS DIVISION
DR. PDKV AKOLA

PERCENTAGE RATE TENDER AND CONTRACT FOR WORK.

General Rules And Directions For The Guidance Of Contractors.

1) All work proposed to be executed by contract shall be notified in a form of invitation to tender pasted on a board hung up in the office of the University Engineer and signed by the **University Engineer Dr. PDKV Akola**

The form will state the work to be carried out as well as the date for submitting and opening tenders and the time allowed for carrying out the work, also the amount of earnest money to be deposited with the tender, and the amount of security deposit to be deposited by the successful tenderer and the percentage, if any, to be deducted from bills. Copies of the specifications, designs and drawings and estimated rates, scheduled rates and any other documents required in connection with the work which will be signed by the University Engineer for the purpose of identification shall also be opened for inspection by contractors in the office of the University Engineer during office hours.

2) In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof, and in the event of the absence of any partner it shall be signed on his behalf by a person holding a power of attorney authorizing him to do so.

2 (A) (i) The Contractor shall pay along with the Tender the sum of **Rs.3000/-** as and by way of earnest money. The contractor may pay the said amount by forwarding along with the tender a FDR / Bank Guarantee for the said amount for a period of one year issued by a scheduled Bank for the said amount and duly endorsed in the name of **University Engineer Dr. PDKV Akola.** The said amount of earnest money shall not carry any interest whatsoever.

ii) In the event of his tender being accepted, subject to the provision of sub clause (iii) below, the said amount of earnest money shall be appropriated/adjusted towards the amount of security deposit payable by him under condition of General Conditions of Contract.

iii) If after submitting the tender, the contractor withdraws his offer or modifies the same or if after the acceptance of his Tender, the Contractor fails or neglects to furnish the balance of security deposit, without prejudice to any other rights and powers of the Government hereunder, or in law, Government shall be entitled to forfeit the full amount of the earnest money deposited by him.

iv) In the event of his Tender not being accepted, the amount of earnest money deposited by the contractor shall, unless, it is prior there to forfeited under the provisions of sub-clause (iii) above, be refunded to him on his passing receipt therefore.

3) Receipt for payments made on account of any work, when executed by a firm should also be signed by all the partners, except where the contractors are described in their tender as a firm, in which case the receipts shall be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipts for the firm.

4) Any person who submits a tender shall fill up the usual printed form including the column total according to the estimated quantities stating at what rate he is willing to undertake each item of the work. Tenders which propose any alteration in the work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort, will be liable to rejection. No single tender shall include more than one work, but contractors who wish to tender for two or more works shall submit a separate tender for each. Tenders shall have the name and the number of work to which they refer written outside the envelope.

5) The University Engineer Dr. PDKV Akola, open tenders in the presence of any intending contractors who may be present at the time and will enter the amount of the several tenders in a comparative statement in a suitable form. In the event of a tender being accepted, the contractor shall thereupon, for the purpose of identification, sign copies of the specifications and other documents mentioned in Rule-1. In the event of a tender being rejected, the Divisional Officer shall authorize the Treasury Officer/Bank concerned to refund the amount of earnest money deposited to the contract or making the tender, on his giving a receipt for the return of the money.

6) The Officer competent to dispose of the tenders shall have the right of rejecting all or any of the tenders.

7) No receipt for any payment alleged to have been made by a contractor in regard to any matter relating to this tender or the contract shall be valid and binding on Government unless it is signed by the University Engineer.

8) The memorandum of the work to be tendered for and the schedule of materials to be supplied by the Works Division and their rates shall be filled in and completed by the office of the University Engineer before the tender form is issued. If a form issued to an intending tenderer has not been so filled in and completed, he shall request the said officer to have done this before he completes and delivers his tender.

9) All work shall be measured net by standard measure and according to the rules and customs of the Works Division without reference to any local custom.

10) Under no circumstances shall any contractor be entitled to claim enhanced rates for any items in this contract.

11) All corrections and additions or pasted slips should be initialled.

12) The measurement of work will be taken according to the usual method in use in the Works Division and no proposal to adopt alternative methods will be accepted. The University Engineer's decision as to what is "the usual method in use in the Works Division" will be final.

a) The contractor shall give a list of machinery in their possession and which they propose to use on the work.

b)The contractor will have to construct shed for storing materials procured by him at his own cost at the work site having double locking arrangement. The materials will be taken to use in the presence of the department person. No materials will be allowed to be removed from the site of the work.

13) The tenders will be liable to be rejected, if while submitting it, the tender or in the case of a firm each partner thereof does not sign or the signature/signatures is/are not attested by a witness in the space provided for the purpose.

14) The tendering Contractor shall furnish a declaration along with the tender showing all works for which he has already entered into contract, and the value of the work that remains to be executed in each case on the date of submitting the tender.

15) Every tenderer shall submit along with the tender information regarding the Income Tax circle, or ward of the district in which he is assessed to Income-Tax, the reference to number of the assessment and the assessment year.

16) In view of the difficult position regarding the availability of foreign exchange, no foreign exchange would be released by the department for the purchase of plant and machinery required for the execution of the work contracted for.

17) The contractor will have to construct shed for storing controlled and valuable materials required for the work, the materials will then be taken for use in the presence of the departmental person. No materials also will be allowed to be removed from the site of works.

18) The tendering contractor should furnish a detailed statement of works in hand showing the costs of works in hand and the works completed against each with certificate from head of the office concerned.

(19) **Joint Venture:-**

19.1) In case of Joint venture the copy of registered partnership deed and certificate of Registration from Assistant Registrar of firms shall be produced at the time of purchasing of tender form and also in envelope No.1.

19.2) Two or more contractors of any class may combine and tender for a work costing to the amounts upto which each individual contractor or the higher of two limits, if they are of different categories are empowered to tender as per the original registration provided.

(i) The combination is of the contractor as a whole and not individual partners and.

(ii) They draw a registered partnership deed and submit a copy thereof to the authority at the time of purchase of the tender forms.

19.3) Whenever the advantage of such combination of two or more contractors is to be taken for quoting for this work where in only the individual contractor of higher category is eligible to quote, it should be ensured that the registered partnership deed should be irrevocable till the completion of this work for which they have combined and till all the liabilities there of are liquidated and the share of the contractor of the higher category should not be less than 50%. Further, the percentage share of the contractor of the lower category in such a partnership/combination, should not be more than his limit of eligibility to quote for works divided by the estimated cost of work put

to tender (i.e. when such a percentage is applied to the cost of the work, his share of cost should not exceed his own eligibility limit of tendering for works.)

(19.4) Grouping of plants and machineries owned by individual Contractors executing joint Venture will be considered.

(19.5) Earnest money in form of TDR/FDR issued in the name of Joint-Venture company drawn by the Schedule Bank having branches in Maharashtra and endorsed in the name of **University Engineer**, **Works Division, Dr. PDKV Akola** for a period of one year only be considered.

If documents submitted by the contractor to the department during the process of tender at any stage / in Envelope No. 1 / at the time of acceptance of tender / while executing the

परिशिष्ट१-

(१) मराठी

नमुना सत्यप्रतिज्ञापत्र (रुपये -/५००च्या स्टॅम्प पेपरवर)

सत्यप्रतिज्ञापत्र (Affidavit)

मी ---------- वय वर्ष ---------- राहणार ---------- ---------- कंपनीचा मालक असून / या फर्मचा ---------- मी ,या सत्यप्रतिज्ञा पत्राव्दारे लिहून देतो की -- १.त्या निविदेच्या लिफाफा क्र .या कामासाठी निविदा सादर करीत आहे ----------मध्ये जी कागदपत्रे सादर केली आहे ती खरीयाची मी खाली केलेली ,चुका नाहीत ,त्या मध्ये कोणत्याही त्रुटी .बरोबर व पूर्ण आहेत , असून असे शपथपूर्वक खालील अटी व शर्थीसह मान्य करीत आहेदिशाभूल ,या कागदपत्रा मध्ये काही चुकीची . .खोटी व तसेच अपूर्ण माहिती आढळल्यास मी भारतीय दंडसंहिता अंतर्गत कायदेशीर कार्यवाहीस पात्र राहीन ,करणारी

.१ यांनी सार्वजनिक बांधकाम -माइया कार्यालयाने किंवा माइया कर्मचा ,मी ,जर कंत्राट कालावधी दरम्यान विभागालाकोणतीही खोटी माहिती किंवा देयका समवेत तसेच पत्रव्यवहारात खोटी बनावट साहित्य खरेदीची / .मी भारतीय दंडसंहिता अंतर्गत कायदेशीर कार्यवाहीस पात्र राहीन ,कागदपत्रे सादर केली असल्यास

.२ अंतिम देयक देण्याच्या तारखे ,जर कंत्राट कालावधी दरम्यान आणि काम समाप्ती नंतर पर्यंत सादर केलेली कोणतेही कागदपत्रे खोटी मी भारतीय दंडसंहिता अंतर्गत कायदेशीर कार्यवाहीस ,बनावट किंवा फसवी आढळल्यास / .पात्र राहीन

.३ कोणतीही माहिती ,जर काम समाप्ती नंतर दोष दायित्व कालावधी दरम्यान किंवा त्यानंतर कोणत्याही वेळी ब / किंवा कागदपत्रे खोटीनावटमी भारतीय दंडसंहिता अंतर्गत ,फसवी किंवा दिशाभूल करणारी आढळल्यास , .कायदेशीर कार्यवाहीस पात्र राहीन

कंत्राटदाराची सही शिक्क /

Annexure -A

Affidavit (On Rs. 100/- Stamp Paper)

I ---------- age ---------- address ---------- ---------- (Authorized signatory to sign in contract), hereby submit,---------- vide this affidavit in truth, that I am the owner of the contracting firm ---------- / authorized signatory and I am submitting the documents in envelope no 1 for the purpose of scrutiny of the contract. I hereby agree to the conditions mentioned below.

1. **I am liable for action under Indian Penal Code for submission of any false / fraudulent paper / information submitted in envelope no.1**
2. **I am liable for action under Indian Penal Code if during contract period and defect liability period, any false information, false bill of purchases supporting proof of purchase, proof of testing submitted by my staff, subletting company or by myself, I will be liable for action under Indian Penal Code.**
3. **I am liable for action under Indian Penal Code if any paper are found false / fraudulent during contract period and even after the completion of contract (finalization of final bill)**

(Signature of contractor)

(seal of company)

INTEGRITY PACT

Between

Works Division, Maharashtra Government

having its Office at University Engineer, Work Division,
Dr. P.D.K.V., Akola.

hereinafter referred to as

"WORKS DIVISION",

and

[Insert the name of the Sale Bidder/Lead Partner of Joint Venture
having its Registered Office at _
(Insert full Address)
and
[Insert the name of the Partner(s) of Joint Venture, as applicable]
having its Registered Office at _
(Insert full Address)
hereinafter referred to as

"The Bidder/Contractor"

Preamble

WORKS DIVISION intends to award, under
laid-down organizational procedures, contract(s) for _
[Insert the name of tile package]
(Signature) _ (Signature) _
(For & On behalf of WORKS DIVISION) (For & On behalf of Bidder/
Partner(s) of
[Joint Venture/ Contractor)
Integrity Pact Page 1 of 8
•
Package and Specification •
Number
[Insert Specification Number of the package]

WORKS DIVISION values full compliance with all relevant laws and regulations, and the principles of economical use of resources, and of fairness and transparency in its relations with its Bidders/ Contractors.

In order to achieve these goals, WORKS DIVISION and the above named Bidder/Contractor enter into this agreement called 'Integrity Pact' which will form a part of the bid.

It is hereby agreed by and between the parties as under:

Section I - Commitments of WORKS DIVISION

(1) WORKS DIVISION commits itself to take all measures necessary to prevent corruption and to observe the following principles:

a) No employee of WORKS DIVISION, personally or through family members, will in connection with the tender, or the execution of the contract, demand, take a promise for or accept, for him/herself or third person, any material or other benefit which he/she is not legally entitled to.

b) WORKS DIVISION will during the tender process treat all Bidder(s) with equity and fairness. WORKS DIVISION will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

c) PUBLICWORKS DEPARTMENT will exclude from evaluation of Bids its such employee(s) who has any personnel interest in the Companies/ Agencies participating in the Bidding/Tendering process

(2) If Principle Secretary PWD, Maharashtra Government obtains information on the conduct of any employee of PUBLICWORKS DEPARTMENT which is a criminal offence under the relevant Anti- Corruption Laws of India, or if there be a substantive suspicion in this regard, he will inform its Chief Vigilance Officer and in addition can initiate disciplinary actions under its Rules.

Section ll-Commitments of the Bidder/Contractor

(1) The Bidder/Contractor commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles

(Signature) _ (Signature) _

(For & On behalf of WORKS DIVISION) (For & On behalf of Bidder! Partner(s) of

(Joint Venture! Contractor)

---~----------

using his participation in the tender process and during the contract execution:

a) The Bidder/Contractor will not, directly or through any other person or firm, offer, promise or give to WORKS DIVISION, or to any of WORKS DIVISION's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange an advantage during the tender process or the execution of the contract.

b) The Bidder/Contractor will not er.ter into any illegal agreement or understanding, whether formal or informal with other Bidders/Contractors. This applies in particular to prices, specifications,

certifications, subsidiary contracts, submission or non-submission of bids or actions to restrict competitiveness or to introduce cartelization in the bidding process.

c) The Bidder/Contractor will not commit any criminal offence under the relevant Anti-corruption Laws of India; further, the Bidder/Contractor will not use for illegitimate purposes or for purposes of restrictive competition or personal gain, or pass on to others, any information provided by WORKS DIVISION as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

d) The Bidder/Contractor of foreign origin shall disclose the name and address of the Agents/ representatives in India, if any, involved directly or indirectly in the Bidding. Similarly, the Bidder/Contractor of Indian Nationality shall furnish the name and address of the foreign principals, if any, involved directly or indirectly In the Bidding.

e) The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, or committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and/ or with the execution of the contract.

f) The Bidder/Contractor will not misrepresent facts or furnish false/forged documents/information s in order to influence the bidding process or the execution of the contract to the detriment of WORKS DIVISION.

(2) The Bidder/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

(Signature) _ (Signature) _

(For & On behalf of PUBLIC/ WORKS DEPARTMENT) (For & On behalf of Bidder/

Partner(s) of (Joint Venture / Contractor)

Integrity Pact Page 3 of 8

Section 111- Disqualification from tender process and exclusion from future contracts

(1) If the Bidder, before contract award, has committed a serious transgression through a violation of Section II or in any other form such as to put his reliability or credibility as Bidder into question, PUBLIC WORKS DEPARTMENT may disqualify the Bidder from the tender process or terminate the contract, if already signed, for such reason.

(2) If the Bidder/Contractor has committed a serious transgression through a violation of Section II such as to put his reliability or credibility into question, WORKS DIVISION may after following due procedures also

exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder/Contractor and the amount of the damage. The exclusion will be imposed for a minimum of 12 months and maximum of 3 years.

(3) If the Bidder/Contractor can prove that he has restored/recouped the damage caused by him and has installed a suitable corruption prevention system, WORKS DIVISION may revoke the exclusion prematurely.
Section IV - Liability for violation of Integrity Pact

(1) If WORKS DIVISION has disqualified the Bidder from the tender process prior to the award under Section Ill, PUBLICWORKS DEPARTMENT may forfeit the Bid Guarantee under the Bid.

(2) If WORKS DIVISION has terminated the contract under Section Ill, WORKS DIVISION may forfeit the Contract Performance Guarantee of this contract besides resorting to other remedies under the contract.

Section V- Previous Transgression

(1) The Bidder shall declare in his Bid that no previous transgressions occurred in the last 3 years with any other Public Sector Undertaking or Government Department that could justify his exclusion from the tender process.

(Signature) _ (Signature) _

(For & On behalf of WORKS DIVISION) (For& On behalf of Bidder/ Partner(s) of Joint Venture / Contractor)

Integrity Pact Page 4 of 8

(2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section VI - Equal treatment to all Bidders/Contractors

(1) WORKS DIVISION will enter into agreements with identical conditions as this one with all Bidders.

(2) WORKS DIVISION will disqualify from the tender process any bidder who does not sign this Pact or violate its provisions.

Section VII - Punitive Action against violating Bidders/Contractors

If PUBLICWORKSDEPARTMENT obtains knowledge of conduct of a Bidder or a Contractor or subcontractor or of an employee or a representative or an associate of a Bidder or Contractor or his Subcontractor which constitutes corruption, or if WORKS DIVISION has substantive suspicion in this regard, WORKS DIVISION will inform the Chief Vigilance Officer (CVO).

(*) Section VIII - Independent External Monitor of Monitors

(1) WORKS DIVISION has appointed a panel of Independent External Monitors (IEMs) for this Pact with the approval of Central Vigilance Commission (CVC), Government of India, out of which one of the !EMs has been indicated in the NIT/IFB.

(2) The IEM is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement. He has right of access to all project documentation. The !EM may examine any complaint received by him and submit a report to Principle Secretary PWD, Maharashtra Government, WORKS DIVISION, at the earliest. He may also submit a report directly to the CVO and the CV e, in case of suspicion of serious irregularities attracting the provisions of the PC Act. However, for ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter shall be referred to the full panel of IEMs, who would examine the records, conduct the investigations and submit report to Principle Secretary PWD, Maharashtra Government, WORKS DIVISION, giving Joint findings.

(Signature) _ (Signature) _

(For & On behalf of WORKS DIVISION) (For & On behalf of Bidder/ Partner(s) of _____ Joint Venture / Contractor)

)

(3) The !EM is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION.

(4) The Bidder(s)/Contractor(s) accepts that the IEM has the right to access Without restriction to all documentation of WORKS DIVISION related to this contract including that provided by the Contractor/Bidder. The Bidder/Contractor will also grant the IEM, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his documentation. The same is applicable to Subcontractors. The IEM IS under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s)/ Subcontractor(s) with confidentiality.

(5) WORKS DIVISION will provide to the !EM information as sought by him which could have an impact on the contractual relations between WORKS DIVISION and the Bidder/Contractor related to this contract.

(6) As soon as the IEM notices, or believes to notice, a violation of this agreement, he will so inform the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION and request the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION to discontinue or take corrective action, or to take other relevant action. The IEM can in this regard submit non-binding recommendations. Beyond this, the IEM has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action. However, the IEM shall give an opportunity to WORKS DIVISION and the Bidder/Contractor, as deemed fit, to present its case before making its recommendations to PUBLIC WORKS DEPARTMENT.

(7) The IEM will submit a written report to the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION within 8 to 10 weeks from the date of reference or intimation to him by PUBLIC WORKS DEPARTMENT and, should the occasion arise, submit proposals for correcting problematic situations.

(8) If the !EM has reported to the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION, a substantiated suspicion of an offence under relevant Anti- Corruption Laws of India, and the Principle Secretary PWD, Maharashtra Government, WORKS DIVISION has not, within the reasonable time taken visible action to proceed against such offence or reported it to the CVO, the Monitor may also transmit this Information directly to the CVC, Government of India.

(Signature)

(For & On behalf of WORKS DIVISION) (For & On behalf of Bidder! Partner(s) of (Joint Venture/Contractor)

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(9) The word 'IEM' would include both singular and plural.

(*) *Tills Section shall be applicable for only those packages to here in the IEMs have been Identified in Section - I : lunation for Bids and/or Clause ITB* 9.3 *in Section - III: Bid Data Sheets of Conditions of Contract, Volume-I of the Bidding Documents.*

Section IX - Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor after the closure of the contract and for all other Bidder's six month after the contract has been awarded.

Section X- Other Provisions

(1) This agreement is subject to Indian Law Place of performance and jurisdiction is the establishment of WORKS DIVISION. The Arbitration clause provided in the main tender document / contract shall not be applicable for any issue / dispute arising under Integrity Pact.

(2) Changes and supplements as well as termination notices need to be made in writing.

(3) If the Contractor is a partnership firm or a consortium or Joint Venture, this agreement must be signed by all partners, consortium members and Joint Venture partners.

(4) Nothing in this agreement shall affect the rights of the parties available under the General Conditions of Contract (GCC) and Special Conditions of Contract (SCC)

(5) Views expressed or suggestions/ submissions made by the parties and the recommendations of the *CVO/ IEM* in respect of the violation of this agreement, shall not be relied on or introduced as evidence in the arbitral or judicial proceedings (arising out of the arbitral proceedings) by the parties in connection with the disputes/ differences arising out of the subject contract.
 # CVO shall be applicable for packages to here in IEM are not Identified in Section IFBI BDS of Condition of Contract, Volume-I, IEM shall be applicable for packages to here in IEM are identified in Section IFB/BDS of Condition of Can tract, volume-l.

(Signature) _

(For & On behalf of WORKS DIVISION) (For & On behalf of Bidder ! Partner(s) of Joint Venture ! Contractor)

•

(6) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. **In** this case, the parties will strive to come to an agreement to their original intentions.

(Signature) .

(For & On behalf of WORKS DIVISION)

(Signature) .

(For & On behalf of Bidder/ Partner(s)

of Joint Venture! Contractor)

(Office Seal) (Office Seal)

Name.,
Designation'
Witness 1:.
(Name & Address).

Name:
Designation'
Witness 1:
(Name & Address) .

Witness 2:
(Name & Address) .

Witness 2:
(Name & Address).

Additional Conditions regarding procurement of Bitumen, Steel and Cement.

As Per Govt of Maharashtra WORKS DIVISION, Marathi Circular No. संकिर्ण-2018/प्र.क्र.30/यं.बां.सा./ **Dt. 27.3.2019**

1. Instructions for purchase of Bitumen.

1.1 The bitumen shall be purchased from the Government refineries viz. Hindustan Petroleum Corporation Limited (HPCL)/ Bharat Petroleum Corporation Limited (BPCL)/ Indian Oil Corporation (IOCL), OR any Private Sector Refinery, OR any other Bitumen producing Refinery who are supplying bitumen of the required **Viscosity Grade** as per prescribed standards and Specifications of MORTH.

1.2 The Contractor/Entrepreneur, must adopt the following procedure for purchase of bulk bitumen obtained from Indian oil refineries or other Bitumen producing refineries.

(1) The Contractor/Entrepreneur appointed for bituminous road works in WORKS DIVISION Maharashtra shall be free to procure bulk bitumen from Public sector refinery / Indian refineries in private sector / local authorized suppliers / Authorized supplier - contractors of Private, Semi government and Foreign Refineries in India / Local manufacturer.

(2) Contractors/Entrepreneur and if it is required, the field officers, as per the requirement of project, has to purchase bitumen of VG-30 grade as given below.

Sr.No	Quantity of Bulk Bitumen to be procured	Source of Supply of Bulk Bitumen
1	Upto 500 MT (For the works in which requirement of bitumen is less than 500 MT)	1. Local Bitumen suppliers 2. Authorized Contractors or Suppliers of Private Sector / Public Sector Oil refineries 3. Contractor / supplier who maintain large stock of bitumen.
2	More than 500 MT (For the works in which requirement of bitumen is more than 500 MT)	1. Direct purchase from **Public Sector** oil refineries 2. Direct purchase from **Private Sector** oil refineries 3. Contractors / suppliers who procures bulk bitumen from oil refineries and maintains stock of bitumen for the purpose of sale. 4. Supplier who imports foreign bitumen to supply public refineries.
3	Only for experimental basis 1500 Km. Per Public Works Region. (If University Engineer permits)	1. Suppliers / Dealers of foreign refineries importing directly bulk bitumen of Grade **VG-30** in India from foreign refineries.

Note – Permission has been granted to use VG-30 grade bulk bitumen procured from foreign refineries for the road works under P.W.D. Government of Maharashtra on experimental basis for the period from 01/04/2019 to 31/3/2020, only for the works to be carried out on experimental basis. (Prior permission of University Engineer is obligatory.)

(3**) Following specifications are obligatory on the Supplier / Contractor for the Viscosity Grade Bitumen procured from private sector or any other oil refineries .**

(A) Viscosity Grade of Bulk Bitumen used in the work shall be conforming to the norms of **Indian Standard bureau I.S. 73:2013.**

(B) The contractor/Entrepreneur shall submit CRC (Consignee receipt certificate) and Bill invoices with paid GST, in triplicate. It is binding on all the refineries to mention the name of work on consignee receipt certificate/ Bills for which the bitumen is being used.

(C) The bitumen producer shall submit the manufacturers laboratory report of Bitumen of concerned batch. This bitumen shall be re-examined in contractors owned laboratory and report shall be submitted to the department.

(D) All the necessary reports, certificates, purchase orders / Bills / tax invoices /Vouchers shall be submitted in originals.

(E) For the works costing more than Rs.5.00 Crores, it is mandatory for the concerned contractor to arrange following tests carrying facilities on the work site
(i) Penetration test
(ii) Softening test
(iii) Seperation Test
(iv) Elastic Recovery test
(v) Adultration test.

1.3.2 Instruction Regarding recovery or payment for Price escalation due to increase or decrease in rate of bulk bitumen.

Following instructions shall be followed for payments of price escalation of bitumen used in the work procured from private sector or any other refineries.

(i) Escalation De-escalation regarding bitumen shall be decided by considering **the lowest rate amongst rates of all Public Sector Refineries on the date of acceptance of tender** and the rate of actual purchase of bitumen from private refinery as on the date of purchase order of bitumen **will be considered as the Star Rate.**

(ii) If due to **increase** in rate of bitumen contractor/entrepreneur is liable for the refund of escalation amount, then the escalation amount shall be calculated by considering **the lowest rate of Public Sector OR Private Sector refineries.**

(iii)If due to **decrease** in rate of bitumen contractor/entrepreneur is liable for the recovery of excess amount, then the recovery amount shall be carried out by considering **the highest rate of Public Sector OR Private Sector refineries.**

2. Instruction regarding procurement of Cement.

2.1 The contractor can purchase the cement from any main manufacturer or manufacturer's authorized distributors.

2.2 Instructions regarding the payment of price escalation due to increase in rate and recovery due to decrease in rate of cement.

If the rate of cement hike or reduce, then the additional payment for hike rate of cement or recovery due to reduction in rate shall be calculated by considering the difference of Star Rate mentioned in the tender and the actual rate of purchase of cement on the date of purchase.

3. Instructions for purchase of Steel.

3.1 The contractor can purchase the Steel from any main manufacturer (SAIL, TATA Steel, ISPAT and other main manufacturer as directed by the Government) or their authorized distributors.

3.2 **Instructions regarding the payment of price escalation due to increase in rate and recovery due to decrease in rate of Steel.**.

If the rate of Steel hike or reduce, then the additional payment for hike rate of Steel or recovery due to reduction in rate shall be calculated by considering the difference of Star Rate mentioned in the tender and the actual rate of purchase of Steel on the date of purchase.

Responsibility regarding the quality and quantity test check of construction materials. (Bitumen, steel, cement)

Following procedure shall be adopted for the verifications of the bills of private suppliers of the Steel, Cement, Bitumen and bitumen procured form the private sector refineries and authorized suppliers of Imported Bitumen.

It is binding on the contractor/Entrepreneur to submit Invoices / Bills / Vouchers of construction materials /Bitumen (With GST number) in originals procured from Private Sector Refineries / Public Sector Refineries or authorized Private Importers dealers.

i) The Contractor/Entrepreneur shall be fully responsible for the authenticity of the invoices / Bills submitted by themselves regarding the purchase of steel, cement and bitumen as mentioned above.

ii) The contractor/Entrepreneur shall assist and make all arrangements as directed for **quality and quantity check** of various building materials used for the work. (Steel, Cement, Bitumen etc.) University Engineers, Deputy Engineers , Sectional Engineers of the department will not be responsible for the authenticity / genuineness of Invoice regarding the purchase of materials submitted by the contractor along with bill. If the invoices/bills/vouchers regarding the procurement of materials submitted by the contractor/Entrepreneur is found forged / fake or bogus, then criminal offence / FIR will be registered by concerned University Engineer. Even in future against the concerned contractor/Entrepreneur. If the invoices/bills/vouchers are found forged / fake or bogus after finalization of agreement then, in such case also the Criminal offence / FIR against the contractor/Entrepreneur as per Indian Penal Code will be registered by concerned University Engineer.

iii) University Engineer is empowered to verify the Invoices /Bill / Vouchers submitted by the contractors/Entrepreneur regarding the purchase of materials and in case of any doubt the University Engineers shall initiate field level enquiry of such documents. After due verification of Invoices regarding purchase of construction materials if these or any of these invoices /Bills/Vouchers are found forged / fake or bogus, then Criminal offence against such contractor/Entrepreneur will be registered under Indian Penal Code by concerned University Engineer..

(V) **Test of steel Cement and other building materials.**

The contractor /Entrepreneur shall assist and make all arrangements as directed for carrying out various quality control tests of steel/cement / other construction materials procured from main producers or their authorized distributors, as per the norms of Indian Standard Bureau for the materials procured by contractor.

The contractor/Entrepreneur shall assist and make all arrangements as directed on the basis of consumption of Steel/ Cement, to carry out required quality control tests as per frequency of Tests chart.

30% quality control tests shall be carried out in the laboratories of WORKS DIVISION and remaining 70% tests shall be carried out in field laboratory installed by the contractor at work site.

If field laboratory is not available then such tests shall be carried out from the laboratory of Engineering Colleges or any other Government laboratory.

(VI) If the contractor/Entrepreneur is found guilty in case of forged /Fake Bills /Invoices/ Vouchers regarding the purchase of materials then criminal action against such contractor/Entrepreneur will be initiated by concerned University Engineer and as per the Law Of Contract the contractor will be black listed forever for works in the WORKS DIVISION (Maharashtra) and will be debarred from participation in any tendering process of the WORKS DIVISION of state of Maharashtra.

(VII) The contractor/Entrepreneur shall assist in grade testing of bitumen at field level.

(VII) The Contractors/Entrepreneurs shall have facility of various bitumen test / quality control test and having modern machinery.

(VIII) **For the works costing Rs. 5.00 Crore and above** - The contractor/Entrepreneur must have ownership of who acquired the required tests equipments for carrying out various bitumen tests, and advanced machinery.

(IX) The Contractor/Entrepreneur shall submit Bills/ Invoices/Vouchers of the utilized Bitumen and other construction materials in quadruplicate (4 Copies) on the Fifth Day of the next month of work completed to the concerned Sub-Division. One copy out of four will be duly signed by University Engineer and returned to the contractor for their Tax and Audit purpose. If contractor fails to submit such invoices then he will be solely responsible for the delay in payment.

(X) The Contractor/Entrepreneur shall submit the abstract of utilized materials in prescribed format (Consumption Statement). The University Engineer & the Divisional Accounts Officer will verify such Consumption Statements and attest the same. Contractor/Entrepreneur shall submit invoices/bills/vouchers as per consumption statement with certificate mentioning that the submitted invoices are not forged or fake. The certificate so given by the contractor will be attested by University Engineer and Divisional Accounts Officers. If such certificate submitted by the Contractor/Entrepreneur is found forged/Fake then Criminal action will be initiated against such contractor.

5. **Instructions regarding utilization of bitumen (V.G.30 Grade Bitumen as per Indian Standard) procured directly from the foreign manufacturing refineries.**

The permission to use VG 30 grade bitumen procured from foreign refineries for the road works under WORKS DIVISION will have to be sought by the contractors/Entrepreneurs from concerned University Engineer in writing before start of work. This permission is only for works taken up on experimental basis. The works on which bitumen procured form foreign refineries is utilized will be under supervision for 2 years for the checking the Performance. the findings will be recorded carefully. The quality of such works works will be Tri Party such as I.I.T, V.J.T.I., V.N.I.T etc. during defect liability period.

Following conditions shall be fulfilled for bitumen procured from foreign refineries.

(1) Bitumen procured from foreign refineries directly shall be conforming to **Indian Standard Bureau Code IS 73:2013**

(2) Refineries shall submit CRC/Bill Invoice in Triplicate with Test Report of Bitumen of concerned bitumen batch. Also inferences of such tests carried out by the foreign refineries in their owned laboratories as per Indian Standard shall also be submitted by the contractor/Entrepreneur to the department.

(3) Such Foreign refineries shall have their owned laboratory in India. Contractor/Entrepreneur shall submit test reports carried out in foreign refinery owned laboratory in India after availability of bitumen in India.

(4) For the purpose of calculating the price variation the lowest of the rate of VG-30 grade bitumen of foreign refinery and the rate of VG-30 grade bitumen of Indian Public Sector refinery on the same date in India, shall be taken. In case of Negative escalation the highest rate of above mentioned rates shall be preferred.

(5) Foreign Refineries bitumen shall be used after obtaining satisfactory test results from Government approved laboratory. Before utilization of such foreign bitumen on the work, the contractor shall submit the undertaking that *" He will be liable for maintaining the Quality of the works as per the prescribed norms and to carry out the required tests of bitumen satisfactory as the the Indian Standards. If quality of such work is not maintained by the contractor OR required tests results of bitumen are not found satisfactory, then such works will be repaired / rectified by the contractor at his own cost. If he denies then the work will be rectified at the Risk & Cost of the contractor. Recovery of such expenses will be made from him as 'Arrears of Land Revenue'. "*

13. Insurance

13.1 The Contractor shall provide Contractor's All Risk Insurance (CAR), in the joint names of the Employer and the contract Insurance cover from the Start Date to the end of the Defects Liability Period in the amounts as deductible stated in the Contract Data for the following events which re due to the Contractor risk.

a) Loss of or damage of the works, Plant and Materials

b) Loss of or damage of Equipment

c) Loss or damage of property (except the Works, Plant, Materials and Equipments in connection with the Contract; and

d) Personal injury or death of any personnel employed by the contract is during execution and maintenance defect Liability period, employee of PWD, any person using the facility created by the contract during the construction and defect liability period.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide is compensation to be payable in the types and proportions of currencies required to rectify the loss of damage incurred.

13.3 If the Contractor does not provide any of the polices and certificated required, the employee may affect the insurance which the Contractor should have provided and recover premiums the Employer has paid from payments otherwise due to the Contractor of It's payment is due, the payment of the premiums shall be a debt due shall be recoverable from the bills and deposits of the contractor of any work in Maharashtra and if no dues in work than as arrears of land revenue.

13.4 Alternations to the terms of Insurance shall not be made without the approval of the Engineer.

13.5 Both parties shall comply with any conditions of the insurance policies.

14 Mandatory Testing of Material and Penalty Clause :- It is mandatory on the part of contractor to carry out all the required tests of various construction materials as mentioned in schedule "B" of the tender. If the contractor fails to submit required test result of the various construction materials as mentioned in the items of schedule "B", he will be liable to deposit the amount at penal rate of five times of the amount of particular test which he has not carried out. Contractor will be informed by the engineer-in-charge through letter. On receipt of letter contractor will have to either deposit the said amount or to carry out the required test within ten days. If he again fails to carry out the required test in stipulated time limit, the said test will be carried out by the department and total expenditure incurred on the testing charges plus five times amount of testing charges will be recovered from the contractor's bill.

As this recovery is only due to the negligence on the part of contractor to carry out work as per Tender conditions and University Engineer's decision will be final and binding on the contractor and it can not be challenged by the contractor by way of Appeal ,Arbitration or in the Court of Law.

The Percentage shall be applied to work portion (A) only. The Part "B" of schedule "B" will be intact.

TENDER FOR WORKS.

I/We hereby tender for the execution, for the Governor of Maharashtra (herein before and hereinafter referred to as "Government") of the work specified in the under written memorandum within the time specified in such memorandum at *( )* in figure as well as in words_____ Percent below/above the estimated rates entered in Schedule 'B' (Memorandum showing items of work to be carried out) and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule 1 hereof and in Clause 13 of the annexed conditions of contract. And agree that when materials for the work are provided by Government such materials and rates to be paid for them shall be as provided in Schedule 'A' hereto.

Contractor's Signature
and seal of contractor

MEMORANDUM

General Description :

a) If several sub-works are included they should be detailed in a separate list : COLOURING AND REPAIRS TO AGRICULTURE RESEARCH STATION NAVEGAON BANDH DIST. GONDIA UNDER DR. PDKV AKOLA(IIND CALL)

b) Estimated Cost. : **Rs. 252716 /-**

c) The amount of earnest money to be deposited shall be in accordance with the provisions of paras 206 and 207 of the M.P.W. Manual. : Earnest Money 1 Percent subject to minimum of Rs. **Rs.3000/-**

d) This deposits shall be in accordance with paras 213 and 214 of the M.P.W. manual : **Security Deposit** 2% **Rs. 6000/-** (at the time of agreement)

Total **Rs. 6000/-**

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e) This percentage where no security deposit is taken will vary from 5% to 10% according to the requirement of the case. Where security deposit is taken as note to Clause 1 of conditions of contract. : Percentage, if any, to be deducted from bills so as to make up the total amount required as Security deposit by time, half the work as measured by the cost, is done, (**2 %) Two** percent.

f) Give schedule where necess--ary dates by which various items are to be completed. : f) Time allowed for the work, from date of written order, to complete **60 Days** including Monsoon & govt. holiday.

Should this tender be accepted I/We hereby agree that this offer shall remain open for acceptance for a minimum period of 45 days from the day fixed for opening the same and thereafter until it is withdrawn by me/us by notice in writing duly addressed to the authority opening the tenders and sent by registered post A.D. or otherwise delivered at the office of such authority.

Treasury challan No._____ dated _____ or Term Deposit receipt, for period of the year issued by a scheduled bank and duly endorsed in the name of **University Engineer, Dr. PDKV Akola** a sum of **Rs. 3000/-** representing the earnest money is herewith forwarded. The amount of earnest money shall not bear interest and shall be liable to be forfeited to the Government. Should I/We fail to (1) abide by the stipulation to keep the offer open for the period mentioned above or (2) sign and complete the contract documents required by the Engineer and furnish the security deposit it as specific in term (d) of memorandum contained in paragraph I above within the time limit laid down in clause (i) of the annexed general conditions of the contract. The amount of earnest money may be adjusted towards the

security deposit or refunded to me/us if so desired by me/us in writing unless the same or any part thereof has been forfeited as aforesaid

I/We have secured exemption from payment of earnest money after executing the necessary bond in favour of the Government a true copy of which is enclosed herewith, should any occasion for forfeiture of earnest money for this work arise due to failure on my/our part to (1) abide by the stipulation to keep the offer open for the period mentioned above - or (**2**) sign and complete the contract documents and furnish the security deposit as specified in item (d) of the memorandum contained in paragraph I above within the time limit laid down in clause (1) of the annexed General conditions of the contract, the amount payable by me/us may, at the option of the Engineer, be recovered out of the amount deposited in lump sum for securing exemption in so far as the same may extend in terms of the said bond and in the event of the deficiency out of any other money which are due or payable to me/us by the Government under any other contract or transaction of any nature whatsoever or otherwise.

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provision of the conditions of contract annexed hereto so far as applicable and in default to forfeit and pay to government the sum of money mentioned in the said condition. Receipt No. _____ dated _____ from the Government Treasury at in respect of sum of **Rs.3000/-** forwarded representing the earnest money (a) the full value of which is to be absolutely forfeited to Government should I/we not deposit the fully amount of security specified in the above memorandum in accordance with Clause 1 (A) of the said conditions of the contract, otherwise the said sum of **Rs.3000/-** shall be refunded.

Contractor
(Address)

+ Signature of Contractor
before submission of Tender.

Dated the day of 20

(Witness)

+ Signature of Witness
to Contractors Signature.

(Address)
(Occupation)

Signature of the Officers
by whom accepted.

The above tender is hereby accepted by me on behalf of Governor of Maharashtra.

University Engineer,
Works Division, Dr. PDKV Akola,

Dated the_____day of_____2

CONDITIONS OF CONTRACT

Security Deposits	**Clause 1 :-**The person/persons whose tender may be accepted (herein after called the contractor, which expression shall unless excluded by or repugnant to the context include his, heirs, executors, administrators, contractor and assigns) shall (A) within 10 days (which may be extended by the Superintending Engineer concerned, upto 15 days if the Superintending Engineer thinks fit to do so) of the receipt by him of the notification of the acceptance of his tender deposit with the University Engineer in cash or Govt. securities endorsed to the University Engineer (if deposited for more than 12 months) of sum sufficient which will made up the full security deposit specified in the tender or (B) (Permit Government at the time of making any payment to him for work done under the contract to deduct such as will amount *+ four percent of all moneys so payable such deduction to be held by Government by way of security deposit) provided always that in the event of the contractor depositing a lump sum by way of security deposit as contemplated at (A) above, then and in such case, if the sum so deposited shall not amount to Two percent, of the total estimated cost of the work, it shall be lawful for Government at the time of making any payment to the contractor for work done under the contract to make up the full amount of two percent by deducting a sufficient sum from every such payment as last aforesaid until the full amount of the security deposit is made up. All compensation or other sum of money payable by the contractor to Government under the terms of his Contract may be deducted from or paid by the sale of sufficient part of his security deposit or from the interest arising there from or from any sums which may be due or may become due by Government to the Contractor under any other contract or transaction of any nature on any account whatsoever, and in the event of his security deposit being reduced by reason of any such deduction or sale as aforesaid, the contractor shall, within ten days thereafter, make good in cash or Government securities endorsed as aforesaid any sum or sums which may have been deducted from or raised by sale of his security deposits or any part thereof. The Security Deposit referred to when paid in cash may, at the cost of depositor, be converted into interest bearing securities provided that the depositor has expressly desired this in writing. If the amount of the Security Deposit to be paid in lump sum within the period specified at (A) above is not paid, the Tender/Contract already accepted shall be considered as cancelled and legal step will be taken against the contractor for recovery of the amounts. The amount of

	the Security Deposit lodged by a contractor shall be refunded along with the Payment of the final bill, if the date up to which the contractor has agreed to maintain the work in good order is over. If such date is not over, only **50%** amount of security deposit shall be refunded along with the payment of the final bill. The amount of security deposit retained by the Government shall be released after expiry of period up to which the contractor has agreed to maintain the work in good order is over. In the event of the contractor failing or neglecting to complete rectification work within the period up to order, then, subject to provisions of clauses 17 and 20 hereof the amount of Security Deposit retained by Government shall be adjusted towards the excess cost incurred by the department on rectification work *+ This will be the same percentage as that in the tender act (e).
Compensation for delay.	**Clause 2 :-** The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor and shall be reckoned from the date on which the order to commence work is given to the contractor. The work shall throughout the stipulated period of the contract be proceeded with, all due diligence (time being deemed to be of the contractor) and the contractor shall pay as compensation an amount as the University Engineer (whose decision in writing shall be final) may decide, of the amount of the estimated cost of the whole work as shown by the tender for every day that work remains uncommenced, or unfinished, after the proper dated. And further to ensure good progress during the execution of the works, the contractor shall be bound in all cases, in which the time allowed for any work exceeds one months to complete.
	The Programme for completion of work is attached in form of bar chart on page No._____. The contractor is supposed to carry out the work and keep the progress as per bar chart on page No. _____. The contractor should complete the work as per phase period given below, which is arrived from the bar chart. The programme of details process laid down by the University Engineer. The following proportion will usually be found suitable. In ¼ time -25% of work ½ time- 50% of work 3/4time -75% of work **60 Days (60 Days including Govt. Holiday & Monsoon Period) . 100% of work.,**

	In the event of the contractor failing to comply with these conditions he shall be liable to pay as compensation an amount equal to one percent, or such smaller amounts as the University Engineer (whose decision in writing shall be final) may decide of the said estimated cost of the whole work for every day that the due quantity of work remains incomplete. Provided always that the total amount of compensation to be paid under provision of this clause shall not exceed 10 percent of the estimated cost of the work shown in the tender. University Engineer, should be the final authority in this respect irrespective of the fact that the tender is accepted by Chief Engineer, Additional Chief Engineer/ Superintending Engineer/ University Engineer of Assistant Engineer/Sub-Divisional Engineer.
Action when whole of Security Deposit is forfeited.	**Clause 3 :-** In any case in which under any clause or clauses of this contract the contractor shall have rendered himself liable to pay compensation amounting to the whole of his Security Deposit (whether paid in one sum or deducted by installments) or in the case of abandonment of the work owing to serious illness or death of the contractor or any other cause, the University Engineer on behalf of the Governor of Maharashtra, shall have power to adopt of the following courses as he may deem best suited to the interests of Government. **a)** To rescind the contract (of which rescission in writing to the contractor under the hand of the University Engineer shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of Government. **b)** To carry out the work or any part of the work departmentally debiting the contractor which the cost of the work, expenditure incurred on tools and plant, and charges on additional supervisory staff including the cost of work charged establishment employed for getting the departmentally in all respects in the same manner and at the same rates as if it had been carried out by the contractor under the terms of the contract. The certificate of the University Engineer as to all the cost of the work and other allied expenses so included and the value of the work so done departmentally shall be final and conclusive against the contractor. **c)** To order that the work of the contractor be measured up and to take such part thereof as shall be unexecuted out of his hands and to give it to another contractor to

	complete, in which case all expenses incurred on advertisement for fixing a new contracting agency, additional supervisory staff including the cost of work charged establishment and cost of the work executed by the new contract agency will be debited to contractor and the value of the work done or executed through the new contractor shall be credited to the contractor in all respects and in the same manner and at the same rates as if it had been carried out by the contractor under the terms of his contract. The certificate of the University Engineer as to all the cost of the work and other expenses incurred as aforesaid for or in getting the unexecuted work done by the new contractor and as the value of the work so done shall be final and conclusive against the contractor. In case the contract shall be rescinded under clause (a) above, the contractor shall not be entitled to recover or be paid any sum for any work thereto for actually performed by him under this contract unless and until the University Engineer shall have certified in writing the performance of the such work and the amount payable to him in respect there of and he shall only be entitled to paid the amount so certified. In the event of either of the courses referred to in clause (b) or (c) being adopted and the cost of the work executed departmentally or through a new contractor and other allied expenses exceeding the value of such work credited to the contractor, the amount of excess value shall be deducted from any money due to the contractor by the Govt. under the contract or otherwise. Howsoever or from his security deposit or the sale proceeds thereof provided howsoever, that the contractor shall have no claim against Government even if certified value of the work done departmentally or through a new contractor except the certified cost of such work and allied expenses provided always that whichever of the three courses mentioned in clause (a), (b) or (c) is adopted by the University Engineer the contractor shall have no claim to compensation for any loss sustained by him reason of him having no claim to compensation for any materials, or entered into engagement or made any advance on account of or with a view of the execution of the work or the performance of contract.
Action when the progress of any particular portion of the work is unsatisfactory.	**Clause 4 :-** If the progress of any particular portion of the work is unsatisfactory the Executive Engineer shall not withstanding the general progress of the work is satisfactory in accordance with clause 2, be entitled to take action under clause 3(b) after giving the contractor 10 days notice in writing and the contractor will have no claim for compensation for any loss sustained by him owing to such action.

Contractor remains liable to pay compensation if action not taken under clause 3 & 4 Power to take possession of or require removal of or sell contractor's plant.	**Clause 5 :-** In any case in which any of the powers conferred upon the Executive Engineer by Clause 3 and 4 hereof shall have become exercisable and the same shall not been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall not withstanding be exercisable in any future case of default by the contractor for which by under any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his security deposit and the liability of the contractor for past and future compensation shall remain unaffected. In the event of the Executive Engineer taking action under sub-clause (a) or (c) clause (3) he may, if he so desires, take possession of all or any tools plant, materials and stores in or upon the works or the site thereof or belonging to the Contractor, or procured by him and intended to be used for the execution of the work or any part thereof, paying or allowing, for the same in account at the contract rates, or in case of contract rates not being applicable at current market rates, to be certified by the University Engineer whose certificate thereof shall be final. In the alternative the University Engineer may after giving notice in writing to the contractor or to his clerk of the works, foreman or other authorised agent require him to remove such tools, plant, materials or stores from the premises within a time to be specified in such notice and in the event of contractor failing to comply with any such requisition the University Engineer may remove them at the contractor's expenses or sale them by auction or private sale, on account of the contractor at his risk in all respects, and the certificate of the University Engineer as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale be final and conclusive against the contractor.

Extension of time	**Clause 6 :-** If the Contractor shall desire an extension of the time for completion of the work on the ground of his having unavoidably hindered init execution or on and the other ground, he shall apply in writing to the University Engineer before the expiration of the period stipulated in the tender or before the expiration of 30 days from the date to which he was hindered as aforesaid or on which the cause for asking extension occurred, whichever is earlier and the University Engineer may, if in his opinion there are reasonable ground for granting an extension, grant such extension as he thinks necessary or proper. The decision of the Chief Engineer P.W D. Region Amravati in this matter shall be final. **Clause 6-A :-** In the case of delay in handing over the land required for the work due to unforeseen cause, the contractor shall not be entitled for any compensation whatsoever from the Government on the ground that the machinery or the labour was idle for certain period. Contractor may, however apply for extension of time limit which may be granted on the merit of the case.
Final Certificate.	**Clause 7 :-** On completion of the work the contractor shall be furnished with a certificate by the University Engineer (Hereinafter called the Engineer-in-charge) in such completion but no certificate shall be given nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall have been executed all scaffolding surplus materials and rubbish and shall have cleaned of the dirt from all wood work, doors, windows, floors or other parts of any building, in or upon which the work has been executed, or on which he may have had possession for the purpose of executing the work nor until the work shall have been measured by the Engineer-in-charge or where the measurements have been taken by his subordinates until they have received the approval of the Engineer-in-charge or where the measurements have been taken by his subordinates until they have received the approval of the Engineer-In-Charge, the said measurements being binding and conclusive against the contractor. If the contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus material and rubbish, and cleaning off dirt on or before the date fixed for the completion of the work, the Engineer-in-charge may at the expense of the contractor, remove such scaffolding, surplus materials and rubbish, and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and the contractor shall forthwith pay the amount of all expenses so

	incurred but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.
Payments on intermediate Certificate to be regarded as advances.	**Clause 8 :-** No payment shall be made for any work estimated to cost less than Rs. One thousand. After the whole of the said work shall have been completed ,a certificate of completion shall be given. But in the case of the works estimated to cost more than Rs. One thousand, the contractor shall on submitting a monthly bill therefore, be entitled to receive payment proportionate to the part of the work then approved and passed by the Engineer-in-charge, whose certificate of such approval and passing of the sum payable shall be final and conclusive against the contractor. All such intermediate payment shall be regarded as payments by way of advance against the final payments only and not preclude the Engineer-in-charge from requiring any bad unsound, imperfect or unskillful work to be removed and taken away and reconstructed, or reacted, nor shall any such payment be considered as an admission of the due performance of the contract or any part thereof, in any respect or the occurring of any claim, nor shall it conclude, determine or affect in any way the powers of the Engineer-in-charge as to final settlement and adjustment of the accounts or otherwise, or in any other way vary or affect the contract. The final bill shall be submitted by the contractor within one month of the date fixed for the completion of the work otherwise the Engineer-in-charge's certificate of the measurement and of the total amount payable for the work shall be final and binding on all parties.
Payments at reduced rates on account of items of work not accepted as completed to beat the discretion of the Engineer-in- charge.	**Clause 9:-** The rates for several items of work estimated to cost more than Rs. One Thousand agreed to within, shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In case where the itemsof work are not accepted as so completed the Engineer-in-charge may make payment on account of such items at such reduced rates as he may consider reasonable in preparation of final or on account bills.

Bill to be submitted monthly.	**Clause 10 :-** A bill shall be submitted by the contractor each month on or before the date fixed by the Engineer-in-charge for all work executed in the previous month, and the Engineer-in-charge shall take or cause to be taken the requisite measurement for the purpose of having the same verified and the claim so far as it is admissible shall be adjusted, if possible, within 10 days from the presentation of the bill. If the contractor does not submit the bill within time fixed as aforesaid, the Executive-in-charge may depute a subordinate to measure up the said work. The presence of the contractor or his duly authorised agent whose counter signature to the measurement list shall be sufficient warrant, and the Engineer-in-charge may prepare a bill from such list which shall be binding on the contractor in all respects.
Bill to be on printed form.	**Clause 11 :-** The Contractor shall submit all bills on the printed forms to be had on application at the office of the Engineer-in -charge. The charges to be made in the bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these condition and not mentioned or provided for in the tender, at the rate hereinafter provided for such work.
Store supplied by Government.	**Clause 12 :-** If the specification or estimate of the work provides for the use of any special description of materials to be supplied from the P.W.D. store or if it is required that the contractor shall use certain stores, and the prices to be charged therefore as hereinafter mentioned being so far as practicable for the convenience of the contractor but not so as in any way to control the meaning or effect of this contract specified in the schedule or memorandum (hereto annexed) the contractor shall be supplied with such materials and stores as may be required from time to time to be used by him for the purposes of the contract only, and the value of the full quantity of materials and stores so supplied shall be set off or reduced from any sums then due, or otherwise, or from the security deposit, or the proceeds of sale thereof, if the deposit is held in Government securities the same or a sufficient portion thereof shall in that case be sold for the purpose. All materials supplied to the contractor shall remain the absolute property of Government and shall on no account be removed from the site of the work and shall at all times be open to inspection by the Engineer-In-Charge. Any such materials unused and is perfectly in good condition at the time of completion or determination of the contract shall be returned to the WORKS DIVISIONs store, if the Engineer-In-Charge so requires by a notice in writing given under his

	hand, but remaining unused by him or for any wastage in or damage thereto.
Work to be executed in accordance with specifications, drawings, orders etc.	**Clause 13 :-** The contractor shall execute the whole and every part of the work like manner and both as regards materials and every other respect in strict accordance with specifications**.** The contractor shall also confirm exactly fully and faithfully to the designs, and drawings and instructions in writing relating to the work signed by the Engineer-in-charge and lodged in his office and to which the contractor shall be entitled to have access for the purpose of inspection at such office or at the site of work during office hours. The contractor will be entitled to receive three sets of contract drawings and working drawings as well as one certified copy of the accepted tender along with the work order free of cost. Further copies of the contract drawings and working drawings if required by him, shall be supplied at the rate of Rs. 1000/- per set of contract drawing and Rs. 1000/- per working drawing except where otherwise specified.
Alterations in specifications & designs not to invalidate contract. **Rate for works not entered in the estimate on schedule of rate of the district.**	**Clause 14 :-** The Engineer-in-charge shall have power to make any alterations in, or additions to or drawing design and instructions that may the original specifications, appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given him in writing signed by the Engineer -in-charge and such alterations shall not invalidate the contract, and any additional work which the contractor may be directed to do in the manner above specified as a part of the work shall be carried out by the contractor in the same conditions in all respects on which he agreed to the main work and at the same rates as per specified in the tender for the main work. And if the additional or altered work, includes any class of work for which no rate is specified in this contract, then such class of work shall be carried out at the rates entered in schedule of rates of the division or at the rate mutually agreed upon rates between the Engineer-in-charge and the contractor which ever are lower. If the additional or altered work for which no rate is entered in the Schedule of rates of the Division, is ordered to be carried out before the rates are agreed upon, then the contractor shall within 7 days of the date of receipt by him of order to carry out work inform the Engineer-in-charge of the rates which if his intention to charge for such class of work, and arrange to carry it out in such manner as he may consider advisable, provided always that if the contractor shall commence work or incur any

Extension of time in consequence of additions or alterations.	expenditure in regard thereto before the rate shall have been determined as lastly here in before mentioned then in such case he shall only entitled to be paid in respect if the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of a dispute the decision of the Superintending Engineer of the Circle will be final. Where however, the work is to be executed according to the designs, drawings, and specifications recommended by the contractor and accepted by the competent authority the alterations above referred to shall be within the scope of such designs, drawings, and specifications to the tender. The time limit for the completion of work shall be extended in the proportion that the increase in its cost occasioned by alterations or additions bears to the cost of the original contract work, and the certificate of the Engineer-in-charge as to such proportion shall be conclusive.
No claim to any payment or compensation for alteration in or restriction of work	**Clause 15 :-** (1) If at any time after the execution of the contract documents, the Engineer shall for any reason whatsoever (other than default on the part of the contractor and for which Government is entitled to rescind the contract) desire that the whole or any part of the work specified in the tender should be suspended or that the whole or part of the work should not be carried out at all he shall give to the contractor a notice in writing of such desire and upon the receipt of such notice the contractor shall forthwith suspend or stop the work wholly or in part as required, after having due regard to the appropriate state at which the work should suspended so as not to cause any damage or injury to the work already done or endanger the safety thereof injury to the work already done or endanger the safety thereof provided that the decision of the Engineer as to the stage at which the work or any part of it could be or could have been safely stopped or suspended shall be final and conclusive against the contractor The contractor shall have no claim to any payment or compensation whatsoever by reason of or in pursuance of any notice as aforesaid on account of any suspension, stoppage or curtailment except to the extent specified here-in-after. (2) Where the total suspension if the work ordered as aforesaid continued for a continuous period exceeding 90 days, the contractor shall be at liberty to withdraw from the contractual obligations under the contract so far as it pertains to the unexecuted part of the work by giving a 10 days prior

	notice in writing to the Engineer, within 30 days of the expiry or expiry of the said period of 90 days, of such intention and requiring the Engineer to record the final measurements of the work already done and to pay the final bill. Upon given such notice, the contractor shall be deemed to have been discharged from his obligation to complete the remaining unexecuted work under this contract on receipt of such notice the Engineer shall proceed to complete the measurement and make such payment as may be finally due to the contractor within a period of 90 days from the receipt of such notice in respect of the work already done by the contractor. Such payment shall not in any manner prejudice the right of the contractor to any further compensation under the remaining provision of this clause. (3) Where the Engineer requires the contractor to suspend the work for a period in excess of 30 days at any time or 60 days in the aggregate, the contractor shall be entitled to apply to the Engineer within 30 day of the resumption of the work after such suspension for payment of compensation to the extent of pecuniary loss suffered by him in respect of working machinery rendered idle on the site or on account of his having, have to pay the salary or wages of labour engaged by him during the said period of suspension. Provided always that the contractor shall not be entitled to any claim in respect of any such working machinery, salary or wages for the first 30 days whether consecutive or in the aggregate of such suspension or in respect of any suspension whatsoever occasioned by unsatisfactory work or any other default on his part. The decision of the Engineer in this regard shall be final and conclusive against the contractor. **(4) In the event of** i) Any total stoppage of work on notice from the Engineer under sub-clause (1) in that behalf. ii) Withdrawal by the contractor from the contractual obligation to complete the remaining unexecuted work under sub-clause (2) on account of continued suspension of work for a period exceeding 90 days. iii) Curtailment in the quantity of an item or items originally tendered on account of any alteration, omission or substitutions in the specifications, drawings, designs or instructions under clause 14(1) where such curtailment exceeds 25% at the rates for the items specified in the tender is more than **Rs. Five thousand/-** It shall be open to the contractor within 90 days from the service of (i) the notice of stoppage of work or (ii) the notice of withdrawal from the contractual obligation under the contract on account of the continued suspension of the work or (iii) notice under clause 14(1) resulting such curtailment or

	produce to the Engineer Satisfactory documentary evidence that he had purchased or agreed to purchase material for use in the contracted work, before receipt by him of the notice of stoppage, suspension or curtailment and require the government to take over on payment such material at the rates determined by the Engineer. Provided however such rates shall in no case exceed the rates at which the same were acquired by the contractor. The Government shall thereafter take over the material so offered, provided the quantities offered are not in excess of the requirement of the unexecuted work as specified in the accepted tender and are of quality and specification approved by the Engineer.
Time limit for unforeseen claims.	**Clause 16 :-** Under no circumstances whatsoever shall the contractor be entitled to any compensation from Government on any account unless the contractor shall have submitted claim in writing to the Engineer-in-charge within one month of the cause of such claim occurring.
Action, compensation payable in case of bad work.	**Clause 17 :-** If any time before the Security Deposit or any part thereof is refunded to the contractor it shall appear to the Engineer-in-charge or his subordinate in charge of the work, that any work has been executed with unsound, imperfect unskillful workmanship or with materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for, or are otherwise not in accordance with the contractor, it shall be lawful for the Engineer-in-charge to intimate this fact in writing to the contractor and then not withstanding the fact that work, materials or articles complained of may have been inadvertently passed, certified and paid for, the contractor shall be bound forthwith to rectify or remove and reconstruct the work so specified in whole or in part, as the case may require or if so required, shall remove the materials or articles so specified and provided other proper and suitable materials or articles at his own charge and cost and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in the written intimation aforesaid, the contractor shall be liable to pay compensation at the rate of 1% on the amount of the estimate for every day not exceeding 10 days, during which the failure so continues and in the case of any such failure the Engineer-in-charge may rectify or remove and re-execute the work or remove and replace the materials or articles complained of as the case may be at the risk and expense in all respects of the contractors should the Engineer-in-charge consider that any such inferior work or materials as described above may be accepted or made use of it shall be within his discretion to accept the same at such reduced rates as be may fix therefore.

Work to be open to Inspection. Contractor or responsible agent to be present.	**Clause 18 :-**All works under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection and supervision of the Engineer-In-Charge and his sub--ordinates, and the contractor shall at all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Engineer-in-charge or his subordinates to visit the works shall have been given to the contractor, either himself be present to receive order and instructions or have a responsible agent duly accredited in writing, present for the purpose. Orders given to the contractor's duly authorised agent shall be considered to have the same force and effect as if they had been given to the contractor himself.
Notice to be given before the work is covered up.	**Clause 19 :-** The Contractor shall give not less than 5 days notice in writing to the Engineer-in-charge or his subordinates in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof taken before the same is so covered up or placed beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinate in charge of the work and if any work shall be covered up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense and in default thereof no payment or allowance shall be made for such work or for the materials with which the same was executed.
Contractor liable for damage done and for imperfection.	**Clause 20 :-** If during the period of **12 Months** from the date of completion as certified by the Engineer- in-charge pursuant to clause 7 of the contractor, in the opinion of the University Engineer the said work is defective in any manner whatsoever the Contractor shall forthwith on receipt of notice in that behalf from the University Engineer, duly commence execution in every respect all the work that may be necessary for rectifying and setting right the defects specified therein including dismantling and reconstruction of unsafe portions strictly in accordance with and in the manner prescribed and under the supervision of the **University Engineer. If the work or part of work is defective beyond repair, the contractor has to reconstruct the work / part of work as directed by University Engineer P.W.Division, Akola.** In the event of the Contractor failing or neglecting to commence execution of the said rectification work or reconstruct work within the period prescribed (not

	more than 3 months) therefore in the said notice and/or to complete the same as aforesaid as required by the said notice, the Executive Engineer may get the same executed and carried out departmentally or by any other agency at the risk, on account and at the cost of the Contractor. The Contractor shall forthwith on demand pay to the Government the amount of such cost, charges and expenses sustained or incurred by the Government of which the certificate of the Executive Engineer shall be final and binding on the Contractor. Such costs, charges and expenses shall be deemed to be arrears of land revenue and in the event of the Contractor failing or neglecting to pay the same on demand as aforesaid without prejudice to any other rights and remedies of the Government the same may be recovered from the Contractor as arrears of land revenue. The Government shall also be entitled to deduct the same from any amount which may then be payable or which may therefore become payable by the Government to the Contractor either in respect of the said work or any other work whatsoever or from the amount of security deposit retained by Government.
Contractor to supply plant, ladders, scaffolding etc.	**Clause 21 :-** The contractor shall supply at his own cost all materials (except such special materials if any) as may be supplied from the WORKS DIVISION Stores, in accordance with the contract), plant, tools, appliances, implements, ladders, cordage, tackle, scaffolding and any temporary works which may be required for the proper execution of the work, in the original, altered or substituted from, whether included in the specification or other documents forming part of the contract or referred to in these conditions or not and which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer-in-charge as to any matter on which under these conditions he is entitled to be satisfied, or which he entitled to require together with carriage therefor, to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out work, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or materials. Failing this the same may be provided by the Engineer-in-charge at the expenses of the contractor and the expenses may be deducted from any money due to the contractor under the contract or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof. The contractor shall provide all necessary fencing and lights required to protect the Public from accident and shall also be bound to bear the expenses of

	defence every suit, action or other legal proceedings at law that may be brought by any person for injury sustained owing to the neglect of the above precautions, and to pay damages and cost such person or which may with the consent of the contractor be paid in compromising any claim by any such person.
Works Scaffolding	**Clause 21-A :-** The contractor shall provide suitable scaffolds and working platforms, gangways and stairways and shall comply with the following regulations in connection therewith. a) Suitable scaffolds shall be provided for workman for all work that cannot be safely done from a ladder or by other means. b) A scaffold shall not be constructed, taken down or substantially altered except. i) Under the supervision of a competent and responsible person, and ii) As for as possible by competent workers possessing adequate experience in this kind of work. c) All scaffolds and appliance connected therewith and all ladders shall i) be of sound material ii) be of adequate strength having regard to the loads and strains to which they will be subjected, and iii) be maintained in proper condition d) Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use. e) Scaffolds shall not be overloaded and as far as practicable the load shall be evenly distributed. f) Before installing lifting gear on scaffolds special precaution shall be taken to ensure the strength and stability of the scaffolds. g) Scaffolds shall be periodically inspected by a competent person h) Before allowing a scaffold to be used by his workmen the contractor shall check where the scaffold has been erected by his workmen or not take steps to ensure that it complies fully with the regulations herein specified.

	i) Working platforms, gangways shall i) be so constructed that no part thereof can sag unduly or unequally. ii) be so constructed and maintained having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping, and iii) be kept free from any unnecessary obstructions. j) In the case of working platforms, gangways, working places and stairways at a height exceeding 3 meters. (to be specified). i) every working platform and every gangways shall have to be closely boarded unless other adequate measures are taken to ensure. ii) every working platform and gangways, shall have adequate width and. iii) every working platform, gangways, working places, stairway shall be suitably fenced. k) Every opening in the floor of the building or in working platform shall except for the time and to the extent required to allow the access or persons or the transport or shifting of materials be provided with suitable means to prevent the fall of persons or materials. l) When persons are employed on a roof where there is danger of falling from a height exceeding 3 meters suitable precaution (to be prescribed) shall be taken to prevent the fall of persons or materials. m) Suitable precautions shall be taken to prevent persons being struck by articles which might fall from scaffolds or other working place. n) Safe means of access shall be provided to all working platforms and other working places.
	Clause 21 B :- The contractor shall comply with the following regulations as regards the hoisting appliances to be used by him. (a) Hoisting machines and tackle, including their attachment, anchorages and supports shall

	(i) be of good mechanical construction, sound material and adequate strength and free from patent defect and (ii) be kept in good repaid and in good working order (b) Every rope used in hoisting or lowering material or as a means of suspension shall be of suitable quality and adequate strength and free from patent defect. (c) Hoisting machines and tackle shall be adequately tested after erected on the site and before and be re-examined in position at intervals to be prescribed by the government. (d) Every chain, ring hook shackle, swivel and pully block used in hoisting or lowering of materials or as a means of suspension shall be periodically examined. (e) Every crane driver or hoisting appliances operator shall be properly qualified. (f) No person who is below the age of 21 years shall be in control of any hoisting machine, including any scaffolds, which give signals to the operator. (g) In the case of every hoisting machine and of every chain, ring, hook, shackle, swivel and pulley block used on hoisting or lowering or as a means of suspension the safe working load shall be ascertained by adequate means. (h) Every hoisting machine and all gear referred to in the preceding regulation shall be plainly marked with the safe working load. i) In the case of hoisting machine having available safe working load, each safe working load and the condition under which it is applicable shall be clearly indicated. j) No party of any hoisting machine or of any gear referred to in regulation of above shall be loaded beyond the safe working load except for the purpose of testing. k) Motors, gearing transmissions, electric wiring

	and wiring and other dangerous part of hoisting appliances shall be provided with efficient safe guards. l) Hoisting appliances shall be provided with such means as will reduce to a minimum risk of the accidental descent of the load. m) Adequate precautions shall be taken to reduce to a minimum the risk of any part of a suspended load becoming accidentally displace.
Measure for prevention of fire.	**Clause 22 :-** The contractor shall not set fire to any standing jungle, tree, brush wood or grass without a written permit from the University Engineer. When such permit is given and also in all cases when destroying cut or dug up trees, brush wood, grass etc. by fire, the contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property. The contractor shall make his own arrangements for drinking water for the labour employed by him.
Liability of contractors for any damage done in or outside work area.	**Clause 23 :-**Compensation for all damage done intentionally or unintentionally by contractor's labour whether in or beyond the limits of Govt. property including any damage caused by the spreading of fire mentioned in clause 22 shall be estimated by the Engineer-in-charge or such other officer as he may appoint and the estimates of the Engineer-in-charge subject to the decision of the Superintending Engineer on appeal shall be final and the contractor shall be bound to pay the amount of the assessed compensation on demand failing which the same will be recovered from the contractor as damages in the manner prescribed in clause 1 or deducted by the Engineer -in-charge from any sums that may be due to or become due from government to the contractor under this contract or otherwise. The Contractor shall bear the expenses of defending any action or other legal proceedings that may be brought by any person for injury sustained by him owing to neglect of precautions to prevent the spread of fire and he shall also pay any damages and cost that may be awarded by court in consequence.
Employment of female labour.	**Clause 24 :-** The employment of female labourers on works in the neighborhood of soldiers barracks should be avoided as far as possible.
Work on Sunday.	**Clause 25 :-** No work shall be done on a Sunday without the sanction in writing of the Engineer-in-charge.

Work not to be sublet. **Contract may be rescinded and Security Deposit forfeited for subletting it without approval or for bribing a Public Officer or Contractor becomes insolvent.**	**Clause 26 :-**The contract shall not be assigned or sublet without the written approval of the Engineer--in-charge. And if the contractor shall assign or sublet his contract, or attempt so to do, or become insolvent or commence any proceedings to be adjudicated and insolvent or make any composition with his creditors, or attempt so to do the Engineer- in- charge may be notice in writing, rescind the contract. Also if any bribe, gratuity, gift, loan, perquisite, regard or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised, or offered by the contractor or any of his servants or agents to any public officer or person in the employment, of the Government in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Engineer-in-charge may notice in writing rescind the contract. In the event of a contract being rescinded, the Security Deposit of the contractor shall there upon stand forfeited and be absolutely at the disposal of the Government and same consequences shall ensure as if the contract had been rescinded under clause 3 hereof and in addition the contractor shall not be entitled to recover or be paid for any work therefore actually performed under the contract.
Sum payable by way of compensation to be considered as reasonable compensation without reference to actual loss	**Clause 27 :-** All sums payable by a contractor byway of compensation under any of these conditions shall be considered as a reasonable compensation to be applied to the use of Government without reference to the actual loss or damage sustained and whether any damage has or has not been sustained.
Changes in the constitution of the firm to be notified.	**Clause 28 :-** In the case of a tender by partners any change in the constitution of a firm shall be forthwith notified by the contractor to the Engineer-in-charge for his information.
S.E/University Engineer is the Authority of Direction and control of work	**Clause 29 :-** All works to be executed under the contract shall be executed under the direction and subject to the approval in all respects of the Superintending Engineer of the Circle for the time being, who shall be entitled to direct at what point or and in what manner they are to be commenced and from time to time carried on.

Work to be under direction and control of Superintending Engineer.	**Clause 30 :-** Except where otherwise specified in the contract and subject to the powers delegated to him by Government under the code rules then in force, the decision of the Superintending Engineer of the Circle for the time being shall be final, conclusive and binding on all parties to the contract upon all questions relating to the meaning of the specifications, designs, drawings and instruction herein before mentioned and as to the quality of the workmanship or material used on the work, or as to any other question, claim, right, matter or things whatsoever, in any way arising out of, or relating to the contract designs, drawing, specifications, estimates, instructions, orders or these conditions, or otherwise concerning the works, or the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof. 2) The contractor may within thirty days of receipt by him of any order passed by the Superintending Engineer of the Circle as aforesaid appeal against it to the Chief Engineer concerned with the contract, work or project provided that a) The accepted value of the contract exceeds Rs. 10/- lakhs (Rupees Ten Lakhs). b) Amount of claim is not less than Rs. 1.00 Lakh (Rupees One lakhs) 3) If the contractor is not satisfied with the order passed by the Chief Engineer as aforesaid the contractor may within thirty days of receipt by him of any such order, appeal against it to the concerned Secretary, WORKS DIVISION who, if convinced that prima-facie the contractors claim rejected by the Superintending Engineer/Chief Engineer is not frivolous and that there is some substance in the claim of the contractor as would merit a detailed examination and decision by the Standing Committee, shall put up to the Standing Committee at Government level for suitable decision.

Store of European or American manufacture to be obtained from the Govt.	**Clause 31 :-** The contractor shall obtain from the P.W.D. stores all stores and articles of European or American manufacture which may be required for the work, or any part of the work or in making up any article s required therefore or in connection therewith unless he has obtained permission in writing from the Engineer-in-charge to obtain such stores and articles elsewhere. The value of such stores and articles as may be supplied to the contractor by Engineer-in-charge will be debited to the contractor in his account at the rates shown in the Schedule in form "A" attached to contract, and if they are not entered in the said Schedule, they shall be debited to him at cost price which for the propose of this contract shall include the cost of carriage and all other expenses whatsoever, which may have to be incurred in obtaining delivery of the same as the stores aforesaid.
Lump sums in estimates.	**Clause 32 :-** When the estimate on which a tender is made includes lump sumps in respect of parts of the work the contractor shall be entitled to payment in respect of items of work involved or the part of the work in question at the same rates as are payable under this contract for such items, or if the part of the work question is not in the opinion of the Engineer-in-charge capable of measurement the Engineer-in-charge may at his discretion pay the lump sum amount entered in the estimate, and the certificate in writing of the Engineer-in-charge shall be final and conclusive against the contractor with regard to any sum or sums payable to him under the provisions of this clause.
Action where no specifications.	**Clause 33 :-**In the case of any class of work for which there is no such specification as mentioned in Rule-1 such work shall be carried out in accordance with the Divisional Specifications, and in the event of there being no Divisional Specifications, then in such case the work shall be carried out in all respects in accordance with the instruction and requirement of the Engineer-in-charge.
Definition of work.	**Clause 34 :-**The expression 'works' or 'work' where used in these condition shall, unless there be something in the subject or context repugnant to such construction be construed to mean the work or the works contracted to be executed under or in virtue of the contract, whether temporary or permanent and whether original, altered, substituted or additional.

Contractor's percentage whether applied to net or gross amount of bill.	**Clause 35 :-** The percentage referred to in the tender shall be deducted from/added to the gross amount of the bill before deducting the value of any stock issued.
Quarry fees & royalties.	**Clause 36 :-** All quarry fees, royalties, and ground rent for stacking materials if any, should be paid by the contractor.
Compensation under Workmen's Compensation Act.	**Clause 37 :-** The contractor shall be responsible for and shall pay compensation to his workmen payable under the Workmen's Compensation Act. 1923 (VIII of 1923), (herein after called the said Act) for injuries caused to the workmen's. If such Compensation is payable and or paid by Government as principal under the subsection (1) of section 12 of the said Act on behalf of the contractor, this shall be recoverable by Government from the contractor under sub section (2) of the said section. Such compensation shall be recovered in the manner laid down in clause I above. **Clause 37-A :-** The contractor shall be responsible for and shall pay expenses of providing Medical aid to any workmen who may suffer a bodily injury as a result of an accident. If such expenses are incurred by Government the same shall be recoverable from the contractor forthwith and be deducted without prejudice to any other remedy of Government from any amount due or that may become due to the contractor **Clause 37-B :-** The contractor shall provide all necessary personal safety equipment and first-aid apparatus available for the use of the persons employed on the site and shall maintain the same in condition suitable for immediate use at any time and shall comply with the following regulation in connection therewith - a) The worker shall be required to use the equipment so provided by the contractor and the contractor shall take adequate steps to ensure proper use of the equipment by those concerned. b) When work is carried on in proximity to any lace where there is no risk of drawing, all necessary equipment's shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger. c) Adequate provision shall be made for prompt first-aid treatment for all injuries likely to be sustained during the course of the work. **Clause 37-C :-** The contractor shall duly comply with the provision of 'The Apprentices Act. 1961 (III of 1961), the rules made there under and the orders that may be issued from

	time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subject to all the liabilities and penalties provided by the said Act and said Rules'.
Claim for quantity of works entered in the tender or estimate.	**Clause 38 :-** (1) Quantities in respect of the several items shown in the tender are approximate and no revision in the tendered rates shall be permitted in respect of any of the items so long as, subject to any special provision contained in the specification prescribing a different percentage of permissible variation, the quantity of the items does not exceed the tender quantity by more than 25% and so long as the value of the excess quantity beyond this limit, at the rate of the items specified in the tender, is not more than Rs. 5,000/-. **2)** The contractor shall if ordered in writing by the Engineer-in-charge so to do also carry out any quantities in excess of the limit mentioned in Sub-Clause (1) here of on the same conditions as and in accordance with the specifications in the tender and at the rates (i)derived from the rates entered in the current schedule of rates and in the absence of such rates (ii) at the rate prevailing in market, the said rates being increased or decreased as the case may be, by the percentage which the total tendered amount bears to the estimate cost of the work as put to tender, based upon the Schedule of rates applicable to the year in which the tenders where invited (for the purpose of operation of this clause, this cost shall be taken to be **Rs. 252716 /-** **3)** Claim arising out of reduction in the tendered quantity of any item beyond 25 percent will be governed by the provisions of clause 15 only when the amount of such reduction beyond 25% at the rate of the item specified in the tender is more tha **4)** Rs. **5,000-00.**
Employment of female or other labour.	**Clause 39 :-** The contractor shall employ any famine, convict or other labour of a particular kind of class if ordered in writing to do so by the Engineer-in-charge.
Claim for compensation for delay in starting work.	**Clause 40 :-** No compensation shall be allowed for any delay caused in the starting of the work on account of acquisition of land and in the case of the clearance work of any delay in according to sanction estimates.

Claim for compensation for delay in the execution of work.	**Clause 41 :-** No compensation shall be allowed for any delay in execution of the work on account of water standing in borrow pits or compartments. The rates are inclusive for hard or cracked soil excavation in mud, subsoil water or water standing in borrow pits and no claim for an extra rate shall be entertained, unless otherwise expressly specified.
Extra Payment	**Clause 42 :-** The Contractor shall not enter upon on commence any portion of work except with the written authority and instructions of the Engineer-in-charge or of his subordinate incharge of the work. Failing such authority the contractor shall have no claim to ask for measurements of or payment for work.
Minimum age of persons employed, the employment of donkey and/or other animals and the payment of fair wages.	**Clause 43 :-** (i) No contractor shall employ any person who is under the age of **18** years. (i) No contractor shall employ donkeys or other animals with breeching of string or thin rope. The breeching must be at lease 3 inches wide and should be of tape (Newar). (iii) No animal suffering from sores; lameness or emaciation or which is immature shall be employed on the work. (iv) The Engineer-in-charge or his agent authorised to remove from work any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by the Government for any delay caused in the completion of the work by such removal. (v) The contractor shall pay fair and reasonable wages to the workmen employed by him in the contract undertaken by him. In the event of any dispute arising between the contractor and his workmen on the grounds that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the University Engineer who shall decide the same. The decision of the University Engineer, shall be conclusive and binding on the contractor, but such decision shall not in any way affect the condition in the contract regarding the payment to be made by the Government at the sanctioned tender rates. (vi) The contractor shall provide drinking water facilities to the workers. Similar amenities shall be provided to the workers engaged on large work in urban areas.

Method of Payment.	**Clause 44 :-** Payment to contractors shall be made by cheques drawn on any treasury within the Division convenient to them. provided the amount exceed Rs. 10/- Amount not exceeding Rs.10/- will be paid in cash.
Acceptance of conditions compulsory before tendering the work.	**Clause 45 :-** Any contractor who does not accept these conditions shall not be allowed to tender for works.
Employment of scarcity labour.	**Clause 46 :-** If Government declare a state of scarcity or famine to exist in any village situated within 10 miles of work, the contractor shall employ upon such parts of the work as suitable for unskilled labour any person certified to him by the University Engineer or by any person to whom University Engineer may have delegated this duty in writing to be in need of relief and shall be bound to pay to such persons wages not below minimum which may arise in connection with the implementation of this clause shall be decided by the University Engineer whose decision shall be final and binding on the contractor.
GST Shall not be included in bidding offer and will be paid separately.	**47 (A) –** "The rates quoted by the Contractor shall be deemed to be inclusive of the labour welfare cess and other taxes (other than GST) that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable low. 1. Bidder shall quote his rate excluding GST. 2. GST shall be payable on the accepted contract value 3. GST Shall be paid to contractor on the amount of bill of work done as per prevailing rate of GST during the period of work done.
DELETED	**Clause 48 :-** The rates to be quoted by the contractor must be inclusive of Sales Tax. No extra payment on this account will be made to the contractor. **Clause 48 A:-** The contractors are bound to pay to the labourers wages according to the Minimum Wages Act, 1948

	applicable to the Zone in Accordance with the order issued in Government PWD/Circular No. MWA/1063, dated 7-12-1968.
	Clause 49 :- In case of materials that remain surplus with the contractor for those issued for the work contracted from the date of ascertaining of the materials being surplus be taken as the date of sale for the purpose of sales tax and the sale tax will be recovered on such sale. **Clause 49-A :- Deleted**
Employment of Labours	**Clause 50 :-** The contractor shall employ the unskilled labour to be employed by him on the said work only from locally available labours and shall give preference to those persons enrolled under Maharashtra Government Employment and Self Employment Departments Scheme. Provided, however that if the required unskilled labours are not available locally, the contractor shall in the first instance employ such number of persons as is available and thereafter may with previous permission. In writing of the University Engineer-in-charge of the said work, obtain the rest of requirement of unskilled the labour from outside the above scheme.
	Clause 51 :- Deleted
Land Charges	**Clause 52 :-** All amounts whatsoever which the contractor is liable to pay to the Government in connection with the execution of the work including the amount payable in respect of (1) Material and or stores supplied/issued hereunder by the Government to the contractor. (2) Hire charges in respect of heavy plant, machinery and equipment given on hire by the Government to the Contractor, for execution by him of the work and/or on which the advance have been given by the Government to the contractor shall be deemed to be arrears of the land revenue and the Government may without prejudice to any other rights and remedies of the Government recover the same from the contractor as arrears of land revenue.

Labour Act	**Clause 53 :-** The contractor shall duly comply with all the provisions of the Contract Labour (Regulation and Abolition) Act 1970, (37 of 1970 and the Maharashtra Contract Labour (Regulation and Abolition) Rules, 1971 as amended from time to time and all other relevant statutes and statutory provisions concerning payment of workers employed by him on the site of the work at the rates prescribed under the Maharashtra contract Labour (Regulation and Abolition) Rules 1971. If the contractor fails or neglects to pay wages at the said rates or make short payment and the Government makes such payment of wages in full or part thereof less paid by the contractor, as the case may be the amount so paid by the Government to such workers shall be deemed to be arrears of land revenue and the government shall be entitled to recover the same as such from the contractor or deduct the same from the amount payable by the Government to the contractor hereunder or from any other amounts payable to him by the Government. (Minimum wages act as per Government Circular CAT/1284/(120)/Building Dt. 14/8/1988).
	Clause 53-A :- Deleted
Price Variation	**Clause 54 :- Deleted**

Labour Health	**Clause 55 :-** A) The anti-malaria and other health measures shall be as directed by the Joint Director (Malaria and Filaria) of Health Services, Pune. B) Contractor shall see that Mosquito genic conditions are not created so as to keep vector population for minimum level. C) Contractor shall carry out anti malaria measures in the area as per guidelines prescribed under National Malaria (M & F) of health Services, Pune. D) In case of a default in carrying out prescribed anti malaria measures resulting in increase in malaria incidence contractor shall be liable to pay to Government the amounts spent by Govt. on anti malaria measures to control the situation in addition on fine. E) **Relations with Public Authorities :** The contractor shall make sufficient arrangements for draining away the sludge water as well as water coming from the bathing and washing places and shall dispose off this water in such a way as not to cause

	any substance. He shall also keep the premise clean by employing sufficient number of sweepers. The contractor shall comply with all rules, regulations, bylaws and directions given from time to time by any local or public authority in connection with this work and shall pay fees or charges which are leviable on him without any extra cost of Government. (Vide Govt. Circular No. CST-1086/CR-243/Ka-Bldg-2/Mantralaya Mumbai 1000032 dt. 11.8.87)
Govt Act's	**Clause 56** :- A contractor shall comply with all the provisions of the Apprentices Act. 1961 and the Rules and Orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Superintending Engineer may, in his discretion, cancel the contract. The contractor shall also be liable for an pecuniary liability arising on account of any violation by him of the provision of the (vide Govt. Circular No. CST - 1086/CR-243 Ka-Building-2/Mantralaya, Bombay-400 032, dated 11 Sept. 1987).
Taxes	**Clause 57 :-** The tender rates are inclusive of all taxes, rates, and cesses and are also inclusive of s leviable tax in respect of sale by transfer of property in goods involved in the execution of a work contract under the provision of Rule 58 Maharashtra Value added Tax Act 2005, for the purpose of levy of Tax"
	Clause 58 :- In case of materials which become surplus with the contractors from those issued for the work contracted for the date of ascertainment of the materials as being surplus will be taken as the date of sale for the purpose of sales tax and sales tax will be recovered on such sale.
Quality Assurance and Maintenance	**Clause 59 :-<u>Quality Assurance and Maintenance Manual</u>**:- **ANNEXURE "A"** : (Annexure to the PWD, Circular No. CAT-1091/CR-60-Bldg-2 Dt. 14th October 1991, regarding incorporating additional condition for Quality Assurance and Maintenance Manual). To ensure the specified quality of work which will also include necessary survey temporary works etc. the contractor shall prepare a quality assurance plan and get, the same provided from the Engineer-In-Charge within one month from the date of work order. For this contractor shall

	submit an organisation chart of his technical personnel to be deployed on the work alongwith their qualification, job descriptions defining the functions of reporting supervising inspecting and approving. The contractor shall also submit a list of tools equipment and the machinery and instrumentation which he proposes to use for the construction and for testing in the field and/or in the Laboratory and monitoring. The contractor shall modify/supplement the organisation chart and the list of machinery/ equipment etc. as per the direction of the Superintending Engineer and shall deploy the persons and equipment on the fields as per the approved chart and the list respectively. The Contractor shall submit written method statements dealing his exact proposal of execution of the work in accordance with the specification. He will have to get these approved from the Engineer-In-Charge. The quality of the work shall be properly documented through certificate, records, checks list, and Log Book of results etc. such records shall be complied from the beginning of the work and be continuously updated the supplementary and this will be the responsibility of the contractor. The forms should be got approved from the University Engineer-In-Charge. 2) Where the work is to be done on lump-sum basis on contractors designs. The contractor shall also submit a maintenance manual giving procedure. For maintenance, with the periodicity of maintenance works including inspection tools of the equipments to be used means of accessibility for all parts of the structure. He shall also include in the manual, the specification for maintenance works that would be appropriate for his design the technique of construction. This manual shall be submitted within the contract period.
Materials	**Clause 60:** It is obligatory on the part of agency to procure R.C.C. pipe (ISI) marked) required for the work from the M.S.S.I.D.C. only.The proof of such procurement like bill of M.S.S.I.D.C. certification of the Divisional Manager M.S.S.I.D.C. to that effect will have to be enclosed alongwith the bill pertaining to the work concerned. The payment towards the procurement of R.C.C. pipes and also items, in which the use of R.C.C. pipes is contemplated would be released only after fulfillment of the conditions, laid down as above. ***Note** : In case, provision of this form B-1 conflicts with those in detailed cyclostyled provision and condition attached to this tender, the detailed cyclostyled provision and condition would prevail over those in this form.*

GENERAL CONDITIONS OF CONTRACT

1) Authority of the Engineer-in-charge.

1.1) So far as it is legally or physically impossible, the contractor shall execute, complete and maintain the works in strict accordance with the contract under the directions and to the entire satisfaction of the Engineer-In-Charge and shall comply with and adhere strictly to the Engineer-In-Charge's instructions, and directions on any matter (whether mentioned in the contract or not pertaining to this works)

1.2) The Engineer-In-Charge shall decide all questions which may arise as to quality and acceptability of materials furnished and work executed, manner of execution, rate of progress of the works, interpretation of the plans and specifications and acceptability of fulfillment of the contract on the part of the contractor. He shall determine the amount and quality of the work performed and materials furnished and his decision and measurements shall be final. In all such matters and in any technical questions which may arise touching the contract, his decision shall be binding on the contractor.

1.3) The Engineer-in-charge shall have the power to enforce such decision and orders if the contractor fails to carry them out promptly. If the contractor fails to execute the work ordered by the Engineer-in-charge may give notice to the contractor specifying a reasonable period therein and on the expiry of the period proceed to execute such work as may be deemed necessary and recover the cost thereof from the contractor.

1.4) **Authorities of the Engineer-in-charge's Representative :**

The duties of the representative of the Engineer-in-charge are to watch and supervise the work and to test and examine the materials to be used for workmanship employed in connection with the works.

1.5) The Engineer-in-charge may from time to time, in writing, delegate to his representative any of the powers and authorities vested in the Engineer-in-charge and shall furnish to the contractor a copy of all such delegations of powers and authorities.
Any written instruction of approval given by the representative of the Engineer-in-charge to the contractor within the terms of such delegations (but not otherwise) shall bind the contractor and the department as through, it had been given by the Engineer-in-charge, provided always as follows :

a) Failure of the representative of the Engineer-in-charge to disapprove any work or materials shall not prejudice the power of the Engineer-in-charge thereafter to disapprove such work or materials and to order to pulling down, removal or breaking up thereof.

b) If the contractor is dissatisfied with any decision of the representative of the Engineer-in-charge, he shall be entitled to refer the matter to the Engineer-in-charge, who shall there upon confirm, reverse or vary such decision.

2) Other conditions for submission of Tender.

2.1) The Contractor shall be deemed to have carefully examined the work and site conditions including labour, the general and the special conditions, the specifications, schedules and drawings and shall be deemed to have visited the site of the work and to have fully informed himself regarding the lead conditions including tide and water level, wind and current velocity and sub-soil conditions and carried out his own investigation to arrive at the rates quoted in the

tender. In this regard he will be given necessary information to the best of knowledge of department but without any guarantee about it.

2.2) It is presumed that the contractor has carefully gone through the works specifications, P.W.D. Handbook, M.O.R.T.& H specifications and the schedule of rates of the division and studied the site conditions before arriving at the rates quoted by him.

3) Treasure trove :

In the event of discovery by the contractor or his employees during the progress of the works of the any treasure, fossils, minerals or any other articles of value or interest, the contractor shall give immediate intimation there of to the Engineer-in-charge and alongwith make over to the Engineer-in-charge this representative such treasure or things which shall be the property of Government.

3.1) Layout of work :

Layout of the work will be done by the Contractor in consultation with the University Engineer, of the Department or his representative. The modern equipments like Theodolite / Total station shall be deployed by the contractor at his own cost as directed by the Engineer-in-charge. Some permanent marks should however be established to indicate the demarcation of the structure or any component there of made to this permanent marks in measurement books and drawing, signed by the contractor and the departmental officer. Responsibility regarding layout will be joint. All vegetation / bushes shall be cleared from site before start of work, so as to stack the material without hindrance to traffic.

4) Agent and work order book :

4.1) The contractor shall himself engage an authorised all time agent on the work capable of managing and guiding the work and understanding the specifications and contract condition. A qualified and experienced Engineer be provided by the contractor as his agent for technical matters in case the Engineer-in-charge consider this as essential for the work and so directs the contractor. Agent will take orders as will be given by the University Engineer or his representative and shall be responsible for carrying them out. The agent and/or site Engineer shall not be changed without prior intimation to the University Engineer and his representative on the work site. The Engineer-in-charge have the unquestionable right to ask for changes in the quality and strength of Contractors supervisory staff and to order removal from work of any of such staff. The contractor shall comply with such order and effect replacements of the satisfaction of the Engineer-in-charge.

4.2 A work order book shall be maintained on site and it shall be the property of Government and the contractor shall promptly acknowledge the order given therein by the Engineer or his authorized representative or his superior officer, and comply with them. The compliance shall be reported by contractor to the Engineer-in-charge in good time so that it can be checked. The blank work order book, with machine numbered pages in quadruplicate with perforated sheets for three copies to be detached, will be provided by the department for this purpose. Whenever any instructions are written in the work order book the contractor will be supplied with the first carbon copy.

5) Initial measurement for record :

Where for proper measurement of the work it is necessary to have an initial set of levels or other measurement taken the same as recorded in the authorized field book or M.B. of Government by the Engineer or his authorized representative will be signed by the contractor who will be entitled to have a true copy of same made at his cost. Any failure on the part of the contractor to get such level etc. recorded before starting the work will tender him liable to accept the decision of the Engineer as to the basis of taking measurements. Likewise the contractor will not cover

any work which will render its subsequent measurement difficult or impossible without first getting the same jointly measured by himself and the authorized representatives of the Engineer. The record of such measurements on the Government side will be signed by the contractor and he will be entitled to have a true copy of the same made at his cost.

6) Custody of work:

All work and materials before being finally taken over by Government will be the entire liability of the contractor for guarding, maintaining and making good any damages of any magnitude. It is however, to be understood that before taking over such work. Government will not put it to regular use as distinct from casual or incidental use, except as specially mentioned elsewhere in this contract or as mutually agreed to.

7) Co-ordinations :

When several agencies for different sub works of the project are to work simultaneously on the project site, the contractor shall render full co-ordination for achieving proper co-ordination between different contractors to ensure timely completion or the whole project smoothly. The scheduled dates for completion specified in each contract shall, therefore, be strictly adhered to. Each contractor may make his independent arrangements for water, power, access, housing etc. but if they so desire he will be at liberty to come to mutual agreement with other contracting agencies in this behalf and make joint agreement with the approval of the Engineer-in-charge. The contractor shall not take or cause to be taken any steps or action that may cause disruption, discontent or disturbance to work, labour or other arrangements etc. of other contractors in the project localities. Any action by the Contractors which the Engineer-in-charge in his unquestioned discretion,may consider infringement of the above would be considered as a breach of the contract conditions and shall be dealt with as such.

In case of any dispute or disagreement between the various contractors, the Engineer-in-charge's decisions regarding the coordination, co-operation and facilities to be provided by any of the contractor shall be final and binding on the contractor concerned & such a decision or decisions shall not vitiate contract nor absolve the contractor of his obligations under the contract, nor form the grounds for any claim or compensation.

8) Patented Devices, Materials and Process :

Whenever the contractor desires to use any designed device, material or process covered by letter of patent copy right, the right for such use shall be secured by suitable legal arrangement and agreement with patent owners and the copy of their agreement shall be filed with Engineer-in-charge.

9) Relation with Public Authorities :-

The contractor shall comply with all rules, regulations, by law and directions, given from time-to-time by any local or public authority or body in connection with this work and shall himself pay fees or charges which are leviable on him with out any extra cost to Government.

10) Indemnity :

The contractor shall indemnify the Government against all action, suits, claims and demands brought or made against it in respect of anything done or committed to done by the contractor in execution of or in connection with the work of this contract any against any loss or damage to the Government in consequences of anything done or committed to be done in the execution of

the work of this contract. The Government may, at its discretion and entirely at the cost of contractor, defend such suit either jointly with the contractor or singly, in case the letter chooses not to defend the case.

11) Stacking, Storage and guarding of materials:

11.1) The stacking and storage of materials at site shall be in such a manner as to prevent determination or instrusion of foreign matter and to ensure the preservation of their quality, properties and fitness for the work. Suitable precautions shall be taken by the contractor to protect against atmospheric actions, fire and other hazard. The materials likely to be carried away by wind shall be stored in suitable stores or with suitable barricades and where there is likelihood of subsidence of soil, heavy materials shall be stored on paved platforms. Suitable separating barricades and enclosures as directed shall be provided to separate materials brought by contractor and obtained from different sources of supply.

11.2) The contractor shall at his own expenses, engage watchmen for guarding the materials and plant and machinery and the work during day and night against any pilferage or damage and also for prohibiting trespassers.

11.3) No materials brought to the site shall be removed from the site without the prior approval of the Engineer-in-charge.

12) Inspection of work by Engineer-in-charge.

12.1) The contractor shall inform the Engineer-in-charge in writing when any portion of the work is ready for inspection giving him sufficient notice to enable him to inspect the same without affection the further progress of the work.

12.2) The contractor shall provide at his cost necessary ladders and such arrangements as are considered safe by the Engineer-in-charge for proper inspection of all parts of the work by the local representatives, M.L.A's and officers etc. No compensation shall be paid to the contractor on this account.

13) Precaution to be taken by contractor:

13.1) The work shall be carried out by the contractor without causing damage to the existing Government property and/or private property. If any such damage are caused, the contractor shall pay for restoration of the property to the original conditions, and any other consequent damages.

13.2) In the event of an occurrence of an accident, involving serious injury or death of any person, at site of work or quarry or at any place in connection with the work the same shall be reported in writing within twenty four hours of the occurrence to the Engineer-in-charge and the Commissioner of Workmen's compensation.

14) Clearance of site on completion of works:

The contractor after completion of work shall clean the site of all debris and remove all unused materials other than those supplied by the department and all plant and machinery, equipments, tools etc., belonging to him within one month from the date of completion of the work, or otherwise the same will be removed by the department at his cost or disposed off as per departmental procedure. Incase the material is disposed off by department, the sale proceeds will be credited to the `contractor's account after deducting the cost of sale incurred. However, no claim of contractor regarding the price of amount credited will be entertained afterwards. In case of road work the vegetation on road formation and slopes shall be cleared at the time of completion by contractor at his own cost.

15) Removal of Constructional plant with prior permission:

All constructional plant, provided by the contractor shall when brought on the site be deemed to be exclusively intended for the construction and the contractor shall not remove the same or any part thereof (Save of the purpose of moving it from one part of the site to another) without the consent in writing of the Engineer-in-charge who shall record the reasons for withholding the consent.

16) Restrictions because of local traffic:

As there is Local traffic by the side of construction, the contractor will have to take proper precautions such as proper barricading, fencing, lighting, information and cautionary boards for safe and smooth flow of traffic, and keeping the concerned authorities informed about the work in progress.

17) Completion Certificate:

17.1) The work shall not be considered to have been completed in accordance with the terms of the contract until the Engineer-in-charge shall have certified in writing to that effect. No approval of material or workmanship or approval of part of work during the progress of execution shall bind the Engineer-in-charge or in any way prevent him from even rejecting the work which is claimed to be completed and to suspend the issue of his certificate of completion until such alteration and modification or reconstruction have been effected at the cost of the contractor as shall enable him to certify that the work has been completed to his satisfaction.

17.2) After the work is completed the contractor shall give notice of such completion to the Engineer-in-charge and within 30 days of receipt of such a notice the Engineer-in-charge shall inspect the work and if there is no defect in the work, shall furnish the contractor with a certificate indicating the date of completion. However, if there are any defects which in the opinion of the Engineer-in-charge are rectifiable he shall inform the contractor the defects noticed. The contractor after rectification of such defects shall then inform the Engineer-in-charge and Engineer-in charge on his part shall inspect the work and issue the necessary completion certificate within 30 days if the defects are rectified to his satisfaction, and if not, he shall inform the contractor indicating defects yet to be rectified. The time cycle as above, shall continue.

17.3) In case defects noticed by the Engineer-in-charge which in his opinion are not rectifiable but otherwise work is acceptable at reduced payment, work shall be treated as completed. In such cases completion certificate shall be issued by the Engineer-in-charge within 30 days indicating the un-rectifiable defects for which specified reduction in payment is being made by him.

17.4) The issue of completion certificate shall not be linked up with the site clearance after completion of work.

17.5) Should the part of construction is put to use at any stage prior to date of issue of completion certificate, the maintenance period of that part of the work shall be reckoned from the date of actual use of the facility.

18) Ancillary Works :

The contractor shall submit to Engineer-in-charge in writing the details of all ancillary works including layout and specifications to be followed for its construction. Ancillary work shall not be taken up in hand unless approved by Engineer-in-charge. The Engineer-in-charge reserves the right to suggest modifications or make complete chages in the layout and specifications proposed by the contractor at any stage to ensure the safety on the work site. The contractor shall carry out all such modification to the ancillary works at his own expenses as ordered by Engineer-in-charge.

19) Temporary Quarter :-

The contractor shall at his own expense make his own arrangement for housing his staff with all necessary amenities. General layout plan for such structures shall be got approved from the Engineer-in-charge. It will be the responsibility of the contractor to get his layout plan of temporary structure approved from the local competent authorities.

20) Safety measures and Amenities :

Safety Measures

The contractor shall take all necessary precautions for the safety of the workers and preserving their health while working on such jobs as required special protection and precaution where ever required. The contractor shall also comply with the directions issued by the Engineer-in-charge in this behalf from time to time at all times.

The following are some of the requirement

i) Providing protective footwear to workers in situations like mixing and placing of mortar or concrete, in quarries and place where the work is to be done under too much wet conditions as also for, movements over surfaces infested with oyster growth.

ii) Providing protective hardware to working in quarries etc. to protect them against accidental fall of materials from above.

iii) Providing handrails at the edge of the floating platforms, barges walkways, ladder etc.

iv) Providing workmen with safety belts, ropes etc. when working on any masts cranes, cribs, hoists, dredgers etc.

v) Taking necessary steps towards training the workers concerned on the use of machinery before they are allowed to handle it independently and taking all necessary precautions in and around the areas where machines, hoists and similar units are working. Wherever required, the persons handling the machinery shall have requisite licenses, certificate etc.

vi) Preventing over loading and over crowding of floating and land based machinery and equipment.

vii) Providing life belts to all men working at such situations from where they may accidentally fall into water or on the ground, . Equipping the boats with adequate numbers of life buoys etc.

viii) Avoiding bare live wires etc. as would cause electrocutions.

ix) Making platforms, stagings and temporary structures sufficiently strong and not causing the workmen and supervisory staff to work under risks.

x) Providing sufficient first-aid trained staff and equipment to be available quickly at the worksite to render immediate first-aid treatment in case of accident due to suffocation, drowning and other injuries.

xi) Taking the all necessary precautions wherever drivers are engaged on work.

xii) Providing full length gum boots, leather hand gloves, leather jackets with

fireproof aprons to cover the chest and back reaching upto knees plain goggles for the eyes to the labour working with hot asphalt handling, vibrators in cement concrete and also where use of any or all these items is, essential in the interest of health and well-being of the labourers in the opinion of the Engineer-in-charge.

21) Medical and Sanitary Arrangements to be provided for labour employed in the construction by the Contractor :

a) The Contractor shall provide an adequate supply of potable water for the use of labourers on works and in camps.

b) The Contractor shall construct trenches or semi permanent latrines for the use of labourers. Separate latrine shall be provided for men and women.

c) The Contractor shall build sufficient number of huts on suitable plot of land for use of the labourers according to the following specifications.

(1) Huts of Bamboos and Grass may be constructed.

(2) There should be no over crowding. The floor space at the rate of 3 sqm. (30 Sq.ft.) per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.

(3) The contractor must find his own land. If he wants Government land he should apply for it. Assessment for it, if demanded will be payable by contractor. However the department does not bind itself for making available the required land.

(4) A good site not liable to submergence shall be selected. High ground remote from jungle but well provided with trees, shall be chosen wherever it is available. The neighborhood of tank, jungles, grass or weeds should be particularly avoided. Camps should not be established close to large cutting of earth work.

(5) The lines of huts shall have open space of at least 10 meters between rows. When a good natural site can not be procured particular attention should be given to the drainage.

d) The contractor shall construct sufficient number of bathing places. Sufficient number of washing places should also be provided for the purpose of washing cloths.

e) The contractor shall make sufficient arrangements for draining away the surface and sullage water as well as water from the bathing and washing places and shall dispose off this waste water in such a way as not to cause any nuisance.

f) The contractor shall engage a medical officer with a traveling dispensary for a camp containing 3000 or more persons if there is no Govt. or other private dispensary situated within 8 kilometers from the camp. In case of an emergency, the contractor shall arrange at his cost free transport for quick medical help to his sick workers.

g) The contractor shall provide the necessary staff for affecting the satisfactory conservancy and cleanliness of the camp to the satisfaction of the Engineer-in-charge. At least one sweeper per 200 persons should be engaged.

h) The Assistant Director of Public Health shall be consulted before opening a labour camp and his instructions on matters such as water supply. Sanitary convenience, the camp site, accommodation and food supply shall be followed by the contractor.

i) In addition to above all provisions of the relevant labour act pertaining to basic amenities to be provided to the labourer shall be applicable which will be arranged by the contractor.

j) The contractor shall make arrangement for anti-malaria measure to be provided for labour employed on the work. The anti-malaria measures shall be as directed by Assistant Director of Public Health Officer.

22) The contractor except as provided in special conditions which follow, shall, if necessary construct at his cost, temporary roads and maintain these in proper conditions till completion of the work, at his own cost.

23) The contractor except as provided in special conditions which follow shall have to at his own expenses make all preliminary arrangements for labour, water, electricity, and materials etc., immediately after getting the work order. The Government may render necessary assistance in this regard by way of letters of recommendation, if so requested by the contractor. No claim for any extra payment or application for extension of time on the grounds of any difficulty in connection with the above matters will be entertained.

24) Working methods and progress schedules :

24.1) The Contractor shall submit within the time stipulated by the Engineer in writing the details of actual methods that would be adopted by the contractor for the execution, of any items as required by Engineer at each of the location, supported by necessary detailed drawing and sketches including those of the plant and machinery that would be used their locations arrangement for conveying and handling materials etc. and obtain prior approval of the Engineer-in-charge who reserves the right to suggest modifications or make corrections in the method proposed by the contractor whether accepted previously or not at any stage of the work, to obtain the desired accuracy, quality, safety and progress of work which shall be binding on the contractor. No claim on account of such change in method of execution will be entertained by Government so long as specification of the item remains unaltered.

24.2) The Contractor shall furnish within one month of the order to start the work programme of work in quadruplicate indicating the date of actual start, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating date of procurement of materials and setting up of plants and machinery. The programme is to be such as to be practicable of achievement towards the completion of the whole work in the time limit and of the particular items, if any on the due dates specified in the contract. Planning and programme of works shall be done by the mutual discussion between the **Engineer –in-charge** and contractor's representative in charge of work. The progress of work shall be reviewed every six months and revised programme shall be drawn up, if necessary, No revised programme shall be operative without the approval of Engineer-in-charge in writing. The Engineer is further empowered to ask for more detailed schedule or schedules say weekly, for any item or items in case of urgency of work as will be directed by him and the contractor shall supply the same and when asked for. Acceptance of the programme or the revised programme, by the Engineer-in-charge shall not relieve the contractor of his responsibility to complete the whole of the work by the prescribed time or the extended time if any.

24.3) The Contractor shall furnish sufficient plant, equipment and labour as may be necessary to maintain the progress schedule. The working and shift hours restricted to one shift a day for operations to be done under the Government supervision shall be such as may be approved by the Engineer-in-charge. They shall not be varied without prior approval of the Engineer. Night work which requiring supervision shall not be permitted except when specifically allowed by Engineer-in-charge if requested by contractor. The contractor shall

provide necessary lighting arrangement etc. for night work as directed by Engineer without extra cost of Government.

24.4) The contractor shall submit report on progress of work in forms and statement etc. as periodical intervals in the form of progress charts, forms, statements and/or reports as may be approved by the Engineer. Forms for sending reports about progress will be supplied by the University Engineer.

24.5) The contractor shall maintain proforma, chart, details regarding machinery equipment, labour, material, periodical returns thereof in proforma to be approved from the Engineer-in-charge.

25) Payment :

The Tenderer must understand clearly that the rates quoted are for completed work and include all cost due to labour, all leads and lifts involved and if further necessitated scaffolding plants, supervision, service works, power etc. and to include all to cover the cost of night and round the clock work as and when required and no claim for additional payment beyond the prices or rates quoted will be entertained and the tenderers will not be entitled subsequently to make any claim on the ground of any representation or on any promise by and person (whether tender in the employment of any Public Works Deptt. or not) or on the ground of any failure on his part to obtain all necessary information for the purpose of making his tender and fixing the several prices and rates therein relieve him from any risks or liabilities arising out of or consequence upon the submission of the tender.

Payment to the contractors will be made by cheque drawn on any treasury within the Division, provided the amount to be paid exceeds Rs. 100/- smaller amount will be paid in cash.

26) Claims of extra work

26.1) Claims for extra work shall be registered within 30 days of occurrence of the event. However, bills for these claims alongwith supporting data details may be submitted subsequently.

26.2) Bills for extra work or for any claim shall be paid separately apart from the interim bills for the main work. The payment of bills for the main work shall not be withheld for want of decision on the extra/claims not covered in the schedule of items for extra work.

27) Bill and Payments:

27.1) Two running payments in a month are permitted. First of the bill shall be submitted by the contractor by the 10th day of the month and Second bill, if necessary, shall be submitted by the contractor by the 25th day of the month.

27.2) The format of running bill on which the bills are to be submitted by the contractor shall be supplied to the contractor by the Department Printed copies of the bills forms as per this format shall be arranged by the contractor at his cost. The bills in five copies shall be submitted to the concerned Engineer's representative in the standard proforma only.

27.3) The final bill shall be submitted by the contractor within one month of the date of issue of completion certificate. The final bill shall be paid within six months of initial submission.

27.4) Recovery of secured advances shall be effected through bills proportionately as per consumption of materials in the work billed for.

27.5) The contractor can have true copy of the bills paid to him after paying charges for photo copying the same.

27.6) **Controlled concrete** :

Acceptance criteria shall be as per IS: 456 –-------0

27.7) **Ordinary concrete** :
Acceptance criteria shall be as per IS: 456 –-------0

28) Assistance in procuring priorities, permits etc. :

28.1) The Engineer-in-charge on written request by the contractor, will if in his opinion the request is reasonable and in the interest of work and its progress, assist the contractor in securing the police protection and the priorities for deliveries, transport, permits, for controlled materials permits for quarries and other similar permits including labour licence etc. where such are needed. All cost in this behalf shall be borne by the contractor. The department will not, however, be responsible for the non-availability of such facilities or delays in the behalf and no claims on account of such failure or delays shall be allowed by the department.

28.2) The contractor will have to make his own arrangement for machinery required for the work. However, if such machinery is conveniently available with the department it may be spared on hire as per department's rules in force if requested by the contractor in writing. For such arrangement a separate agreement in the prescribed form will have to be signed by the contractor. Such an agreement shall be independent of this contract and the supply or non-supply of machinery shall not form a ground for any claim or extension of time limit for this work.

29) Water supply :

29.1) Availability of adequate water for work and sources thereof shall be confirmed by the contractor before submitting the tender.

29.2) The Contractor shall make his own arrangements at his own cost for entering into contract with concerned authorities for obtaining the connection and carry the water upto the work site as required by him. The location of the pipe line with respect to the road shall be decided by Engineer-in-charge and shall be binding on the contractor. The department shall not bear any responsibility in respect of any problem and contractor shall not be liable for getting any compensation on any ground. The progress of work shall not hamper for the above reasons.

29.3) The contractor is advised to provide water storage tanks of adequate capacity to take care of possible shut down of water supply system.

29.4) The contractor shall have to supply water required by the department for its establishment at work site free of cost.

30) Electricity :

30.1) The contractor will have to make his own arrangement at his own cost for obtaining or providing electric supply at work site. The Department shall not bear any responsibility in respect of any problem and contractor shall not be liable for getting any compensation on any ground. The progress of work shall not hamper for the above reasons.

30.2) Electrical supply for the Departments use at work site shall be provided by the contractor at mutually agreed terms. The contractor may not abide by these conditions when power supply at the site fails.

31) Telephone facilities :

Contractor will have to make his own arrangement at his own cost for telephone connection at work site, if required.

32) Material Sources:

32.1) The tenderers shall make their own independent investigations into the availability as well as suitability of the various materials required for construction as referred to in this para.

32.2) If any quarry is in the possession of the department the contractor will be allowed to use the same on usual conditions. In other cases, the contractor will have to make his own arrangement for procuring quarries or the quarry permits, necessary assistance of which will be given by the department.

32.3) Lime stone shall not be permitted for any concrete work.

33) Land:

33.1) The contractor shall make all efforts to obtain land required for the ancillary works. In case the contractor is unable to obtain land and if requested then the department may requisit land at his cost.

33.2) Land as available with the department or requisitioned by the department at the request of the contractor will be handed over to the contractor for such use as will be necessary for ancillary work required on payment of rent to the department. Plot development, if any, will have to be done by the contractor at his own cost. The development shall be in conformity with the regulations of the local authority.

33.3) If for the purpose of construction it becomes necessary of the contractor to occupy land not in possession of the department the contractor will have to make his won arrangement with the land owners and pay such compensations as mutually agreed between them.

33.4) On completion of work, all land mentioned in para 34.1., 34.2, 34.3 shall be handed over back to the owners, or the department, as the case may be, after clearing the land as directed by the Engineer-in-charge. Dismantling of building on Government or department land shall be done only after the approval of the Engineer-in-charge.

34) Floods or Accidents :

The contractor shall take all precautions against damages by floods or from accidents etc. No compensation will be allowed to the contractor on this account or for correction and repairing any such damages to the work during construction.

The contractor shall be liable to make good at his cost any plant or materials belonging to the Government lost or damaged by floods or from any other causes while in his charge.

35) Urgent Works: If any “Urgent Works” become necessary and contractor is unable or unwilling to carry it out at once, the Engineer-in-charge may by his own or through other people have it carried out as he may consider necessary. If the "Urgent Work" shall be such as in the opinion of the Engineer-in-charge the contractor is liable under the contract to carry out at his expenses, all expenses incurred on it by the department shall be recoverable from the contractor, and be adjusted or set off against any sum payable to him.

36) Change of Cement Concrete etc.:

Theoretical consumption of Cement for the Concrete work

Sr.No.	Volumetric mix of concrete	Consumption of cement in bags/Cum
1	C.C.M-10	4.40 bags/Cum
2	C.C.M-15	6.27 bags/Cum
3	C.C.M-20	7.10 bags/Cum
4	C.C.M-25	7.50 bags/Cum
5	C.C.M-30	8.00 bags/Cum
6	C.C.M-35	8.30 bags/Cum
7	C.C. M-40	8.50 bags/Cum
8	C.C. 1:4:8	3.40 bags/Cum

Note : The weight per bag of cement is considered as 50 Kg.
The rate of consumption of cement for various grades of concrete referred above is a theoretical rate of consumption assumed for the estimate purpose. The contractor will have to obtain an economic mix design for various grades of concrete and get it approved from the Engineer-in-charge. The specification for controlled cement concrete shall be as per standard specification No. B-7 Page 38, and IS 456-3600

Immediately upon the receipt of the award of the contract, the contractor shall inform the Engineer the exact location of the sources of the acceptable material. The concrete mix to be used shall be got designed in all approved laboratory, by the contractor with a optimum quantity of cement to give the specified strength in the preliminary tests and the proportion got approved by the engineer in writing. These proportions shall be used so long as the materials continue to be of the same quality and from the same sources subject only to slight changes in the relative quantities of fine and course aggregate for the purpose of promoting workability provided the work tests and shows the required strength.

If such preliminary tests involve change in cement consumption upto 2% on the higher or lower side, no adjustment in the cost of the item to be paid to the contractor shall be made. If such alterations, changes, theoretical consumption of cement by more than 2% on the higher or lower side, the sources and quality of aggregate remaining the same, payment will be adjusted for or against the contractor in whatever amount the total cost of cement to the contractor has been increased or decreased by more than 2%. The amount of such increase or decrease shall be calculated on the basis of quantity of cement determined and prescribed in the special provisions. In adjusting the cost only the cost of cement shall be considered and not handling or other charges, which shall be treated as incidental to the terms. If during the progress of work the contractor wishes to change the material, the proportions shall be fixed on the basis of fresh preliminary tests to give the required strength after the Engineer is satisfied that the material satisfy the specifications. No adjustment of the cost shall be made for a change of proportions of cement fixed in the original preliminary tests.

37) Contractor to inform himself fully :

The Contractor shall be deemed to have carefully examined the work and site conditions including labour, the general and the special conditions, the specifications, schedules and drawings and shall be deemed to have visited the site of the work and to have fully informed himself regarding the local conditions including water levels, winds, current velocities and sub-soil condition and carried out his own investigation to arrive at the rates quoted in the tender. In this regard he will be given necessary information to the best of knowledge of department but without any guarantee about it.

If he shall have any doubts as to the meaning of any portion of these general conditions, or the special conditions to the scope of working of the specifications and drawing, or any other matter concerning the contact, he shall in good time before submitting his tender set forth the particulars there of and submit them to the Engineer in writing in order that such doubt may be clarified authoritatively before tendering. Once a tender is submitted the matter will be decided in accordance to the tender conditions in absence of such authentic clarification.

38) Errors, Omissions And Discrepancies :

a) In case of errors, omissions and/or disagreement between written and scaled dimensions in the drawing or between the drawings and specifications etc. the following order of preference shall apply :

i) Between actual scaled and written dimensions or description or description on a drawing the latter shall be adopted.

ii) Between the written or shown description or dimensions in the drawing the corresponding one in the specifications, the latter, shall apply.

iii) Between the quantities shown in the schedule of quantities and those arrived at from the drawing the latter shall be preferred.

b) In all cases of omissions and/or doubts or discrepancies in the dimension or description of any item or specifications a reference shall be made to the Engineer, whose elucidation, elaboration or decision shall be considered as authentic. The contractor shall be held responsible for any errors that may occur in the work through lack of such reference and precautions.

c) The contractor should not sublet any part of work without written permission of the Engineer-in-charge.

39) Samples and Testing of Materials :

i) All materials to be used on work such as cement, lime, brick, aggregates, steel, stone, asphalt, wood, tiles etc. shall be got approved in advance from the Engineer-in-charge and shall pass the tests and analysis required by him which will be (a) as per specifications of the items concerned and or (b) as specified by the Indian Road Congress standard specification and code of practice for road and bridges or (c) I.S.I. specification whichever and wherever applicable (d) as per specification Ministry of Surface Transport for Roads and bridges section 900 quality control for road work or (e) such recognised specification acceptable to the Engineer-in-charge as equivalent there to or in the absence of such authorised specification (f) such representative in the order of precedence given above.

ii) The contractor shall at his risk and cost make all arrangements and/or shall provide for all such facilities as the Engineer-in-charge may require for collecting, preparing and forward required number of samples for tests or for analysis to the nearest approved laboratory and bear all charges and cost of testing. Such samples shall also be deposited with the Engineer-in-charge till sent for testing.

iii) The contractor shall, if and when required, submits at his cost the samples of materials to be tested or analyzed and if so directed, shall not make use or incorporate in the works any materials to be represented by the sample until the required test or analysis have been made and after this test results of the materials finally accepted by the Engineer-in-charge.

iv) Frequency of testing of the construction material and the percentage of testing from the Government laboratory shall be as under.

a) Where the field laboratory certified by the concerned University Engineer is established for the work at work site 70% tests as per total frequency required shall be carried out in the said field laboratory & 30% tests shall be carried out at the Vigilance & Quality Control Laboratory for the materials mentioned in **Annexure-I** on **page ___ to ___** here under for the material not covered in Annexure- I, 50% tests shall be carried out in the field laboratory and remaining 50% tests need to be carried out in the Vigilance & Quality Control Laboratory of P.W.D. Govt. of Maharashtra. The entire responsibility of the sample testing as per required frequency including testing charges will be borne by the Contractor.

b) Where field laboratory is not established at works site 100% tests as per frequency shall be carried out in the Vigilance & Quality Control Laboratory.

c) Testing of cement and steel 100% in V.Q.C.C.Laboratory at Amravati/Akola is compulsory.

v) For providing Electric wiring duct tubes of the required diameters and length shall be provided through walls, beams and floors, slab as when diverted without any extra cost.

vi) a) The contractor will make his own arrangement for receiving all materials, tools, etc. required for the work.
b) No extra charge for the carriages of work be allowed.
c) The rates for all items are inclusive of all charges such as carting, lifting etc. No extra payment for any lead and lift will be paid for any item.
d) The contractor should not be sublet any part of work without written permission of the Engineer-in-charge.
e) The condition in the tender notice will be biding on the contractor and tender notice will form a part of agreement.
f) Frequency of testing shall be as per relevant specifications. In case such frequency is not specified in work specifications then the I.S. Code will be referred and for other cases where I.S. Code do not stipulate the frequency of testing it will as directed by Engineer-in-charge.

40) Weigh Batching: The following instructions shall be followed as regards to preliminary designs of mix and methods of batching of plain cement concrete and reinforced cement concrete. The preliminary mix design and batching for various grades of concrete shall be governed by the following guidelines as per IS 456–3600/ Mix Design- It will be the responsibility of the contractor to obtain the mix design for various cement concrete grades at his cost from the recognised institution.

41) Miscellaneous:

41.1) Competency of Tender:- The work will be awarded only to those contractors who are considered to be responsible bidders, capable of performing the class of work to be completed. Before passing the final award any or all bidders may have to show that he has the necessary experience, facilities, ability, and financial resources to execute the work in satisfactory manner and also within the stipulated time. The bidders may also be required to furnish to the Department a statement in respect of their experience and final resources.

41.2) Eraser : Person tendering are informed that no erasers or any alterations by them in the text of the documents set herewith will be allowed and any such eraser on an alteration will be disregarded, if there is any error in writing no overwriting should be done but the wrong words or figures should be struck out and the correct one written above or near it in an unambiguous way. Such corrections should be initiated and dated.

41.3) Acceptance : Intimation of acceptance of tender will be given by a telegram or a letter sent by registered post to the address given below the signature of the tenderer in the tenders.

The tenders which do not fulfill any of the conditions for those in the form and which are incomplete in any respect shall be liable for rejection.

41.4) Precautions to be taken by the contractor to prevent accident.

i) No live electric lines should be allowed to run along the ground in the blasting zone and they should be at least 3 meter above ground if not more.

ii) The wiring cable should be taken near the live electric line and it should be preferably short firing cable as supplied by the supplier of explosives. If such cable is not available a substitute cable made up of several pieces properly jointed and tapped be used.

iii) The blasting shed from where the exploder is to finally operated should be at least 3000 Ft. away from the area to be blasted. It should have a strong roof which can withstand the impact of flying stones at his range.

iv) Only trained hands should be allowed to handle explosives, cable detonators etc.

41.5) Police Protection:- For the special protection of the camp of the contractors work, the Deptt. will help the contractors as far as possible to arrange for such protection with the concerned authorities. The cost shall be borne by the contractor.

41.6) For providing electric wiring or water line etc. recesses shall be provided if necessary through walls, slabs beams etc. and later on refilled it with bricks or stones, chippings cement mortar without any extra cost.

41.7) In case it becomes necessary for the due fulfillment of contract for the contractor to occupy land outside the Department limits the contractor will have to make his own arrangements with the landowners and pay such rents, if any, which are payable as mutually as agreed between them.

41.8) The contractor shall duly comply with the provisions of the Apprentices Act.1961 (iii) of 1960 and the rules and orders made there under from time to time under the said Act and the said Rules and on his failure or neglect to do so he shall be subject to all the liabilities and penalties provided by the said Act and said Rules.

41.9 It is presumed that the contractor has gone carefully through the standard specification (vol. I & II 1981 edition) of Govt. of Maharashtra P.W.D condition/MORT & H specifications of latest edition and the schedule of rate of the Division, and studied of site conditions before arriving at rates quoted by him. The special provisions and detailed specification of wording of any item shall gain precedence over the corresponding contract. Decision of Engineer-in-charge shall be final in case of interpretation of specification.

41.10 If the standard specifications fall short for the items quoted in the schedule of this contract reference shall be made to the latest Indian Standard specifications, I.R.C. codes, and MORT & H specification if any of items of this contract do not fall in reference quoted above, the decision and specifications as directed shall be final.

42) Load Testing :

The Engineer-in-charge is empowered to order load testing of the building, bridges or their component whenever there is a doubt about the workmanship or the safety of the building

component or whenever there is a need to confirm the workmanship and the safety of the structure by carrying out load test. The load testing shall be carried out as per the specifications B.R. 58 of the book of standard specifications published by Govt. of Maharashtra P.W.D. with such specifications as ordered by Engineer-in-charge.

i) The load for such test shall be full dead load (excluding self load of the member under test) plus 125% maximum design live load (including impact) in cases of R.C.C. Bridges.

ii) The load testing will be carried out by the Department through a suitable Competent Agency. Test result from such agency as will be fixed by Department will be binding on the contractor.

iii) If the result of the load test are not found to be satisfactory, the contractor shall strengthen the already cast member of reconstruct the members at his cost and also bear the cost of load test. The decision of the Engineer-in-charge will be final in this case.

43) Special Conditions:

43.1) The contractor should ensure that all safety precautions are observed by their labours, working closed to the State Highway and while closing the State Highway precautions are taken including insurance etc. for their labours at the cost of the contractor etc.If any accident occure to the labour etc, no claim in this regard on whatsoever account shall be entertained and this decision of the department will be final and conclusive.

43.2) During the execution if there is any change in:
(i) Span Arrangement.
(ii) Height of substructure and superstructure above ground level.
(iii) Change in the depth of foundation, tendered rate for respective items will hold good and no extra claims shall be entertained on this account.

43.3) Contractor shall observe the rules and regulations imposed by traffic police for smooth flow of traffic on the diversion road and shall not be entitled for claim any compensation arising thereof.

44) **Mix Design**

44.1) The following instructions shall be followed as regards preliminary design of mix methods of batching of plain cement concrete and reinforced cement concrete. These instructions should be treated as supplementary to the relevant provision in the specifications for the respective items contained in the book of standard specifications and will override the provisions contained therein wherever they are contrary to the following instructions. The preliminary mix design and batching for various grades of concrete shall be governed by the following guidelines.

	Concrete Grade	Guidelines
1	**Up to M-15**	This should only by ordinary concrete. No change may be prescribed for the present practice as regards preliminary design of mix permitting volume batching.
2	**M-20**	Preliminary mix design must be carried out for these mixes. However, weight batching shall be insisted for cement only.

44.2) For the grades of concrete M-20 and above the preliminary mix design shall be carried in P.W.D. Govt. laboratory.

(i) The charges for preliminary design of concrete mix shall be entirely borne by the contractor.

(ii) For grades of concrete M-20 and above where cement is to be used by weight, the cost of extra cement required to make up the under weight bags shall be borne by the contractor.

(iii) For the items of concrete of grades lower than M-20 other items in the agreement where cement is not to be used by weightment. The cement bags shall contain cement of 50 Kg. net weight.

44.3) The admixtures such as plasticizers/super plasticizers for concrete grade M-20 and above shall be used as directed by Engineer-in-charge depending upon specific requirements. No extra payments on this account will be admissible.

45) Definitions :- Unless excluded by or repugnant to the contents-

(a) The expression **"Government"** as used in the tender documents shall mean the WORKS DIVISION of the Government of Maharashtra.

b) The expression **'The Chief Engineer'** as used in the tender papers shall mean Chief Engineer, P.W.Region, Amravati .

c) The expression **'Superintending Engineer'** as used in the tender papers shall mean the officer of Superintending Engineers ranks (by whatever designation he may be known) under whose control the work lies for the time being.

d) The expression **"Engineer" or "Engineer-in-charge"** as used in the tender paper shall mean the University Engineer-in-charge of the work. The Engineer-in-charge for this work is University Engineer,_____.

e) The expression **'Contractor'** as used in the tender paper shall mean the successful tenderer that is the tenderer whose tender has been accepted and who has been authorised to proceed with the work.

f) The expression **'contract'** as used in the tender papers shall mean the deed of contract together with all its original accompaniments and those later incorporated in it by mutual consent.

g) The expression **'plant'** as used in the tender papers shall every temporary accessory necessary or considered necessary by the Engineer to execute, construct, complete and maintain the work and all altered, modified, substituted and additional works ordered in the time and the manner herein provided and all temporary materials and special and other articles and appliance of every sort kin and description whatsoever intended or used therefore.

ADDITIONAL TENDER CONDITIONS

1) Construction Machinery/Equipment.:

1.1) The methodology and equipment to be used on the project shall be furnished by the contractor to the Engineer well in advance of commencement of work and approval of the Engineer obtained prior to its adoption and use.

1.2) The contractor shall give a trial run of the equipment for establishing its capability to achieve the laid down specifications and tolerance to the satisfaction of the Engineer before commencement of work, if so desired by the Engineer-in-charge.

1.3) All equipment provided shall be proven efficiency and shall be operated and maintained at all times in manner acceptable to the Engineer-in-charge.

1.4) No equipment or personnel will be removed from site without permission of Engineer-in-charge.

2) Work Programme and Methodology of Construction:

The Contractor shall furnish his programme of construction for execution of the work within the stipulated time schedule together with methodology of construction of each type of work and obtain the approval of the Engineer-in-charge.

3) Revised Programme of work in case of slippage :

In case of slippage from the approved work programme at any stage, the contactor shall furnish revised programme to make upto slippage within the stipulated time schedule and obtain the approval of the Engineer-in-charge.

4) Action in Case of disproportionate progress :

In case of extremely poor progress of the work or any item at any stage of work which in the opinion of the Engineer can not be made good by the contractor considering his available resources, the Engineer will get it accelerated to make up the lost time through any other agency and recover the additional cost incurred, if any, in getting the work done from the contractor after informing him in writing about the action envisaged by him.

5) Setting Out :

Setting out the work as spelt out in clause 109 of Ministry's Specification for Road and Bridge Works (2nd Revision) will be carried out by the Contractor.

6) Public Utilities:

Action in respect of public utilities will be taken by the contractor as envisaged in clause 110 of MORT&H Specification of Road and Bridge work (2001).

7) Arrangement for traffic during construction:

Action for arrangement for traffic during construction will be taken by the contractor as envisaged in the contract documents and spelt out in clause 112 of M.O.R.T.&H. Specification of Road and Bridge work (2001)

8) Quality Control :

The responsibility of achieving quality of work will be on the contractor who will take actions as stipulated in section 900 of M.O.R.T.&H. Specification of Road and Bridge work (2001).

9) MORT&H specification for Road and Bridge work (2001) Fourth Revision:

MORT&H Specification of road and Bridge work (2001) will form part of the contract documents and the contractors will be legally bound to the various stipulation made therein unless and other wise specifically relaxed or waived wholly or partly through a special clause in the correct documents.

10) Applicable in case of Road Work only:

The details of the paver, specified in the M.O.R.T.&H. clause 504.3.5 third revision be relaxed in the case of bituminous macadam MORT&H–IVth Revision (Clause 504) where it is going to be covered by any wearing course other than semidense Bituminous macadum (Clause 507)/ Bituminous concrete (Clause 509) with the provision that it can be laid by means of self propelled mechanical paver with suitable screeds capable of spreading, temping and finishing the mixture to the specified lines grades and cross section.

11) Special Condition for B.T.work:

In respect of Black Top Work, 15% (Fifteen P.C.) payment of black Top item in a particular Km. will be retained till completion of side berms/C.D. Works etc. in that Km. After completion of other items satisfactorily, the withheld payment will be released finally..

12) Insurance of Contract work.

Contractor shall take out necessary Insurance Policy/Policies (Viz contractors all risk Insurance policy, Erection all risk, Insurance policy etc. as decided by the Directorate of Insurance) so as to provide adequate insurance cover for execution of the awarded work for total contract value and complete contract period compulsorily from the, "Directorate of Insurance, Maharashtra State, Mumbai" only. Its postal address for correspondence is "264, MHADA, First Floor, Opp. Kalanagar, Bandra (East) Mumbai--------051". (Telephone Nos. 26590403/26590690 and Fax Nos. 26592461/26590403. Similarly all workmen appointed to complete the contract work are required to insure under workmen's compensation insurance Policy. Insurance Policy/Policies taken out

from any other company will not be accepted. If any Contractor has effected Insurance with any Insurance Company, the same will not be accepted and the amount of premium calculated by the Government Insurance Fund will be recovered directly from the amount payable to the Contractor for the executed contract work and paid to the Directorate of Insurance Fund Maharashtra State, Mumbai. The Director of Insurance reserves the right to distribute the risk of insurance among the other resources.

12(A) INSURANCE

The contractor shall provide in the joint names of the Employer and the contractor insurance through Director of insurance Govt.of Maharashtra from the start date to the end of the Defects Liability Period for the following events which are due to the Contractors risks . The Contractors all risk policy and the workmens insurance policy shall be within the Maharashtra insurance Fund only as stated above.

A) Loss of or damage to the work, plant and materials
B) Loss of or damage to Equipment
C) Loss of or damage of property (except the work, plant, materials and Equipment) in connection with the contractor and
D) Personal injury or death

Policies and certificates for insurance shall be delivered by the contractor to the Engineer for the Engineer's approval before the start date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

If the contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the contractor or, if no payment is due, the payment of the premiums shall be a debt due.

Alteration to the terms of an insurance shall not be made without the approval of the Engineer.

Both parties shall comply with any conditions of the insurance policies.

13) The responsibility of achieving quality of work will be on the contractor who will take action as stipulated in standard specification as per Schedule "C".

14) The contractor shall provide,furnish, maintain and remove on completion of the work a suitable site **office-cum-laboratory** on the work site for use of Executive Engineer's representative. The site office cum laboratory shall be separate rooms of sufficient area. It shall preferably be 68 sqm as per drawing attached with Tender Document. It may have brick wall & asbestos or corrugated sheet roof with false ceiling, paved floor should be 0.45 mtr. above ground level, laboratory shall have working platform, necessary electrical provision and water supply arrangement. Arrangement of display of drawing should also be made. He should provide suitable latrines, urinals and keep them clean daily. This will be included in his offer. Necessary laboratory equipment, office furniture shall be provided by the contractor at his own cost, After completion of work it will be property of contractor. It should be removed from site of work at his own cost.

15) The contractor should produce the no objection certificate obtained from the Maharashtra Pollution Control Board before starting Crusher/Drum Mix Plant on the work site.

16) **<u>Supply of Colour Record Photographs and Album</u> :**
The contractor shall arrange to take colour photograph at various stages/Facts of the work including interesting and novel features of the work as desired by the Engineer-in-charge. Photographs shall be of acceptable quality. Each photograph taken shall be standard post card size, marked in albums of acceptable quality. Also the C.D. or the same shall be supplied for each photograph in the Album shall be suitably captioned.
The contractor shall arrange for taking video films of important activities of the work as directed by the Engineer-in-charge during the currency of the project and editing them to a video film of playing time not less than 60 minutes and up to 180 minutes as directed by the Engineer-in-charge. It shall contain narration of the acceptable quality and the film shall be capable of producing colour pictures.

It shall be considered as incidental to the work and no additional payment, whatsoever will be made for the same.

17) Notwithstanding whether it as per the rules of the traffic authorities or otherwise the agency should ensure that their vehicles, the term includes all construction machinery towards or self driven are equipped with the following to emphasize / traffic safety.

i) Reflector 4 Nos.
ii) Tail lamp 2 Nos.
iii) One of the following slogan:

a) **" जल्दी रती ाम राब, होश मे आया लाट सहाब "**
b) **" दारुचा ए च प्याला ार ा तुमच्या नाशाला "**
c) **" Drink and drive, you won't survive"**
d) **" वाहन व्यवस्थीत, जीवन सुर ित "**
e) **" ए झप ी ए अपघात"**
f) **" जेथे ल ा विचलित तेथे अपघात निश्चित "**
g) **" आप ी भुल दुसरो ी परेशानी"**
h) **"आवरा वे ाला सावरा जिवाला"**
i) **" मनाचा ब्रे उत्तम ब्रे "**
j) **" न ो मर ा, न ो अपं ाता, वे ावर ताबा बाळ ा द ाता"**
k) **" समय मुल्यवान है ले ीन जिवन अमुल्य है"**
l) **" धुम्रपान मद्यपान आयुष्याची धुळधा ा"**
m) **" Live & let Live"**
n) **" A cat has 10 lives you have only 1"**
o) **" If married divorce speed"**

In absence of the above requirements and failure of the agency to fulfill them in a reasonable time the University Engineer in charge of the work will get it done from the Mechanical wing of the P.W.Department and would recover the cost from the amount due to the agency at the following rates.

i) Reflector Rs.25/- Per Nos.

ii) Tail Lamp Rs.175/- Per Nos.

iii) Slogan Rs.75/- Per Nos.

18) The decision of the **Engineer –in-charge** will be binding and conclusive in this matter.

19) After award of contract, contractor will have to provide and fix the information boards showing name, tender cost, period of completion, Name and Telephone number of agency and University Engineer and other details as directed by Engineer-in-charge as per drawing attached. It is incidental to work & no Extra payment will made to the contractor.

20) ~~**Laboratory Set up**~~

~~**Field Laboratory:-**~~

~~20.1) The Contractor for the purpose of testing of material shall arrange to provide and maintain fully furnished and adequately equipped field laboratory of adequate floor area as shown in drawing. The field laboratory shall preferably be located adjacent to site or as directed by the Engineer in-charge. The field laboratory shall be provided with amenities like water, electric supply etc. to be arranged by Contractor.~~

~~20.2) The floor space requirement shall include office space for Engineer & Contractor's representative, storage of samples, installation of equipment, laboratory table, cup boards, working platform of size 1m x 10 m working space for carrying out various tests, curing tank, wash basin, toilet etc. and the minimum furniture such as office tables & chairs for material engineers, stools, working tables, store accessories.~~

~~20.3) The Cost of Construction of laboratory at work site or plant site as the case may be and cost of furniture, electrical equipments fittings during the currency of Contract is incidental to work and no separate payment will be made for the same to the contractor.~~

~~20.4) If the contractor fails to establish the laboratory within 60 days from the issue of work order an amount of **Rs. 1.50 lacs** will be recovered from forth coming bill payable to the Contractor.~~

~~20.5) After completion of work the above property will be contractor's property.~~

~~20.6) The laboratory established by the contractor shall be manned by a qualified materials Engineer/Civil Engineer assisted by experienced technicians and the setup shall be got approved from the Engineer-in-charge.~~ No of correction University Engineer

~~20.7) The Contractor shall prepare printed proforma for recording readings and results of each type of tests. Such formats shall be got approved from the Engineer in charge. The Contractor should keep a daily record of all the tests carried out by him. Two copies of the test results should be~~

submitted to Engineer in charge within 7 days from the date of testing for examination and approval One copy of test results will be returned to the Contractor by the Engineer in charge for keeping the record of test results in acceptable manner at site of work.

20.8) All quality Control register/records shall be maintained by the Contractor and checked by the Engineer in charge or his representatives regularly.

21) Set up of equipments:

21.1) The contractor shall have at least following equipments calibrated to the latest date in the laboratory so established. The Contractor will have to carry out the calibration of the equipments from the approved agency as and when directed by the Engineer-in-charge at his own cost in cases where the calibration validity stands expired.

General:

i)	Balance 20 Kg. Capacity (self indicating)	1 No.
ii)	Electronic balance 5 Kg. Capacity, accuracy 0.5 gm.	1 No.
iii)	Water bath Electrically operated & thermostatically controlled, with adjustable shelves, sensitivity 1°C.	1 No.
iv)	Thermometer: (1) Mercury in glass 0° to 250° (2)Mercury in Steel with 30 cm.stem upto 300°C (Dial type)	 2 Nos. 2 Nos.
v)	Kerosene or Gas stove/electric hot plate	1 No.
vi)	Set of IS sieves 45 cm. Dia. G.I. Frame, 125 mm, 100mm, 90mm, 80mm, 63mm, 53mm, 50mm, 45mm, 40mm, 37.5mm, 26.5mm, 25mm, 22.4mm, 20mm, 19mm, 13.2mm, 11.2mm , 9.50mm, 5.6mm, 4.75mm, 4.25mm, 6.3mm, 6mm, with lid and pan (coarse sieve)	1 Set of 23 Nos. sieves.
vii)	Set of IS fine sieves 20 cm. dia. brass Frame, 2.8 mm, 2.36mm, 1.18mm, 0.60mm, 0.30mm, 0.15mm, 0.75mm, 425 micron , 300 micron, 180 micron, 150 micron, 90 micron, 75 micron with lid and pan, (fine sieves)	1 Set of 13 Nos. sieves.
viii)	Glass ware, spatulas, wire gauges, steel scales, measuring tape, enameled tray, porcelain dish, requirement plastic bags, gunny bags, digging tolls etc.	As per requirement
ix)	First aid kit	1 No.
ii)	**Aggregate & Soil testing**	
i)	Atterberg limits (liquid & plastic limit) determination apparatus	1 Set

ii)	Density test apparatus (Sand pouring cylinder, tray, can etc.) complete.	1 Set
iii)	Aggregate impact value test apparatus.	1 Set
iv)	Flakiness and elongation test gauge	1 Set
v)	Standard measures of 5, 3 and 1 litre	1 Set
vi)	Field density apparatus with cutting tray, chisel, hammer and standard sand	2 Set
vii)	3 meter straight edge and camber plate adjustable type	2 Set
viii)	Measuring Cylinders3000 ml and 100 ml.	1 No. each
b)	**Cement Concrete Testing**	
i)	Compression testing machine of 200 tone capacity with two dial gauges.	1 No.
ii)	Cube moulds 15cmx 15cmx15cm	18 Nos.
iii)	Slump testing apparatus	2 Nos.
iv)	Needle vibrator	2 sets
v)	Compacting factor test	2 sets
vi)	Vicat's apparatus for testing setting time	1 No.

c)	**Bitumen Testing**	
i)	Penetrometer with Standard needles	1 No.
ii)	Centrifuge type bitumen extractor electrically operated complete with industrial benzene	1 Set
iii)	Field density apparatus with cutting tray, chisel, hammer and standard sand	2 Set
iv)	3 meter straight edge and camber plate adjustable type	2 Set
v)	Measuring Cylinders3000 ml and 100 ml.	1 No. each

CONDITIONS FOR MATERIALS TO BE PROCURED BY THE CONTRACTOR

1) **CEMENT** :-

Cement to be used for works shall comply of the following with the prior approval of Engineer.

a) Ordinary Portland cement 43 grade Conforming to IS: 8112 used in the manufacture of exposed surface of concrete of any element of a structure shall be from the same factory. Independent testing of cement used shall be done by the contractor at site and in the laboratory approved by the Engineer before use. Any cement with lower quality than those shown in manufacture's certificate shall be debarred from use. In case of finally ground cement or imported cement , the Engineer may direct the contractor to satisfy him as to the acceptability of such cement, especially with regard to creep and shrinkage effect. Any consignment or part of a consignment of cement which has deteriorated in any way shall not used in the works and shall be removed from the site by the contractor without charge to the employer.

Cement shall be transported, handled and stored on the site in such manner as to avoid deterioration, contamination. Each consignment shall be stored separately, so that it may be readily identified and inspected and cement shall be used in the sequence in which delivered at site. The contractor shall prepare and maintain proper records on site in respect of the delivery, handling storage and use of cement and these records shall be available for inspection by the Engineer at all times.

b)Use of Portland Pozolana Cement Conforming to IS : 1489 (Part-I 1991) permissible, subject to the following conditions :-

i) For the concrete containing PCC Cement, the curing period shall not be less than 14 days.

ii) The stripping time for removal of form work shall be as under.

		Minimum period before striking form work .
(a)	Vertical formwork to columns, walls, beams.	48 hrs.
(b)	Soffit formwork to slabs (Props to be refixed immediately afrer removal of formwork)	10 days
(c)	Soffit formwork to beams (Props to be refixed immediately after removal of formwork)	14 days
(d)	Props to slabs i) Spanning up to 4.5m. ii) Spanning over 4.5m.	 10 days 21 days
(e)	Props to beams and arches. i) Spanning up to 6m. ii) Spanning over 6m.	 21 days 28 days

2) **Sand**

Silt content of sand shall not more than permissible limit. If it is found more than the permissible limit, it should be washed at site by contractor at his own cost.

3) **T.M.T. STEEL/HYSD STEEL**

High Yield Strength Deformed (T.M.T.) bars shall comply with IS :1786 grade Fe-415 and mild still bars shall comply I.S. 432.

All reinforcements shall be free from rust, loose mill scale or coats or oil, paints etc. placing in position for concreting. The Agency should use the Steel manufactured by the Main Producers or authorised conversion agents only. No rerolled steel shall be incorporated in the work.

4) **Bulk/Packed Bitumen**

i) Only 60/70 grade bitumen shall be used.

ii) Bitumen brought on site shall conform to I.S.73 of latest edition

iii) Testing has to be arranged by contractor from recognized Govt. laboratory at his own cost for all tests mentioned in IS-73 of latest edition

iv) The Contractor shall use Bulk Bitumen obtained from any Government Refinery only.

v) The material brought by agency will be open to check by Executive Engineer or his representative at all time. He should submit bill from refinery itself only. No other bill than refinery's unit will be accepted by department and no claim of contractor will be admissible.

vi) For other activities storage weighments specification No. Rd. 42 Pg.217 of Standard Specification of P.W.D. will be referred. Contractor has to arrange own static tank for storage of bulk bitumen.

vii) If it is decided to procure bulk bitumen the contractor shall intimate Engineer-in-Charge well in advance. Consignment will not be allowed to unload until it's weight is checked on weigh bridge by Departmental persons.

5) **Rejection of Materials Not Conforming to Specification.**

Any stock or batch of materials (s) of which samples (s) does not confirm to the prescribed test and quality shall be rejected by Engineer or his representative and such material shall be removed from site by the contractor at his own cost. Such materials shall not be made acceptable by modifications.

Materials not corresponding in character and quality with approved samples will be rejected by the Engineer or his representative and shall be removed from site immediately and will not be allowed to use for any component of work.

APPENDIX – 1

Statement showing (approximately) Quantity to be brought by the Contractor

Sr. No	Name of Materials	Approximate quantity to be brought by the Contractor at his own cost	Unit	Remarks
1	2	3	4	5
1	Bulk Bitumen VG 30(60/70) Grade	**M.T.**	One Metric Tonne	1) All required materials will have to be procured and brought by the Contractor at the site at his own risk and cost. The proof of purchase should be produced before execution of work and along with work bill 2) Bitumen shall be procured from any Govt. Refinery by the Contractor at his own cost & risk. However proof of purchasing of 60/70 grade bitumen should be produced during the execution of work and along with bill. 3) R.C.C. Pipe should be purchased by M.S.S.I.D.C. only. 4) Custody of material shall be sole responsibility of the contractor. 5) Physical properties shall be conformed with MORT&H/IS specification. 6) Stipulated test shall be carried out by the Contractor at his own cost as per the frequency. 7) Cement and steel shall be purchased from the manufacturers / main producers only.
2.	Cement (43 grade)	**M.T.**	One Metric Tonne	
3.	TMT / HYSD/M.S bars	**MT**	One Metric Tonne	

ADDITIONAL CONDITIONS FOR MATERIAL BROUGHT BY THE CONTRACTOR

1) All the material required for construction for work shall be arranged by the contractor at his own cost. The samples of material to be procured shall be got approved by the Engineer-In-Charge, Material as per approved samples shall only be procured.

2) The contractor shall submit periodically as well as on completion of work, an account of all materials brought by him in a manner as directed by Engineer-In-Charge. The contractor shall also furnish monthly account of materials. A separate register shall be maintained on site for recording daily item wise receipt and consumption of Cement, Steel and Asphalt used by him, also item wise consumption of other materials used. This register shall be signed daily by the contractor or his representative and representative of Engineer-in-Charge.

3) All the materials required for the work shall be brought by the contractor at his own cost. In each case, certificate for its quality and quantity shall be produced by the contractor and samples of each material shall be got tested from Government Laboratory as mentioned in condition at serial No. 39(4)(1) (General condition) by the contractor at his own cost and the test results of samples shall be supplied to the Department. The material not conforming to the required standard shall be removed at once from the site of the work by the contractor at his own cost.

4) Testing of all construction material shall be carried out as per required frequency and specifications. and the charges for testing shall be borne by the Contractor.

5) The contractor shall construct shed/sheds as per direction of the Engineer-In-Charge of the work for storing the materials brought at site. The material shall be taken out for use in the presence of the departmental representative only.

6) The contractor shall make his own arrangement for the safe custody of the materials which are brought for construction of work.

7) The contractor shall not transfer any material once brought at work site without prior written permission from Engineer-In-Charge.

8) In case the materials brought by the contractor become surplus owing to the change in the design of the work, the materials should be taken back by the contractor at his own cost after prior permission of the Engineer-In-charge.

9) The charges for conveyance of materials from the place of delivery to the site of work and the actual spot on work site shall be entirely borne by the contractor. No claim on this account shall be entertained.

10) The contractor shall furnish the account of asphalt brought by him at each time before placing orders for further supply. Also the same should submit on completion of the work, final account of the material used by him to the Department. This account will be scrutinized by the Engineer-In-Charge.

11) Contractor should bring the bitumen from Govt. refinery only

12) All empty asphalt drums shall be the property of contractor and the same shall be removed immediately after completion of work.

13) Agency shall ensure the laying temperature of hot mix material as specified & accordingly he shall make necessary arrangement for preventing loss of temperature of hot mix material during transit from location of drum mix plant to work site.

14) The agency should use the steel manufactured by the main producer only.

15) The contractor shall procure the RCC pipes if required for this work from M.S.S.I.D.C. only. Proof of purchasing of pipe should be submitted.

16) The contractor should inform the schedule of arrival of Bouzers to the Engineer-in-charge time to time.

17) The contractor shall also arrange to provide field laboratory at plant site along with all necessary equipment & materials for testing the grade of bitumen procurred by him.

ADDITIONAL CONDITIONS FOR BITUMEN

1) The contractor shall use Bulk Bitumen, VG30(60/70) grade received from the Government Refinery only. Bitumen received as above will be entirely consumed in the respective item & work as directed by the Engineer-in-charge.

2) Conveyance charges of Bitumen, VG30(60/70) grade (including loading/unloading etc.) from Government Refinery to the hot mix plant site will be borne by the Contractor

3) The Contractor should be aware that delay may occur in getting the bulk asphalt to be supplied at the refinery. They are, therefore, advised to indent for their requirement, sufficiently in advance allow for the period usually taken for supplying Bulk Bitumen.

4) The contractor shall submit periodically as well as on completion of work, an account of all materials issued to him in a manner as instructed by the Engineer-In-Charge. In addition, a separate register shall be maintained on site for recording daily item wise asphalt consumption of the work (Giving details of quantities of items of executed and asphalt required for each of them) as directed and shall be signed daily by the contractor or his representative, and got signed daily from the representative of the Engineer-in-Charge.

5) The bitumen shall be made available on working days only during working hours. Bulk Asphalt will be delivered as per the rules of the concerned Govt. refinery. The contractors are expected to know all the rules and regulations framed by the refineries in this behalf.

6) The Contractor should note that the bouzars when received from Government are always unloaded at the plant in the presence of the Junior Engineer/ other representative of the Department during 8.00 A.M. to 6.00 P.M. only. He should arrange to give advance intimation in this behalf to Engineer –in-charge so that the arrangement to depute the Jr.Engineer /Representative at the plant site can be made.

7) Since the work lies in agricultural area the contractor shall have to make adequate arrangement for regulating the farmers and their animals by providing barricading whenever necessary and by displaying adequate number of requisite sign, and caution board etc. The work shall have to the planned properly to avoid any inconvenience to the local people.

8) A detailed programme of completion of work shall be enclosed with the tender.
The contractors should note that once, the work is started, he will not be allowed to operate his plant, for any work other than the work of **University Engineer, Public Works Division Akola** without the specific permission in writing from the **University Engineer, Public Works Division Akola** Any breach of this condition will be seriously dealt with.

DECLARATION OF THE CONTRACTOR

I/We hereby declare that I/We have made myself/ourself thoroughly conversant with the local conditions regarding all materials and labour on which I/We have based my/our rates for this work. The specifications, local existing condition and lead of the materials on this work have been carefully studied and understood by me/us submitting the tender I/We undertake to use only the best materials approved by the University Engineer-in-charge of the work or his duly authorised representative before starting the work and to abide by his decision. I/we shall maintain rectify the entire works as per standard specification of P.W.D. (Red Book) and M.O.R.T. & H. Specification as soon as the damage occurs upto the expiry of defect liability period without putting forth any reason for the failure.

Contractor's Signature
and seal of contractor

ANNEXURE-I

QUALITY CONTROL TESTS & THEIR FREQUENCIES

Sr.No.	Material	Test	Frequency of Testing	Remarks
1	Sand	i) Fineness Modules	At the beginning & if there is change in source	
2	Metal	i) Crushing Value	One test per 200 Cum or part hereof	P.W.D. hand book I.S.2386 Part -IV
		ii) Impact Value		
		iii) Abrasion Value		
		iv) Water Absorption		
		v) Flakiness Index		
		vi) Stripping value		
		vii) Gradation		
3	Cement Concrete	Compressive Strength	Upto 5 Cum – 1 set	M.O.R.T.& H. Specification. 1716 (Fourth revision 01)
			6-15 – 2 sets	
			16-30 – 3 sets	
			31-50 – 4 sets	
			51 & Above – 4 sets + 1 additional 50 Cum or part thereof	
4	Cement	i) Compressive Strength	One test for each consignment of 50 MT (------- bags) or part thereof.	I.S. 8112 - 1989
		ii) Initial Setting Time		
		iii) Final Setting Time		
		iv) Specific Gravity		
		v) Soundness		
		vi) Fineness		
5	Steel	i)Weight per meter	One test for every 5.0 M.T. or part thereof for each diameter.	I.S. 432 IS 1786-1985
		ii) Ultimate Tensile Stress		
		iii) Yield Stress		
		iv) Elongation		
6	Granular Sub-Base	i) Gradation	One test per 200 cum	MORT&H specification Table 900-3 (Fourth Revision 2001)
		ii) Aturberg limits	One test per 200 cum	
		iii) Moisture content prior to compaction	One test per 250 cum	
		iv) Density and compacted layer	One test per3000 Sqm	
7	Water Bound Macadam	i) Aggregate impact value	One test per 200 cum	MORT&H specification Table 900-3 (Fourth Revision 2001)
		ii) Gradation	One test per 100 cum	
		iii) Flakiness index & Elongation index.	One test per 200 cum	
		iv) Atterberg limits of binding material.	One test per 25 cum of binding material.	
		v) Atterberg limits of portion of aggregates passing 425 Micron.	One test per 100 cum of aggregate	
8	Prime coat/tack coat/ for spray	i) Quality of Binder	No.of samples per lot and tests as per I.S. 73 I.S. 217 and I.S. 8887 as applicable.	MORT&H specification Table 900.4 (Fourth Revision 2001)
		ii) Binder Temperature	At regular close intervals,	

Contractor No of correction University Engineer

		iii) Rate of spread of binder.	1 test per3000 sqm. and not less than two tests per day.	
9	Seal coat/ Surface Dressing	i) Quality of Binder	Same as mentioned under Sr.No.8	MORT&H specification Table 900.4 (Fourth Revision 2001)
		ii) Impact Value/Los Angle's Abrasion value	1 test per 50 cum of aggregate.	
		iii) Flakiness & Elongation Index	1 test per 50 cum.	
		iv) Stripping value of aggregate (Immersion tray test)	Initially 1 set of 3 representative specimen for each source of supply subsequently when warranted by change in the quality of aggregates.	
		v) Water Absorption		
		vi) Water sensitivity of mix (if required)		
		vii) Gradation.	1 test per 25 cum	
		viii) Soundness.	Initially one determination by each method for each source of supply, then as warranted by change in the quality of aggregate.	
		ix) Temp. of binder	At regular close intervals,	
		x) Rate of spread of materials	1 test per3000 Sqm. and not less than 2 tests per day.	
		xi) Percentage of fractured faces	When gravel is used. One test per 50 cum,.	
10	Open graded premix surfacing/ Close graded premix surfacing	i) Quality of Binder	Same as per Sr.No.8	MORT&H specification Table 900.4 (Fourth Revision 2001)
		ii) Impact Value/Los Angle's Abrasion value	Same as per Sr.No.9	
		iii) Flakiness & Elongation Index	Same as per Sr.No.9	
		iv) Stripping value	Same as per Sr.No.9	
		v) Water Absorption	Same as per Sr.No.9	
		vi) Water sensitivity of mix	Same as per Sr.No.9	
		vii) Gradation.	Same as per Sr.No.9	
		viii) Soundness.	Same as per Sr.No.9	
		ix) Temp. of binder	At regular close intervals,	
		x) Binder content	1 test per3000 Sqm. and not less than 2 tests per day.	
		xi) Rate of spread of materials	Regular control through checks of layer thickness.	

		xi) Percentage of fractured faces	Same as per Sr.No.9	
11	Bituminous Macadam/ BBM	i) Quality of Binder	Same as per Sr.No.8	MORT&H specification Table 900.4. (Fourth revision 2001) Fo BBM- Annexture-A on page 102.
		ii) Impact/ Abrasion value	Same as per Sr.No.9	
		iii) Flakiness/ Elongation Index	Same as per Sr.No.9	
		iv) Stripping value	Same as per Sr.No.9	
		v) Water sensitivity of mix	Same as per Sr.No.9	
		vi) Water absorption	Same as per Sr.No.9	
		vii) Soundness	Same as per Sr.No.9	
		viii) Percentage of fractural faces	Same as per Sr.No.9	
		ix) Gradation	2 tests per day per plant both on individual constituents and mixed aggregates from dryer.	
		x) Binder content & aggrt. Grading	Periodic subject to minimum of 2 tests per day plant.	
		xi) Control of temp of binder & aggregates for mixing & of the mix at the time of laying & rolling.	At regular close intervals.	
		xii) Density of compacted layer	Regular control through check of layer thickness. As directed by the Engineer-in-charge.	
12	Bitumen (Pure)	i) Penetration ii) Ductility iii) Softening point iv) Flash/fire point v) Specific gravity	2 test per lot as per I.S. 73	

ANNEXURE-II

SPECIFICATION FOR BITUMINOUS BOUND MACADAM

Item: Providing and constructing 75 mm/ 50 mm thick bituminous bound macadam (BBM) road surface including all materials, preparing the existing road surface, spreading 40 mm stone metal lexicess 30% crusher broken metal + 70% hand broken (by breaking rubber obtained, by blasting) heating and spraying the bitumen 60/70@ 2 kg/sqm, spacing 12 mm size chips, compacting with static roller.

1) General :

The work consists of supply of materials and labour required for providing and laying bituminous bound macadam surface for compacted thickness of 75mm/50mm. The item includes preparing the existing road surface to receive the bituminous bound macadam course i.e. picking the existing W.B.M. surface or application of tack coat on existing B.T. surface spreading of 40mm size metal layer in required thickness with compaction with power roller, heating and spraying bitumen with required thickness with compaction with power roller heating and spraying bitumen with sprayer etc. spreading key aggregates, 12 mm. chips, and final compaction with power roller, etc. complete and finishing in accordance with the requirement of and in close conformity with grades, lines, cross section and thickness as per approved drawings etc. complete.

2) Diversions:

Temporary diversions shall be constructed and maintained by the contractor at his own cost. Diversions shall be watered if dust is likely to blow on to the road being Bituminised.

3) Materials :

(A) Aggregates: The aggregates for providing B.B.M. surface shall comply with specification Nos. Rd.41 for 40 mm and 12 mm size metal, and shall normally comply with the following regarding to size and quality of aggregate and grade and quantities of bitumen.

Sr. No.	Description	Rate of application for 100 sqmt.			
		75 mm		50 mm	
		On asphalt surface	On WBM Surface	On asphalt surface	On WBM Surface
a)	40 mm size hand broken metal	9.00 Cum	9.00 Cum	6.00 Cum	6.00 Cum
b)	12mm size chips	1.80 Cum	1.80 Cum	1.20 Cum	1.20 Cum
c)	Bitumen for grouting I.S. penetration or S.65 with (60/70 grade) penetration	200 Kg	200 Kg	175 Kg.	175 Kg.
d)	Tack coat for existing Bitumen surface with 60/70 bitumen	50 Kg	-	50 Kg	-

Note : 70% Hand broken metal and 30% crusher broken metal of total quantity for 40 mm size metal shall be used.

(B) Bitumen :

The bitumen shall be paving bitumen of suitable penetration grade within the range S-35 to S-65 i.e. 60/70 as per Indian Standards Specifications for "Paving Bitumen" IS 73-1992.

4) Preparation of Base:

Any pot holes in the existing bituminous road surface and broken edges shall be patched well and the surface shall be brought to correct level and camber with additional metal and bitumen as required which will be paid separately. Before starting the work the bituminous surface shall be swept clean of all the dirt, mud cakes, animal droppings & other loose foreign material.

If so required by the Engineer, the contractor shall keep the side width & nearby diversion watered to prevent dust from blowing over the surface to be bituminous. Existing water bound macadam surface shall be picked for and surface loosened for a dept of 2.5 cm and the picked surface shall be brought approximately to the correct camber and section Edge line shall be correctly marked by dog belling the surface to form a continuous the notch.

There shall always be sufficient length of prepared surface ahead of the bituminous surfacing operations as directed by the Engineer to keep these operations continuous.

5) Tack Coat on bitumen surface:

Applying tack coat for existing B.T. surface only at the rate of 50 kg/100 m2 as per specification No. Rd-47.3.3.

6) Picking of existing W.B.M. Surface :

Picking of existing W.B.M. surface for receiving bituminous bound macadam as per Rd. 33.

7) Spreading and Compaction

7.1 Spreading of 40 mm metal (70% Hand broken & 30% crusher broken):- 40 mm metal shall be spreaded evenly at the specified rate of 9 cubic metres/6 cubic metre per 100 squares of area so as to form a layer over the width of road with correct camber/super elevation as required. Any foreign matter, organic matter, dust, grass etc. shall be removed immediately. The sections shall be checked with camber board and straight edge batten etc. Any irregularities shall be made good by adding aggregates in case of depressions and removing aggregates from high spots.

7.2 Compaction of 40mm size metal :- The surface of 40 mm metal layer after bringing to necessary grades and sections shall be rolled with the use of 8 to 10 tonnes power roller. Roller shall commence from the edges and progress toward the centre longitudinally except on super elevation portion it shall progress form the lower to upper edges parallel to the centre line of pavement. Whether the roller has passed over the whole area and high spot or depressions which become apparent shall be corrected by removing or adding aggregates. The rolling shall then continued till the entire surface has been rolled to desired compaction such that there is no crushing of aggregates and all roller marks have been eliminated. Each pass of roller shall uniformly overlap not less than one third of the track made in the preceding pass.

8) Application of Bitumen :

Bitumen of I.S. grade supplied for the work shall be heated to temperature of 177 Celsius to 191 Celsius (350 F to 375 F) in a bitumen boiler and temperature shall be maintained at the time of actual application. The hot bitumen shall be applied through a pressure on the road surface uniformly at the rate of 200 kg. Per 100 sqm. The road surface shall be divided into suitable rectangles marked by chalk so as to ensure correct rate of application of the bitumen.

9) Key Aggregates:

On Completion of bitumen application, 12 mm size key aggregates shall be spread immediately at a uniform rate of 1.8 cubic meters/ 1.2 cubic meters per 100 sqm. of area when entire surface in hot condition Brooms shall be used to ensure even distribution of key aggregates.

10) Final Compaction:

Immediately after spraying of bitumen and spreading of key aggregates, the surface shall be rolled with a power roller to obtained full compaction and to force the blindage of key aggregates in to the interstice of the course aggregate. The rolling shall continue till the asphalt surface hardens and key aggregates stop moving under power roller.

11) Surface Finish and Quality Control:

The surface finish shall conform to requirements of clause 902 of specification for roads and bridges by Ministry of surface Transport (Copy enclosed) Quality control Test and their frequencies shall be as per table below.

Sr.No.	Test	Frequency
1	Quality of binder	Two samples per lot to be subjected to all or some test as directed by the Engineer.
2	Aggregate Impact Value	One test per 200 cubic meter of aggregate.
3	Flankiness Index and Elongation Index	One test per 200 cubic meter of aggregate.
4	Stripping value	Initially one set of three representative specimen for each source of supply subsequently when warranted by changes in the quality of aggregate.
5	Water absorption of aggregates	Initially one set of three representative specimen for each source of supply subsequently when warranted by changes in the quality of aggregate.
6	Aggregate grading	One test per 100 cubic meter of aggregate
7	Temperature of binder at application	At regular close intervals.
8	Rate of spreading for binder.	One test per3000 square meter of area.

12) Item to Include:

i) Diversions unless separately provided in the tender

ii) Preparing the road surface.

iii) Applying tack coat on existing B.T. or picking the existing W.B.M. surface.

iv) Supplying spreading and compaction of 40 mm and 12 mm size aggregate.

v) Supplying, heating and spraying of bitumen.

vi) Supplying and spreading and compaction of 12 mm size chips (By Power roller.

vii) All labour, materials, including bitumen and aggregates used of tools, plants and equipment for completing the item satisfactorily.

13) Mode of Measurement and Payment.

The contract rate shall be for 1.00 Sqm. The measurements shall be for the width of the road as executed, limiting it to the width specified or as ordered by the Engineer and the length measured along the centerline. The measurement dimensions shall be recorded correct upto two places of decimals of a meter and the area worked out correct upto one place of decimal of a Sqm.

ANNEXURE-III

Specifications for Traffic Safety Measures During Widening of Roads where traffic can be passed over part width

Providing Traffic Safety Measures on Road during Widening of roads Comprising of Traffic Sign Boards and devices as per detailed design, drawing, specification and as directed by Engineer-in-charge.

SPECIFICATIONS :-

The item includes providing traffic safety arrangements required for traffic control near has stretch of road where widening work is being taken up, before actual start of widening work of road. The contractor will have to provide the traffic safety arrangements as per the detailed drawing. The traffic safety arrangements will have to be got approved from the Engineer-in-charge by the Contractor before taking any construction activities for Widening of works.

The Engineer-in-charge shall get himself satisfied about the traffic safety arrangement provided on the work site before allowing contractor to dismantle the existing structure and a certificate to get effect shall be recorded in the Measurement Book.

A) The Sign No. 1 "SPEED LIMIT (20)" shall be placed at a distance of 120 m away from the point where the transition of carriageway begins. The Sign Board shall be of size 60 cm dia. Having white background and red border and the numericals shall be in black colour as per IRC 67-1977. Distance between Sign No.2 shall be minimum 20 m.

B) The Sign No.2: “NARROW ROAD AHEAD” shall be placed at a distance of 80 m away from the point where transition of carriageway starts. The Sign board shall be of an equilateral triangle of size 90 cm. having white background. Retro reflective border in Red colour and non reflective symbol of black colour as per IRC: 67-1977.

C) The sign No.3: The sign board indicating “MAN AT WORK” shall be placed at a distance of 40 m. away from the point where the transition of carriageway starts.. The sign board shall be of an equilateral triangle of size 90 cm. having white backgrounds. Retro reflective border of Red colour and non reflective symbol of black colour as per IRC 67-1977.

D) The sign No. 4: The board displaying the message "GO SLOW-WORK IN PROGRESS" shall be placed near point of transition of carriageway. The sign board shall be of size 1.0m x 1.0m having red background and message in white colour.

F) Retro Reflective Strong Inviolable Stand Type Barrier painted black and having white Retro Reflective Strips for closer of traffic shall be placed to cover the entire width of carriageway including shoulder as per drawing. The Barricades shall not be removed unless permission is given by the responsible officer of the rank not less than Sectional Engineer. The Barricade shall have two plates of size 1.30 x 0.20m painted black and shall have white Retro Reflective Strips and mounted on angle iron stand of 1.0 m height.

G) Yellow light flasher shall be kept lit from sunset to sunrise, 2 nos. along with white painted line and 2 Nos. at barriers on both sides as indicated in the drawing.

H) Informatory sign board indicating name or work, estimated cost, completion period defect liability period. Name of contractor with telephone no. Name of Engineer with telephone no. shall provided between sign board no.4 and the barricade. The Sign board shall be having green back ground and white messages retro reflective as per IRC :67-1977.

J) This is incidental to work (being Safety Measures) and no payment will be made on account of this

FINANCIAL RULE FORM NO. 2-A
(See rule 51 - 4)
GUARANTEE BOND FOR SECURITY DEPOSIT

In consideration of the **GOVERNOR OF MAHARASHTRA** (hereinafter referred to as **"THE GOVERNMENT"**) having agreed to exempt to _____ (hereinafter referred to as **"THE CONTRACTOR"**) from depositing with the Government in cash, the sum of Rs._____ (Rs. _____ only) begging the amount of Security Deposit payable by the Contractor to the Government under the terms and conditions of the Agreements dated the _____ day of _____ and made between the Government of the one part and the Contractor of the other part (hereinafter referred to as " the said Agreement") for _____ as security for the observance and performance by the contractor of the terms and conditions of the said agreement on the contractor furnishing to the Government a Guarantee in the prescribed form of a Scheduled Bank in India being in fact these presents in the like sum of Rs. _____ (Rs._____ only. We _____ Bank Limited registered in India under _____ Act and having one of our local Head Office at _____ do hereby.

1) **Guarantee to the Government -**

a) Due performance and observance by the Contractor of the terms, covenants and conditions on the part of the Contractor contained in the said Agreement, and

b) Due and punctual payment by the contractor to the Government of all sums of money, losses, damages, costs, charges, penalties and expenses payable to the Government by the Contractor under or in respect of the said Agreement.

2) Undertake to pay to the Government on demand and without demur and not with standing any disputes raised by the Contractor(s) in any suit or proceeding filed in any Court or Tribunal relating thereto the said sum of Rs. _____ (Rs. _____ only) or such less sum as may be demanded by the Government from use our liability hereunder being absolute and unequivocal and agree that.

3)a) The guarantee herein contained shall remain in full force and effect during the subsistence of the said Agreement and that same will continue to be enforceable till all

the dues of the Government under or by virtue of the said Agreement have been duly paid and its claims satisfied or discharged and till the Government certified that the terms and conditions of the said Agreement have been fully properly carried out by the Contractor.

b) We shall not be discharged or released from the liability under this Government by reasons of -

i) any change in the constitution of the Bank or the Contractor, or

ii) any arrangement entered into between the Government and the Contractor with or without our consent,

iii) any forbearance or indulgence shown to the Contractor.

iv) any variation in the terms, covenants of conditions contained in the said Agreement,

v) any time given to the Contractor, or

vi) any other conditions or circumstances under which, in law, a surety would be discharged.

c) Our liability hereunder shall be joint and several with that of the Contractor as if we were the principal debtors in respect of the said sum of Rs. _____ (Rs. _____ only) and

d) We shall not revoke this guarantee during its currency except with the previous consent in writing of the Government.

IN WITNESS WHERE OF The Common Seal of _____ has been here unto affixed this day of _____ The common seal of _____
Was pursuant to the resolution of the Board of Directors of the company dated the _____ day of _____ herein affixed in the presence of who, in token thereof, have hereto set their respective hands in the presence of -

1) _____

2) _____

VOLUME-II

SECTION A

STANDARD SPECIFICATIONS
FOR BASIC MATERIAL

A.1LIME.

A.1.1 General

- The Specification covers eminently hydraulic limes (in their hydrated states) and moderately hydraulic limes and fat limes in their un hydrated and hydrated states used in building construction.

Classification - As per I.S. 712-*, the Building limes shall be classified as -

Class A.- Eminently Hydraulic lime used for structural purposes.

Class B.- Semi-Hydraulic lime used for masonry work.

Class C.- Fat lime used mainly for finishing coat in plastering, White washing and with suitable add mixtures such as Surkhi, or any other pozzolanic material, to produce Artificial hydraulic mortar.

Class D.- Magnesium lime used for finishing coat in plastering, White washing etc.

Class E.- Kankar lime used for necessary mortar.

Chemical Composition - For different classes of limes, the chemical composition shall be as per I.S. 712-*.

Physical Requirements - They shall comply with I.S. 712-*. All impurities, ashes or pieces improperly burnt shall be screened or picked out before slaking. The lime shall be slaked with water not less than one week or more than two weeks before use. The slaked lime shall be screened through I.S. 240 sieve for mortar used for concrete or masonryand first coat of plaster and I.S. 120 sieve for second and third coats of plaster.

Storage - Storage shall comply with I.S. 712-*. The slaked lime if stored, shall be kept in a water-proof and damp-proof closed shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. The lime shall be used when fresh, i.e., within 14 days of its removal from kiln.

All lime that has been in any way damaged by rain, moisture, dirt, air-slaking or any other cause shall be rejected and all rejected material shall be removed from the work site forthwith.

Sampling and testing - According to I.S. 712-* Sample of lime shall be got approved by the Engineer who shall keep it in his office.

Field Testing - According to I.S. 1624-***.

Measurement - When required to be measured, measurement shall be by volume with cu. metre as the unit.

A.2.CEMENT

Cement - Cement shall conform to I.S. 269-* or I.S. 8112- ****. for Gr. 43 or Gr. 53 cement.

The type of cement as to whether it shall be Ordinary Rapid Hardening or Low Heat shall be specified. When no type is specified, Ordinary Portland cement shall be used.

The weight of Ordinary Portland cement shall be taken as 144 kg. Per cu. m. and Rapid Hardening Portland cement as 121 kg. per cu. m. The measurement of proportion of cement should normally be on the basis of weight and whole bags, each undisturbed and sealed 50 kg. bag being considered equivalent to 35 litters in volume. When part bag is required, cement shall be taken by weight. When the basis of mix. is by volume,cement will be taken by weight, assuming 35 litters to be equal to 50 kg. Care should be taken to see that each bag contains full quantity of cement.

Tests - When tests are considered necessary, they shall be carried out as indicated in I.S. 269-* or I.S. 8113 : 1976. The contractor should ensure that the cement is of sound and required quality before using it.

Storage - Cement required for use shall be as fresh as possible and stored on planks raised 15 to 20 cm above the floor and stacked 30 cm away from the walls in suitable closed weather-proof buildings at the work site or at the selected approved site, in such a manner as to prevent deterioration by dampness or moist atmosphere or intrusion of foreign matter. Cement shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt, i.e. first received being first used. Not more than 15 bags shall be stacked vertically in one pile and maximum width of the piles should not be more than 3 metres. Any cement that has deteriorated caked or which has been damaged shall not be used. Cement concerning which there is a doubt shall not be used pending testing and satisfactory results. Cement that is condemned shall be immediately removed from the work site. When temporarily stored in the open for use within 48 hours, it shall be kept on a platform of planks about 15cm to 20cm. above ground and covered with a tarpaulin. Ordinary cement stored for more than 2 months from the date of receipt from the factory shall be subjected to test and used only if found satisfactory. The cost of tests shall be borne by the agency responsible for the storage after 2 months from receipt. Different kinds or brands of cement or cement of the same brand from different mills should be stored in separate groups and should not be mixed during the use except when directed in writing by the Engineer. Cement shall be kept in a store under double locking arrangement so that it can be taken out or fresh stock admitted with the knowledge of supervising staff of the Department. A board indicating stock and daily transactions of cement shall be kept in each room of the cement store. Daily account of receipt and use of cement bags shall be maintained by the Contractor in the Performa approved by the Engineer. This shall be kept in the store for verification by the supervising Departmental staff. Copies of the records shall be supplied to the Engineer regularly.

The cement shall not be stored for unduly long periods. It should not be handled in such a way as to impair its strength or useful characteristics.

Measurement - When required to be measured, measurement shall be by weight with tonne as the unit.

A.3.NEERU

General - This specification covers neeru to be used for plaster finishes in building work.

Materials –

1) Lime - Class C lime (i.e pure fat lime) as mentioned in I.S.1712-1973 shall be used. Lime shall comply with specification No. A.1 in all respects.
2) Water - Water shall conform to specification No. A.4.
3) Sand - Sand shall conform to specification No. A.5. All

sand shall pass through I.S. sieve No.50.(0.599 mm)

Preparation - Lime shall be slaked and mixed with sufficient water to form a thick paste. It shall be reduced to a fine paste by grinding. It shall then be passed through a fine sieve (3mm mesh) to remove all un slaked particles and foreign matter and allowed to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be allowed to run off. The slaked lime paste thus formed shall be used for preparing neeru. Ready lime powder class C conforming to I.S. 1712 may also be used for preparing neeru.

The neeru shall be prepared by mixing together 4 parts of this lime paste and 1 part of fine sieved sand by volume. Jute fibre finely chopped shall be added to this mortar at the rate of 4 Kg of jute to every Cu.m. of lime sand mixture. The mixture shall then be properly ground to a fine paste between two stone or a mill. Neeru may also be prepared from ready powder by intimate hand mixing.

The neeru thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at a time. In case of neeru prepared from ready lime powder , it shall be used immediately.

Measurements - When required to be measured the measurement shall be by volume with Cu.m. as unit.

A.4.WATER

(a) Water for mixing cement/lime mortar or cement/lime concrete - Water for mixing cement/lime mortar or concrete shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil, acid and injurious alkali, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C. Water shall be obtained from sources approved by the Engineer. Sources of water shall be maintained at such a depth and the water shall be withdrawn in such a manner as to exclude silt, mud, grass or other foreign materials. Containers for transport, storage and handling of water shall be clean.

If required by the Engineer, it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S. 269-**. Any indication of unsoundness, change in time of setting by 30 minutes or more, or decrease of more than 10% in strength of mortar prepared with the water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water tested. Sea water shall not be used.

Water fit for drinking will generally be found suitable for mixing cement/lime mortar or concrete.

(b) Water for curing cement/lime mortar or concrete - Water for curing mortar or concrete should not be too acidic or too alkaline. It should have a pH value ranging between 4.5 to 8.5. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces. Hard and bitter water containing more than 100 p.p.m. of sulphates shall not be used for curing purpose.

Sea water and water containing over 3% of chloride salts should not be used for curing reinforced concrete works.

Potable water will generally be found suitable for curing cement/lime mortar or concrete.

A.5.FINE AGGREGATE

General - All fine aggregate shall conform to I.S. 383-== and relevant portion of I.S. 515-= as directed by the Engineer.

Sand for use in concrete shall be natural sand or crushed stone screenings. Sand shall be

clean, well graded, hard, strong, durable and gritty particles free from injurious amounts of dust, clay, kanker nodules, soft or flaky particles, shale, alkali, salts, organic matter, loam, mica or other deleterious substances and shall be approved by the Engineer.

The maximum size of particles shall be limited to 5mm. Where the best trap sand available in the region contains murum or laterite particles, such particles may be allowed up to 5%. Zeolite crystals may also be permitted up to 4%. If the fine aggregate contains more than 4% of clay, dust or silt shall be washed. When the quality of fine aggregate is doubtful, it shall be tested for clay, organic impurities and other deleterious substances as laid down in I.S. 383-==. It shall not contain deleterious materials in such quantity as to reduce the strength or durability of the mortar or concrete or to attack the reinforcement in the case reinforced concrete work. Sea sand shall not be used.

The fine aggregate for concrete shall be graded within limits given in table III or table IV in paragraph 5-2 of the I.S. 383-==. The fineness modulus may range between 2.6 to 3.6. If substitution of a certain quantity of stone screenings will improve the quality of concrete, the Engineer may allow it.

The fine aggregate for cement mortar for masonry and first coat of plaster should generally satisfy the following grading:-

I.S. Sieve	Percentage by weight passing sieve
480	100
240	80 - 95
120	70 - 90
60	40 - 85
30	5 - 50
15	0 - 10

The fineness modulus shall not exceed 3.0

The fine aggregate for cement mortar for pointing and second coat of plaster may have the following grading :-

I.S. Sieve	Percentage by weight passing sieve
480	100
240	100
120	75 - 100
60	40 - 85
30	5 - 50
15	0 - 10

The fineness modulus shall not exceed 1.6.

I.S. 1542-1960 shall generally apply for sand for plaster.

Contractor No of correction University Engineer

Gradation - The gradation of materials from any one source shall not vary in composition beyond the range of values that governs, in selecting source of supply. For determining the degree of uniformity, determination of fineness modulus shall be made upon representative samples

furnished by the contractor from such sources as he proposes to use. Fine aggregate from any one source having a variation in fineness modulus greater than -20 to +20 from the average fineness modulus of the representative samples submitted by the contractor shall be rejected or may be accepted subject to such changes in the proportion of aggregate as the Engineer may direct.

A.6.COURSE AGGREGATE

Coarse aggregate shall consist of crushed or broken stone and be hard, strong, dense, durable, clean, of proper gradation and free from skin and coating likely to prevent proper adhesion of mortar. the aggregate shall generally be cubical in shape and as far as possible flaky, elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-== and I.S. 515-=. Unless special stones of particular quarries are mentioned in the special provisions, aggregates shall be broken from the best trap/granite/ quartzite/gneiss stones in that order available in the region and approved by the Engineer. Stone shall have no deleterious reaction with cement. Shingle of the appropriate grading may be permitted to be substituted for some proportion of the metal without price adjustment if it is shown that thereby strength of concrete is increased and workability improved.

The maximum size of the aggregates may be upto 80mm. and well graded between the sizes 5mm to 80mm. in such proportions as to give maximum density to the concrete. The maximum size should be as large as possible within the above limit but should not exceed 1/4 of the minimum thickness of the member, provided however this size presents no difficulty in the case of R.C.C. to surround the reinforcement thoroughly and fill up the corners of the formwork satisfactorily. In the case of general concrete work, a maximum size of 40mm is used and in R.C.C. work a maximum size of 20mm will be found satisfactory; but it should be restricted to 6mm less than the minimum lateral clear distance between bars or 6mm less than the cover, whichever is smaller.

The crushing strength of aggregate will be such as to allow the concrete in which it is used to built up the specified strength of the concrete.

Approximate range in grading of coarse aggregate may be as under :-

PERCENTAGE OF COARSE AGGREGATE FRACTION

MAXIMUM SIZE OF AGGREGATE (1)	NOMINAL RANGE (2)	40mm to 80 mm (3)	20mm to 40 mm (4)	5mm to 20 mm (5)	10mm to 20 mm (6)	5mm to 10 mm (7)
20mm		100	55—67	33--45		
40mm		40—50	50—60	28—40	18--30	
80mm		20—36	16—36	35—44	10—30	13--29

Grading tests shall be taken in the beginning and at change of source or machinery or type of metal. Where required by the Engineer, tests indicated in I.S. 383= and I.S. 456-* shall be got carried out in an approved laboratory at the contractor's cost to show the accept-ability of the material.

Coarse aggregate of a porous nature where absorption of water after 24 hours' immersion in water, is more than 5% by weight, shall not be used.

Limits of deleterious substances shall not exceed those prescribed in 2.3.1.1 and 2.3.1.2 of I.S. 515-=.

Storage - The aggregates of different sizes shall be stored separately and handled in such a manner as to prevent intermixing of different sizes of aggregates required separately for grading purposes. No foreign matter shall be allowed to be mixed up with aggregates. If covered with dust, etc., they washed clean before use.

Royalty - The contractor shall be responsible for observing the laws, rules and regulations imposed under the Minor Minerals Act and such rules prescribed by Government Departments such as Forest and Revenue and by competent Local Authorities etc. Royalty payable in connection with securing the material shall be paid by the contractor subject to general conditions of contract.

Where rules permit refund of Royalty for use of the materials in Government work the Engineer will pass a certificate for the quantity so used.

The contractor shall be entirely responsible for operating existing quarries or opening new quarries including removal of over-burden and shall bear all costs pertaining to them.

In the case of Departmental quarries, operations shall be carried out in such a way that their further usefulness is not affected. No royalty will be charged when the material is allowed to be obtained from the Departmental quarry.

When the quarries are not owned by the Department, the contractor shall be responsible for securing the written consent of the land owners for opening new quarries or working old ones and for payment of all compensation, Royalty, etc.

Samples of coarse aggregates required for the work shall be got approved by the Engineer both regarding quality and grading and shall be kept in the Engineer's office. The coarse aggregate to be used shall conform to those samples.

Blasting - Blasting shall be carried out according to instructions laid down in specification No. B.2.

Measurement - When required to be measured, measurement shall be by volume with cu. meter as the unit. No deduction shall be made for the voids.

A.7.STONE FOR MASONRY

Stone to be used in the masonry shall be trapped, granite, quartzite, gneiss, laterite or any other type of good stones available locally. In the absence of mention of a special type in the item or the special provision, good trap, granite, quartzite or gneiss stones in that order available in the region and known to be satisfactory in use in view shall be used. The stone shall stand weathering well and when immersed in water for 24 hours shall not absorb water more than 5% of its dry weight when tested according to I.S. 1124-===. The stone of the required quality shall be obtained from quarries specified in the contract or quarries approved by the Engineer. All stones shall generally be freshly quarried. Laterite stone should be compact in texture and the mottled and streaked colours pervading it should not be very unevenly distributed. Those types in which white clay colours should not be used as building stones. Laterite stones exposed to weather to harden for some time should be preferred. It should not be used where subject to great pressure and liable to be soaked with water.

Quality of face stones - The stones to be used in the face shall be tough, hard, dense, sound and durable, resistant to weathering action, reasonably fine-grained, uniform in colour and texture and free from seam cracks or other defects which would adversely affect their strength, durability or appearance. They shall also be free from weathered portion and skin. The exposed faces shall be entirely free from any type of discolorations. Preferably stone shall be from a quarry

the product of which is known to be of satisfactory quality in use. Stones shall be freshly quarried with clean faces and sharp edges all round and shall be of such a character that it can be wrought to such lines and surfaces, whether curved or plane as may be required. size and shape of stones shall be as per the requirements of each item.

Quality of rubble stones - Rubble stones for hearting shall be of approved quality, sound, hard, dense and durable, free from segregation, seams, cracks, and weathered portions and other structural defects or imperfections tending to affect their soundness and strength. Stones shall generally be freshly quarried with sharp edges and clean faces. They shall be free from rounded, worn or weathered surfaces or skin or coating which prevents the adherence of mortar. Size and shape of stone shall be as per the requirement of each item.

Quality of other stones - Stones to be used as headers, pin headers, quoins, coping, etc., shall comply with the requirements of facing and hearting stones as may be relevant and shall further comply with the requirement of size and shape stipulated under the relevant item.

Samples - Sample of stones to be used in the work shall be got approved by the Engineer before the work is started and such samples shall be maintained in the Engineer's office.

Royalty, octroi duties, etc. - Royalties, compensation, octroi duties, etc., payable in connection with securing the stones shall be paid by the contractor subject to conditions laid down in the general conditions. The contractor shall be responsible for observing the laws, rules and regulations imposed under the Minor Minerals Act and such other rules etc., laid down by Government Departments and Local Authorities.

Where rules permit refund of royalty for use of the materials in Government works, the Engineer will pass a certificate for the quantity so used. No royalty will be charged when the materials are allowed to be obtained from the Departmental quarries. In the case of Departmental quarries, operations will be carried out in such a way that their further usefulness is not affected.

The contractor will be entirely responsible for operating existing quarries or opening new quarries including removal of over-burden and shall bear all costs pertaining to them.

Where the quarries are not owned by the Department, the contractor shall be responsible for securing the written consent of the land owners for opening new quarries or working old ones and for payment of all compensation, Royalty, etc. The stones whatever their source shall be of the specified quality.

Blasting - Blasting shall be carried out according to instructions laid down in specification No. B.2.

Measurement - When required to be measured, measurement shall be by volume, length of numbers as the case may be with cu. metre, metre and one as the respective unit.

In case of rubble the measurement shall be by volume of stacks without deductions for voids.

In case of khandkies the measurement shall be by length.

In case of stones such as quoins, arch stones, etc., the measurement shall be by numbers for specified sizes.

In case of stones such as the slabs, coping stones, etc., the measurement shall be by volumes for specified dimensions.

A.8.BRICKS

First-class Bricks - First-class Bricks shall be of regular and uniform size, shape and colour,

uniformly well burnt throughout but not overburnt. They shall have plain rectangular faces with parallel sides and sharp, straight and right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10mm depth on one of their flat faces.

They shall give a metallic ringing sound when struck.

They shall show a fine grained, uniform, homogeneous and dense texture on fracture and be free from lumps of limes, laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance or usefulness for the purpose intended. They shall not have any parts under-burnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60cm

Size - (a) The size of the conventional bricks may vary from about 22cm x 10cm x 6.5cm to 23cm x 11cm x 8cm Only bricks of one standard size, shall be used on one work unless specially permitted by the Engineer. The following tolerances are permitted in the standard conventional size adopted on a particular work :-

Length - plus or minus 3mm.

Breadth - plus or minus 1.5mm.

Depth - plus or minus 1.5mm.

(b) When I S bricks are used they shall comply with I.S. 1077-1966*.

Absorption - After immersion in water, absorption by weight shall not exceed 20% of the dry weight of the brick when tested according to I.S. No. 1077-1966*.

Crushing strength - The load to crush the brick when dry shall not be less than 44 Kg/sq.cm and when thoroughly soaked, shall not be less than 33 Kg/sq.cm.

Tests - When bricks are to be used in high load bearing walls, where the load coming on the walls is of the order of 4.5 Kg/sq.cm. and more, where there is a doubt about the crushing strength of the bricks, the Engineer may order the compression tests as laid down in I.S. 1077-1966*. If different kilns use different materials and methods of

burning, one test shall be made for each group of kilns using the same type of materials and methods of burning. If the average strength is less than that mentioned in A.8.1.5. The bricks from the kiln represented by the sample shall be rejected. All tests shall be done at the cost of the contractor.

Second class Bricks - (a) Second class bricks shall be similar to first class bricks except that they may be slightly over burnt and may not have very sharp edges. Tolerance in depth shall be plus or minus 3mm. Absorption of water when immersed in water shall not exceed 22% when tested according to I.S. 1077-1966*. Crushing strength may be 10% less than that prescribed for first class bricks.

All other provisions specified for first class bricks shall also apply to second class bricks.

(b) When I.S. bricks are used they shall comply with relative provisions for second class bricks in I.S. 1077-1966*.

A.9.MILD STEEL BARS FOR REINFORCEMENT

Material - Mild steel reinforcement bars - mild steel bar reinforcement for R.C.C. work shall conform to I.S. 432-(Part I) and shall be of the tested quality of not less than Grade I.

It shall also comply with the relevant part of I.S. 456-*.

All the reinforcement shall be clean and free from dirt, oil, paint, grease, mill scale or loose or thick rust at the time of placing.

The contractor shall produce a test certificate of the manufacturer.

If independent tests are considered necessary, they shall be carried out according to I.S. 1521 and 1608-****. The cost of such tests shall be borne by the contractor if the results are unsatisfactory and by the Department if the results are satisfactory. In case of untested steel, the cost of the tests shall invariably be borne by the contractor.

Bars of rods rerolled from scrap steel shall not be used unless tests show that they fully comply with I.S. 432-(Part I).

Storage - Reinforcement steel shall be stored above ground surface upon platforms, skids or other supports to avoid distortion and sags of long lengths and shall be protected as far as practicable, from surface deterioration by direct contact with undesirable elements or by exposure to conditions producing rust and corrosion. All bars of the same designation shall be stacked separately in racks and distinctly marked.

Measurement - When required to be measured, measurement shall be by weight with quintal or tonne as the unit. The bars may be directly weighed or the weight shall be calculated according to standard weights mentioned in ISI Hand Book correct upto 0.10 Kg.

A.9.(A) HIGH YIELD STRENGTH DEFORMED BARS

The bars shall conform to I.S. 1786-1979 or I.S. 1139-1966. These shall either be cold twisted or hot rolled deformed bars with the 0.2% proof stress of 415 N/sq.mm. or 500 N/ sq.mm. as per the requirement of the design.

Storage shall conform to A.9.2.

Measurement shall conform to A.9.3.

A.9.(B) HIGH TENSILE STEEL BARS

The high tensile steel bars for use in prestressed concrete work shall conform to I.S. 2090-1962.

The storage shall conform to A.9.2.

The tensile strength of the high tensile steel bars shall be as specified in the special

A.10.1.

provisions of the item. In the absence of the given strength the minimum ultimate strength shall be taken as 100 Kg./sq.mm.

Measurement shall conform to A.9.3.

A.9.(C) HIGH TENSILE STEEL WIRES

The high tensile steel wires for use in prestressed concrete work shall conform to I.S. 1785-**.

The storage shall conform to A.9.2.

The tensile strength of the high tensile steel wires shall be as specified in the special provisions of the item. In the absence of the given strength the minimum ultimate strength shall be as given in para 6-1 of I.S. 1785-**.

Measurement shall conform to A.9.3.

A.10.STRUCTURAL STEEL

All structural steel shall conform to I.S.226-**** and I.S.800-****. The steel shall be free from defects mentioned in I.S.226-**** and shall have a smooth uniform finish. It shall be straightened if necessary, in the mill before shipment. Material shall be free from loose mill scale, rust-bits or other defects affecting its strength and durability. Rivet bars shall conform to I.S.1148-*.

Storage - Structural steel shall be stored above the surface of the ground upon platforms, skids or other suitable supports to avoid distortion of sections in long length and shall be protected as far as practicable from surface deterioration by direct contact with harmful elements or exposure to conditions producing rust and corrosion. It should be so stored and handled that the material will not be subject to excessive stress and damage.

Straightening - All deformed structural material will be properly straightened by methods which are not injurious prior to being laid off, punched or otherwise worked in the shop. Sharp kinks and bends shall be cause for rejection.

Tests - When the steel is supplied by the contractor, test certificates of the manufacturers shall be produced. If further tests be necessary, they will be done according to I.S. 226-****= and I.S. 1521-*****, 1608-***** ; the cost of such tests will be borne by the Department if the results are satisfactory and by the contractor if the results are unsatisfactory.

Measurement - The sections shall be supplied in specified exact lengths, smoothly cut to the required lines. The lengths of the sections shall be measured correct to a centimetre and weight calculated on the basis of standard weights prescribed by I.S. for each relevant section correct up to 0.10 of a Kg. Tolerances mentioned in I.S. 226-****= shall be applicable unless other tolerances are prescribed in the specifications of any particular item.

The contract rate shall be for a unit of one quintal or one tonne.

A.11.MILD STEEL BINDING WIRE

The mild steel wire shall be of 1.63mm or 1.22mm (16 or 18 gauge) diameter and shall conform to I.S. 280-*.

The use of black or galvanised wire will be permitted for binding reinforcement bars. It shall be free from rust, oil, paint, grease, loose mill scale or any other undesirable coating which will prevent adhesion of cement mortar.

Storage - The wire coils shall be stored above ground on platforms or other supports and protected from surface deterioration by direct contact with harmful elements or by exposure to conditions producing rust and corrosion.

Measurement and Payment - No measurements will be taken of the wire used for tying reinforcement bars. The rate for reinforcement steel and its fabrication shall include the cost of the binding wire.

Measurement - When required to be measured, measurement shall be by weight with quintal or tonne as the unit. The wire shall be weighed correct up to 0.10 Kg.

A.12.TIMBER

General - The specifications cover the requirements of good quality timber to be used for various works. When the kind of wood is not specially mentioned, good Indian teak (Tectona Grandis) alone shall be used.

Quality - Timber to be used in building works shall be from the heart of a sound tree of mature growth, the sapwood being entirely removed. It shall be uniform in substance, straight in fibre, free from large, loose, dead or cluster knots, flaws, shakes, warp, cup, spring, twist, bends or defects of any kind. It should be free from spongy, brittle, flaky, or brushy condition, sapwood and borer holes.

All timber shall be seasoned and be free from decay, rot, harmful fungi and insect attacks and from any other damage of harmful nature which will affect the strength, durability, appearance or its usefulness for the purpose for which it is required.

Colour - The colour should be uniform as far as possible, the darkness of the colour amongst coloured species of timber being generally a sign of strength and durability.

Kinds - Timber shall be of the species mentioned in the tender items. Normally for doors, windows, roof, scantlings, trusses, etc., in all permanent and first class works, Indian Teak Wood (Tectona Grandis) of the best quality like that from Dandeli, Ballarshah, and Bulsar shall be used. Properly seasoned and treated Nana (Lagarstroemia Lanceolata) wood can be used as an alternative to teak wood when so specified. Adequately seasoned and properly treated timber of Haldu (Adma Cardifolia), Anjan (Hardwickia binata) and Bijasal (Pterocarpus marsupium) can be used in place of teak for specified items of wood work when so stipulated in the tender. Seasoned rose wood (Dalbergia Latifolia) can be used for internal fittings for first class work and furniture. Where jungle wood or hardwood is mentioned for interior or temporary works and where economy is the sole consideration, following species of timber may be used:-

Serial No. (1)	Trade Name (2)	Botanical Name (3)
1.	Poon	CalophyllNum spp.
2.	Pali	Dischopsis spp.
3.	Silver Oak	Grevillea Robusta A(unn).
4.	Bija Sal	Pterocarpus Marsupium.
5.	Sal	Sborea Rubusta Gaertn.
6.	Kindal	Terminalia Paniculata.
7.	Laurel or Ain	Terminalia Tomentosa.
8.	Kalam	Mitra gyanana paryifolia.
9.	Dhaura	Anogeissuc lifolia wall.
10.	Haldu	Adiona Cordifolia Hoop.
11.	White cedar	Dyso Xylum Malabaricum.
12.	Benteak or Nana	Lager spoemia Lanceolata.
13.	Mundani	Acrocarpus Trascinefolious.
14.	Gurjun	Ritecracarpus Indicus.
15.	Malabar Red Pine	(Piney) (Hardwickia Pinnata).
16.	Dhaman	Grewia filia folia.
17.	Jamba	Xylia Xylocarpa.
18.	Anjan	Hard wickia binata.
19.	Salai	Boswelia serata Raxb.

The samples of species to be used shall be deposited by the contractor in the office of the Engineer.

Seasoning - Only properly seasoned timber shall be used for first class work. Seasoning of timber shall be judged from its moisture contests as laid down in I.S. 287-

****. The timber should be well seasoned in the log before being cut into scantlings and thereafter also in scantlings as long as possible. Care must be taken to see that warping or cracking does not set in during seasoning.

The maximum permissible moisture contents for timber for various purposes shall be as under :-

Climatic Zones as per I.S. 287-***

	Zone I Dry area Annual Rainfall Below 50.0 cm.	**Zone II** Moderately Dry area Annual Rainfall 50-100 cm.	**Zone III** Moderately Humid area Annual Rainfall 100-200 cm.	**Zone IV** Humid area Annual Rainfall over 200 cm.
	Moisture content (% of, over dry weight of timber)			
(1)	(2)	(3)	(4)	(5)
(a) For roof and floor timbers, roof and weather boarding and other carpenter's work.	12	14	17	20
(b) For joinery including frames, stair-cases, moulding and other joiner's work.	10	12	14	16
(c) Floor and match boarding	08	10	10	12

Note -- The above limits may be relaxed for timber intended for temporary construction such as shoring from work, bullies, and the like.

Grading - Grading for structural timber shall be as per clause 5 of I.S. 883-****.

Stacking - As soon as foundations of a building are laid, all necessary timber scantlings shall be brought to site and stacked as laid down generally in I.S. 1141-**** and kept under cover and allowed to remain till required.

Inspection - Timber for building work shall not be wrought until seen and approved by the Engineer, who may reject defective timber which shall be immediately removed from the site of work. Any effort like plugging, painting, using any adhesives or resinous materials to hide defects shall render the pieces rejectable by the Engineer. Timber presented for inspection shall be clean and free from dust, mud, paint or other material which may conceal the defects. Cut off ends for protection can be done after inspection with raw linseed oil or any other material approved by the Engineer. No timber work shall be painted, tarred or oiled without the previous permission of the Engineer.

Sawing - All scantlings, planks, etc., shall be sawn in straight lines and planes and of uniform thickness and of full measurement from end to end and shall be sawn in the direction of the grain. They shall be sawn with such sufficient margin as to secure specified dimensions, lines and planes after being wrought.

Tolerances - The Engineer may allow tolerances in the defects permissible as per I.S. 883-*****, clause 5.2 and table II in it, if in his opinion any particular permissible defect does not reduce the usefulness of the piece for the purpose it is required. The

tolerances for defects shall be mentioned in the specifications for individual item of wood work.

Maximum slope of grain shall range between 1 in 10 and 1 in 20 as per I.S. 883-*****, clause 4.2.3.

Rejected timber - Any timber rejected shall at once be removed from the site of the works.

Classification - Timber shall be classified as :-

(a) Logs, round, square or rectangular when the felled timber is not at all processed or when it is only partially hewn to a square or rectangular shape on the outside. Quantity is measured in cubic meters.

(b) Pole or post-natural felled timber without any processing is classified according to the midgirth or middiameter according to the girth or diameter at top and bottom excluding bark in each case. These are measured in meters in groups of each girth or diameter.

(c) Planks - When the thickness of the sawn scantling is less than 5cms. and width more than 5cm., they are classified as planks.

(d) Battens - When the thickness and width are each less than 5cm. these are classified as battens and supply is measured in meters only and completed item in sq. metres.

(e) Scantlings - Sawn scantlings of dimensions other than the above. These are measured in cubic meters.

A.13.OIL PAINTS

General - The specifications cover the requirements for oil paint to be used as a finishing material with respect to its composition, form, condition and tests to be carried out. Unless expressly permitted in the special provisions or directed by the Engineer, nothing but ready mixed (factory mixed) paints satisfying the I.S. specifications for the particular paint shall be used. But in cases when the Engineer permits use of stiff paints, the procedure for preparing paints shall be described in the specifications given below in A.13.b.

All paints, thinners, etc., should preferably be kept in a separate store that is well ventilated and free from excessive heat, sparks, flame or direct rays of the sun.

READY MIXED PAINTS

Material - The paint shall be of the specified colour and approved by the Engineer. The paint shall comply in all respects with relevant Indian Standard from :-

I.S. 105,107,111 to 116, 130 to 132, 134, 149 to 153, and 163- 1950.

I.S. 108, 135, 136 - 1952.

I.S. 102 to 104, 106, 118 to 129- 1962.
I.S. 117- 1964.

I.S. 133, 137, 148, 154 to 157- 1965.

I.S. 109, 110, 158, 161, 162- 1968.

the exact reference depending on choice of paint, the specified purpose to be served such as under-coating, finishing, exterior or interior painting and mode of application of paint like spraying and brushing. The detailed specifications for any item on painting shall mention the mode of application of paint. If mode is not mentioned application shall be with brushes.

Except as otherwise required in the cited specifications, all paints shall meet the following general requirements :-

(1) The paint shall not show excessive settling in a freshly opened full can and shall easily be redispersed with a paddle to a smooth, homogeneous state. The paint shall show no curdling, livering, caking or colour separation and shall be free from lumps and skins.

(2) The paint as received shall brush easily. possess good levelling properties and show no running or sagging tendencies when applied to smooth steel vertical surfaces at a rate of 10 sq. m. per litre.

(3) The paint shall not skin within 48 hours in a three quarters filled closed container.

(4) The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other surface imperfections. The paint shall show no streaking or separation when flowed on clean glass.

(5) All vehicles shall be free from rosin and rosin derivatives. They may contain additional agents such as anti-skinning and wetting aids.

The paints shall be supplied in strong, substantial containers, clearly marked with the ready mixed weight and volume of paint content together with colour the name and address of the manufacturer. They shall not be opened until actually required for use. Paints from containers which have been opened shall be used first.

Use - Ready mixed paint shall be used exactly as received from the manufacturer and according to their instructions and without any admixtures whatsoever except with the previous approval of the Engineer.

Tests - In case of doubt regarding the quality, the paints supplied by the contractor shall be tested in an approved laboratory as described in I.S. 101-1964 if considered necessary by the Engineer.

OIL PAINTS PREPARED ON SITE

Material -

(1) Oil paste - Oil pastes to be used to prepare oil paints shall comply in all respects with the Indian Standard I.S. 96 depending on the choice of colour and requirement in respect of chemical composition.

(2) Linseed oil - Raw linseed oil shall comply with the I.S. 75-1973. Boiled linseed oil shall comply with I.S. 75-1950 and pale boiled linseed oil shall comply with I.S. 77-****.

(3) Turpentine - Turpentine shall comply with I.S. 533-****.

Oil paste, linseed oil and turpentine shall be supplied in strong and substantial containers, clearly marked with the name, weight and volume of content of material together with colour the name and address of the manufacturers.

Preparation of Paint - The oil paste shall be mixed with a mixture of (pale boiled, boiled or raw) linseed oil and turpentine (mixed in proportion of about 3:1). Mixing shall be done thoroughly so as to produce a paint of uniform consistency suitable for application by brushing. If there are any undissolved particles or impurities, the paint should be screened through an approved strainer or canvas cloth to exclude them. The brushing consistency shall be such that when the paint is applied to a smooth and clean vertical steel surface, there shall be no running, streaking and sagging of the paint during the time required to dry. In case a flat finish is desired for the final coat, a little more turpentine shall be added to the paint.

Tests - In case of doubt regarding the quality, the oil pastes shall be tested as described in I.S. 85-1950 and linseed oil and turpentine shall be tested as described in the respective I.S. mentioned above. The cost will be borne by the Department if the material satisfies the specifications and by the contractor if otherwise.

Measurement - When required to be measured, measurement shall be by volume with litre as the unit for liquid and semi liquid paints and by weight with kg. as unit for stiff pastes.

FLY ASH BRICKS

MATERIALS

Contractor No of correction University Engineer

Fly Ash

Fly ash shall conform to Grade 1 or Grade 2 of IS 3812:1981

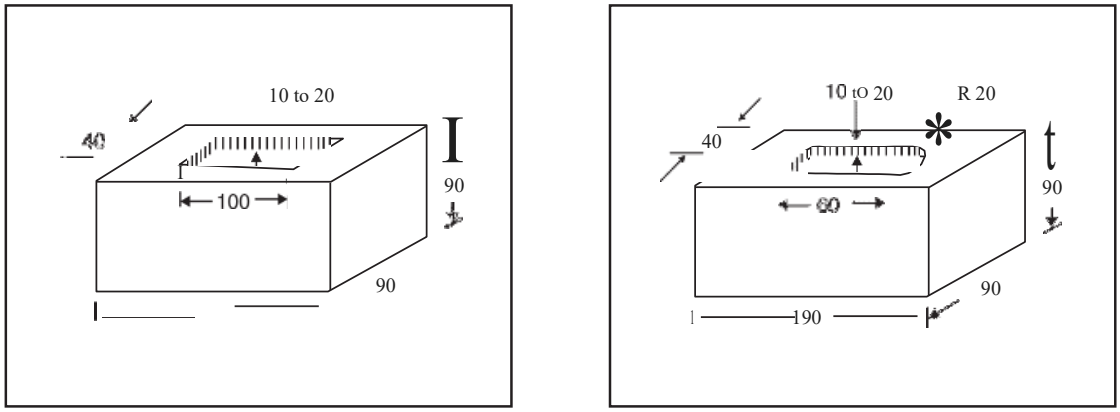
Bottom Ash used as replacement of sand shall not have more than 12 percent loss on ignition when tested according to IS 1727 : 1967

Sand

Deleterious materials, such as clay and silt in sand, shall preferably be less than 5 percent.

Lime

Lime shall conform to Class C hydrated lime of IS 712 : 1984



All dimensions in millimeters

SHAPE AND SIZE OF FROGS IN BRICKS

Additives

Any suitable additive considered not deterimental to the durability of the bricks may be used.

M S PLATES (PLAIN)

Thickness is mm	Weight in kg. per sqm.	Thickness in mm	Weight in kg. per sqm.
5	39.25	16	125.60
6	47.10	18	141.30
8	62.80	20	157.00
10	78.50	22	172.70
12	94.20	25	196.25
14	109.90		

FLATS

Width mm.	Weight Kg per metre length for thickness in												
in mm	3	4	5	6	8	10	12	16	18	20	25	32	40
10	0.2	0.3	0.4	0.5	-	-	-	-	-	-	-	-	-
15	0.4	0.5	0.6	0.7	0.9	-	-	-	-	-	-	-	-
20	0.5	0.6	0.8	0.9	1.3	-	-	-	-	-	-	-	-
25	0.6	0.8	1.0	1.2	1.6	2.0	2.4	-	-	-	-	-	-
30	0.7	0.9	1.2	1.4	1.9	2.4	2.8	3.8	-	-	-	-	-
35	0.8	1.1	1.4	1.6	2.2	2.8	3.3	4.4	5.0	5.5	-	-	-
40	0.9	1.3	1.6	1.9	2.5	3.1	3.8	5.0	5.6	6.3	-	-	-
45	1.1	1.4	1.8	2.1	2.8	3.5	4.2	5.6	6.4	7.1	-	-	-
50	1.2	1.6	2.0	2.4	3.1	3.9	4.7	6.3	7.1	7.8	9.9	-	-
55	1.3	1.7	2.2	2.6	3.4	4.3	5.2	6.9	7.8	8.6	10.8	-	-
60	1.4	1.9	2.4	2.8	3.8	4.7	5.6	7.5	8.5	9.4	11.8	15.1	-
65	-	-	-	3.1	4.1	5.1	6.1	8.2	9.2	10.2	12.8	16.3	20.4
70	-	-	-	3.3	4.4	5.5	6.6	8.8	9.9	11.0	13.7	17.6	22.0
75	-	-	-	3.5	4.7	5.9	7.1	9.4	10.6	11.8	14.7	18.8	23.6
80	-	-	-	3.8	5.0	6.3	7.5	10.0	11.3	12.6	15.7	20.1	25.1
90	-	-	-	4.2	5.6	7.1	8.5	11.3	12.7	14.1	17.7	22.6	28.3
100	-	-	-	4.7	6.3	7.8	9.4	12.6	14.1	15.7	19.6	25.1	31.4

Contractor No of correction University Engineer

INTEGRATED PLANT FOR TMT STEEL

The various conditions & I.s. specifications for the TMT steel are as under :

A) Steel to be used shall be TMT (Thermo mechanically treated) of grade Fe-415. All specifications, mechanical, properties like 0.2% proof stress, ultimate stress elongations, bend, rebend test and chemical composition of carbon. Manganese, Carbon equivalent, Sulphur, Phosphorus, Nitrogen shall be strictly confirming to respective grades of steel as per I.S. 1786.

B) The TMT Steel shall be procured stricly from the integrated steel plant. The term integrated steel plant shall meant.

a) The plants have its own mines to procure the virgin raw iron ores.

b) That the plants have its modern facility of blast furnace and basic oxygen steel making facility.

c) That plant is making raw material (billets) in house confirming the chemical composition of carbon, manganese, sulphur and phosphorus strictly as per composition recommended by I.S. 2061 & 2062.

d) That plant has its rolling under strictly computer numeric control observing exactly the tolerance limits of rolling as specified by I.S. 1786.

e) That plant is issuing its Test Certificate of chemical & mechanical properties of rolled steel of each batch of large tonnage quantity, (more than min. 100 Ton)

The manufacturers/suppliers complying above requirements shall be selected and their names shall be listed and registered with the Executive Engineer, P.W. Division, Nashik. A certificate wil be issued to them in token of their listing.

Only such listed manufacturers /suppliers will be liable for the supply of TMT steel against the requirement for the various P.W.D. works.

Presently R.I.N.L. TATA STEEL, SAIL are having integrated plants.

Number of Traffic lanes	Width of carriageway in m.	Width of centre line in cm.	Length of line sagment in m.		Length of gap on NH/SH		Remarks
			Straight reach	Curved reach & near intersection	On straight reach	On curved reach & near intersection	
2	7.0	10.00	4.50	3.0	7.50	3.00 On curves where sight distance is inadequate provide solid lines	Single Broken line white
3	---	10.00	4.50	3.0	7.50	3.00 On curves where sight distance is inadequate provide solid lines	Single Broken line
4.6 & 8	---	2 lines	---	---	---	---	Solid lines

SECTION B

STANDARD SPECIFICATIONS FOR BUILDING WORKS

B.1.EXCAVATION

Excavation for foundation including shoring and strutting as necessary and disposing of excavated stuff as directed.

General - The excavation will generally refer to open excavation of foundation wet or dry.

Clearing site - The site on which the structure is to be built shown on the plan and the area required for setting out and other operations should be cleared and all obstructions, loose stones, materials and rubbish of all kinds, stumps, brush wood and trees removed as directed, roots being entirely grubbed up. The materials obtained will be the property of Government and materials pronounced useful by the Engineer will be conveyed and properly stacked as directed within the specified lead. Useless materials will be burnt or otherwise disposed off as directed by the Engineer.

Setting out - After clearing the site, the centre lines will be given by the Engineer and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc., and maintain them as long as required true to line, curve, level and slopes. the contractor will assume full responsibility for alignment, elevation and dimension of each and all parts of the work. Labour, materials, etc., required for setting out and establishing Bench Marks and other reference marks shall be arranged by the contractor at his own cost.

Excavation - Foundation excavation shall include removal of all materials of whatever nature and whether wet or dry, necessary for the construction of the foundation and substructure exactly in accordance with the lines, levels, grades and curves shown on the plans or as directed by the Engineer. It shall be taken to the exact width of the lowest step of the footing and the sides shall be left plumb where the nature of soil admits it. Unless there is a specific extra provision in the contract for shoring or for cutting side slopes, contractor shall at his own cost do the necessary shoring or cutting of slopes to a safe angle or both as approved by the Engineer when the strata need such treatment. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purposes of measurements before the ground is disturbed.

Preparing the foundation for footing - The bottom of foundation shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Before footing is laid, final surface should be slightly watered and rammed. If any soft patches come to light on inspection or ramming, these shall be dug out and dealt with as ordered by the Engineer. No filling will be allowed to bring the foundation to level. If by the contractor's mistake, excavation is made deeper than shown on the plans or ordered by the Engineer, the extra depth shall be made up with masonry of the foundation grade as directed by the Engineer and at the cost of the contractor. All rock or other hard foundation shall be cleaned of all soft and loose material and cut to a firm surface, either level, stepped or serrated as directed by the Engineer. The elevation of the bottom of foundation shown on the plan will be considered as approximate only and the Engineer may order such changes in the dimensions and elevation of the foundation as may be deemed necessary to secure satisfactory foundation.

After each excavation is completed the contractor shall notify the Engineer to that effect and no footing will be allowed to be laid until the Engineer has approved the depth and dimensions of excavation and the nature of the foundation material and the levels and/or measurements are recorded.

Shoring - Unless separately provided in the contract, excavation of slopes to prevent falling in of sides or providing, fixing, maintaining and removing shoring, bracing,

etc., shall not be paid for. The contractor shall be responsible for the design of the shoring for the excavation to be properly upheld. Shoring shall be of sufficient strength to resist side pressure and ensure safety from slips and blows and to prevent damage to work and property and injury to persons. It shall be removed as directed after all items for which it is required are completed.

Protection - Near towns and all frequented places foundation pits, well pits and similar excavation shall be strongly fenced and marked with red lights at night in charge of watchman to avoid accidents. Adequate protective measures shall be taken to see that the foundation excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, property and the people in the vicinity shall be taken by the contractor at his own cost, he being entirely responsible for any injury to life and damage to property caused by his negligence or accident due to his constructional operations.

Disposal of excavated materials - No materials excavated from the foundation trenches of whatever kind they may be, are to placed even temporarily nearer than 1.5 m. or greater distance prescribed by the Engineer from the outer edge of the excavation. All materials excavated will remain the property of Government. Rate for excavation, includes sorting of useful materials and stacking them separately as directed within the specified lead. Materials suitable and useful for backfilling or other use shall be stacked on convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or the elevation shown on the plans or as directed by the Engineer. For backfilling, the materials shall be placed in 15 cm. to 20 cm. layers, moistened and well compacted. Materials not useful in any way shall be wasted as directed by the Engineer. If useful excavated rubble is required by the contractor for use in other items, it shall be paid for at the rate fixed in the tender and if not so provided, at the rate in the Divisional schedule current at the time of tendering or at mutually agreed rate if there is no rate in the Divisional schedule. The site shall be left clean of all debris on completion.

Dewatering - Unless specially provided for as a separate item in the contract, the excavation rate shall include bailing or pumping out all water which may accumulate in the excavation during the progress of the work either from seepage, springs, rain or any other cause and diverting surface flow if any, by bunds or other means. The bunds shall be removed after their purpose is served.

Pumping out water from any foundation enclosure or trenches shall be generally in such a manner as to preclude the possibility of any damage to the foundation trenches, concrete or masonry or any adjacent structure. The excavation shall be kept free from water (1) during inspection and measurement, (2) When concrete and/or masonry are in progress and till they come above the natural water level, and (3) till the Engineer considers that the mortar is sufficiently set.

Slips and blows - If there are any slips or blows in the excavation they shall be removed by the contractor without cost to the Department so as to provide the correct dimensions required for the foundation.

Backfilling - All timber shoring and form-work shall be removed after their necessity ceases and trash of any sort shall be cleaned out from the excavation. All space between foundation masonry or concrete and the sides of excavation must be refilled to the original surface with approved materials, in layers of 15 cm. to 20 cm. in thickness, watered and rammed.

The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure. Where suitable excavated material is to be used for refilling it shall be brought from the place where it was temporarily deposited and used in refilling.

Blasting - Blasting shall be carried out according to specification No. B.2.

Classification - All materials encountered in the excavation shall be mainly classified in the following groups :-

(1) Soils of all sorts, sand, gravel, soft murum and other similar soft or loose materials.

(2) Hard murmur.

(3) Hard murmur and boulders.

(4) Soft rock.

(5) Hard rock (blasted).

(6) Hard rock (chiseled, wedged or line drilled).

(7) Laterite.

(1) Soils of all sorts, sand, gravel, soft murmur and other similar soft or loose materials - Soils of all sorts, sand, gravel, soft murmur, softman, chopan, yellow soil, etc., shall include all materials of earthy or sandy nature which can be easily ploughed or small shingle and gravel which can be easily removed. Removal of small boulders not exceeding 0.03 cu. m. or 30 litres occurring in such strata will be included in the rate for this item.

(2) Hard murmur - This shall include all kinds of disintegrated rock or shale or indurated clay free from boulders larger than 0.03 cu. m. or 30 litres and can be removed with pick and shovel though not without some difficulty.

(3) Hard murmur and boulders - This shall include all kinds of disintegrated rock or shale or indurated clay intterspersed with boulders less than half a cubic metre and larger than 0.03 cu. m. or 30 litres which do not normally need blasting and can be removed with pick, bar, wedges, and hammer. Boulders bigger than 1/2 cu. m. will be paid for as soft or hard rock according as it is soft or hard rock.

(4) Soft rock - This shall include all material which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock, old masonry and also soft rock, boulders bigger than 1/2 cubic metre and other varieties of rock which would normally be removed with pick, crow bars, wedges and hammer with some difficulty.

(5) Hard rock (blasted) - This shall include all rock occurring in masses or boulders bigger than half cubic metre each, which can best be removed by blasting and where, in the opinion of the Engineer, blasting is necessary. Manjrya rock shall be considered as hard rock.

(6) Hard rock (chiselled, wedged or line drilled) - This shall include all rock occuring in masses which can best be removed by blasting but which owing to the proximity of structures, possibility of shattering the rock below or for any other reason should be cut by means of cold chisels or wedges or line drilling.

(7) Laterite - This shall include laterite rock soft and hard which can be removed with Dhokans or blasting. Lateritic murum which has not hardened into stone shall be classified as hard murum.

The classification of the excavation shall be decided by the Engineer and his decision shall be final and binding on the contractor.

Merely the use of explosives in excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer.

Rock referred to above shall include trap, granite, quartzite, gneiss, laterite and other types.

Item to include - The rate for the item of excavation will include: -

(1) Clearing site.

(2) Setting out works, profiles, etc., according to sanctioned plan or as ordered and setting up Benchmarks and other reference mark.

(3) Providing and subsequently removing shoring and strutting or cutting slopes except when, separately provided for in the tender.

(4) Bailing and pumping out water when separate provision does not exist for it in the tender.

(5) Excavation and removal of all materials of whatever nature wet or dry and necessary for the construction of foundation including materials like explosives, removal of blows and slipsand use of tools, plant and equipment necessary for satisfactory completion of the item and preparing bed for foundation.

(6) Sorting out of useful excavated materials, conveying them up to the specified lead clear beyond the structure and stacking them neatly for backfilling or reuse and wasting useless materials as directed by the Engineer.

(7) Backfilling the trenches alongside masonry or concrete with approved material up to the natural ground level.

(8) Necessary protection including labour, materials and equipment to ensure safety and protection against risk or accident.

(9) Supply of facilities for inspection and measurements at any time by the concerned Government officials.

(10) Compensation for injury to life and damage to property if any caused by the contractor's operations concerned with this item.

(11) Small drill holes to explore the nature of substratum if necessary.

Measurement and payment - The payment for respective class of excavation shall be made at the unit contract rate per cubic meter for the quantity acceptably excavated, limited to the dimensions shown in the sanctioned plans or as directed by the Engineer. Excavation to dimensions in excess of the above will not be measured nor paid for and if so ordered by the Engineer the contractor shall have to fill up the excess depth with cement concrete or U.C.R. masonry specified for foundation without extra payment.

Driving of sounding bars, or jumping small drill holes to explore the nature of substratum up to a total length of one meter distributed in 2 or 3 places in each foundation if necessary, will be considered incidental work and will not be paid for separately.

Removal of slips and blows in the foundation trenches will not be measured nor paid for.

If it is necessary in the opinion of the Engineer to carry foundation below the levels shown in the plans, the excavation for the first 1.5 m. of additional depth will be included in the quantity for the particular classification at tendered rate. The excavation below this additional depth of 1.5 metres will be paid for as extra work at the rate to be decided under general conditions of the contract unless the contractor is willing to accept payment at tendered rates. For all depths less than the designed depth plus 1.5 metres the excavation will be paid for at tendered rates.

Dimensions shall be measured correct to two places of decimals of a metre and individual

quantity shall be calculated correct to two places of decimals of a cubic metre.

B.2 BLASTING

General - Blasting shall be carried out only with the written permission of the Engineer. All the laws, regulations, rules etc. pertaining to the acquisition, transport, storage, handling and use of explosives shall be rigidly followed. The magazine for the storage of explosives shall be built to the designs and specifications of the Explosives Department and located at the approved site. No unauthorised person shall be admitted into the magazine and when not in use shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The magazine shall have an effective lighting conductor. The following shall be hung in the lobby of the magazine :-

(a) A copy of rules both in English and in the language with which the workers concerned are familiar.

(b) A statement of up-to-date stock in the magazine.

(c) A certificate showing the last date of testing of the lighting conductor.

(d) A notice that smoking is strictly prohibited.

In addition to these, the contractor shall also observe the following instructions and any further instructions which may be given by the Engineer and shall be responsible for damage to property and any accident which may occur to workmen or the public due to any and all operations connected with storing and handling or use of explosives and blasting. The Engineer shall frequently check the contractor's compliance with the precautions.

Materials, tools and equipment - The black powder, explosives, detonators, fuses, tamping materials, electrical firing equipment, if used, tools for drilling holes and tamping shall be subject to the approval of the Engineer. The Engineer may specify type of explosives to be allowed in special cases. The fuse to be used in wet locations shall be sufficiently water resistant as to be unaffected when immersed in water for 30 minutes. The rate of burning of the fuse shall be uniform and definitely known to permit such a safe length being cut as will permit sufficient time to the firer to reach safety before explosion takes place. Detonators shall be capable of giving effective blasting of the explosives. The blasting powder, explosives, detonators, fuses etc. shall be fresh and not damaged due to damp, moisture or any other cause. They shall be inspected before use and damaged articles shall be discarded totally and removed immediately.

Personnel - The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the details of handling explosives and blasting operations.

Blasting operation - The blasting shall be carried out during fixed hours of the day preferably during the midday luncheon hour or at the close of the work as ordered in writing by the Engineer. The hours shall be made known to the people in the vicinity. All charges shall be prepared by the man in charge only.

Red danger flags shall be displayed prominently in all directions during the blasting operations. People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200 metres from the blasting site in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing, a warning whistle being sounded for the purpose.

The charge holes shall be drilled to required depths and in suitable places.

When the blasting is done with powder, the fuse cut to the required length shall be inserted into the hole and the powder dropped in. The powder shall be gently tamped with copper rods with rounded ends. The explosive powder shall then be covered with tamping material which shall be tamped lightly but firmly.

When blasting is done with dynamite and other high explosives, dynamite cartridges are prepared by inserting the square end of a fuse into the detonator and finishing it with

nippers at the open end, the detonator gently pushed into the primer leaving 1/3rd of the copper tube exposed outside. The paper of the cartridge is then closed up and securely bound with wire or twine. The primer shall be housed into the explosive. Bore holes shall be of such size that the cartridge can easily pass down. The holes shall be cleared of all debris and explosive inserted. The space for about 20 cm. above the charges is then filled with dry clay, pressed home and the rest of the tamping is formed of any convenient material gently packed with a wooden rammer.

At a time not more than 10 such charges will be prepared and fired. The man in charge shall blow a whistle in a recognised manner for cautioning the people. All the people shall then be required to move to safe distances. The charges shall be lighted by the man in charge only. The man in charge shall count the number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the worksite.

Misfire - In case of misfire the following procedure shall be observed:-

Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all charges and determine the missed charge.

If it is blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at about 45 cm. from the old hole and fired. This should blast the old charge. Should it not blast the old charge, the procedure shall be repeated till the old charge is blasted.

In case of charges of gelignite, dynamite etc. the man in charge shall gently remove the tamping and the primer with the detonator. A fresh detonator and primer shall then be used to blast the charge. Alternatively the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole. Another hole may then be drilled 15 cm. away and parallel to it. This hole shall then be charged and fired when the misfired hole should explode at the same time. The man in charge shall report to the office at once all cases of misfire, the cause of the same and what steps were taken in connection therewith.

If a misfire has been found to be due to defective detonator or dynamite, the whole quantity in the box from which the defective article was taken must be sent to the authority directed by the Engineer for inspection to ascertain whether all the remaining materials in the box are also defective.

Accidents - The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property, etc., due to the blasting without extra claims.

Account - A careful and day-to-day account of the explosives shall be maintained by the contractor in an approved register and in an approved manner and shall be open to inspection of the Engineer at all times. Surprise visit may also be paid by the Engineer to the storage and in case of any unaccountable shortage or unsatisfactory accounting, the contractor shall be liable to be penalised by forfeiture of part or whole of his security deposit or by cancellation of tender in which case he shall not be entitled for any compensation.

B.3 ***LIME MORTAR***

Materials –

(1) Lime - Lime for structural purposes classified as class A and lime for masonry works as class B, both shall conform to Specification No. A.1.

(2) Water - The water shall generally conform to the requirements laid down in specification No. A.4. for water.

(3) Fine Aggregate - Fine aggregate to be used for lime mortar for structural purposes, masonry work and plaster shall conform to specification No. A.5. The grading of fine aggregate shall be

suitable for the purpose of the item.

Proportion of mix for Mortar - Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and sand shall be measured by volume. If moist sand is used, necessary allowance shall be made for bulking. Lime mortars used for structural work shall not be weaker than 1 : 3.

Preparation of mortar - The lime mortar shall be prepared by wet process. Bullock driven Ghani or power driven mill may be used. The Bullock ghani shall be normally fitted with a Beale's Telltale.

The slaked lime is to be first placed in the mill in an even layer and ground for 180 revolutions with a sufficiency of water. the water shall be added as required during grinding. Care being taken not to add more water than will bring the mixed materials to a consistency of stiff paste. Thoroughly wetted sand is then to be added evenly and the mixture ground for another 180 revolutions. When two stones are used, the number of revolutions for each stone shall 90 for each part of the grinding. The mortar shall be stirred continuously during the grinding process, particularly in the angles of the ghani. The sides of ghani shall be maintained in good order.

Hydraulic lime mortar shall be ground a second time when used for plaster.

Storage - Mortar shall always be kept damp and protected from sun and rain till used up.

Use - All mortar shall be used as soon as possible after grinding. As a rule it should be used on the day on which it is prepared. But in no case should mortar made earlier than 36 hours be permitted to be used or remain at the site of the work.

Rejection of mortar - Mortar more than 36 hours old or damaged mortar, or mortar which has once set or caked shall be condemned and removed from the site by the contractor at his own expense. No retempering of rejected mortar shall be permitted.

Tests - Field testing as per I.S. 1924-1960* shall be carried out for each class of limes when obtained from a new source.

Mix	Cement	Fine aggregate	Coarse aggregate	Water
(1)	(2)	(3)	(4)	(5)
1:1:2	50kg. bag (35 litres)	35 litres	70 litres	23-27 litres
1:1.5:3	- Do -	52.5 litres	105 litres	23-30 litres
1:2:4	- Do -	70 litres	140 litres	27-32 litres
1:3:6	- Do -	105 litres	210 litres	37.5-45 litres
1:4:8	- Do -	140 litres	280 litres	47.5-57 litres
1:5:10	- Do -	175 litres	350 litres	56-68 litres

In case of slabs special mixes with smaller size aggregates shall be taken out and placed below bottom steel to obtain dense cover.

The ratio of the volumes of the fine and coarse aggregates may be varied within limits of

1:1.5 to 1:2.5 as directed by the Engineer to suit the maximum size of coarse aggregate, the grading, density, workability and strength without extra cost. But the sum of the volumes of the fine and coarse aggregates so adjusted shall however be equal to the sum of the volumes of fine and coarse aggregates given above for a particular mix.

The quantity of water shall be just sufficient, but not more than sufficient, to produce a dense concrete of required workability for its purpose. An accurate control shall be kept on the quantity of mixing water.

An allowance shall be made for surface moisture present in the aggregates when computing water content as indicated in I.S. 456-1978.

In the case of reinforced concrete work, the workability shall be such that the concrete will surround and properly grip all the reinforcement. Water cement ratio will such as will give concrete just sufficiently weight to be placed and compacted without difficulty.

For vibrated concrete, water content may be reduced by 15% to 20% to give the required reduced slump.

B.5.4. Mixing - For all important works concrete shall be mixed in mechanical mixer atthe site of work. Care shall be taken to see that the mixer and other accessories are in first class working condition especially the blades which have to extend right up to the bottom of the drum. Trial mix shall be taken out to ensure good mixing. Mixing shall be continued till there is uniform distribution of the materials and a uniform colour is obtained and each individual particle of the coarse aggregate shall show a complete coating of mortar containing its proportionate amount of cement. In no case mixing shall be done for less than 1.5 minutes. The water cement ratio shall range between 0.55 to 0.64 for 1:2:4 mix.

When the Engineer permits hand mixing it shall be done on a smooth watertight platform large enough to allow efficient turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign matter shall get mixed with concrete nor the mixing water shall flow out.

The cement in required number of bags shall be placed in a uniform layer on top of the measured quantity to fine aggregate required, also spread in a layer of uniform depth in the mixing platform. Dry sand and cement then shall be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually through a rose and the mass turned over till a mortar of required consistency is obtained. The measured quantity of coarse aggregate shall then be placed on a mixing platform and wetted and the mortar added and the entire mass turned and returned until all the particle of the coarse aggregate are fully covered with mortar and mixture is of a uniform colour and required consistency. In hand mixing, quantity of cement shall be increased by 5% above that specified in para. B.5.3 with out any extra cost.

Concrete shall have a consistency such that it will be workable in the required position and in the case of R.C.C., flow around reinforcing steel also.

For vibrated concrete, slump shall range between 2.5 cm. to 5 cm. For hand tamped concrete, slump shall range between 8 cm. to 13cm.according to the type and nature of the concrete item. The slump shall be least permitted by workability and maintained throughout the concreting operation of a member.

The concrete shall be placed in its final position and rammed, vibrated and finished within 30 minutes of adding water to cement. Remixing of partially hardened concrete shall not be permitted.

B.5.5(a) Scaffolding - All scaffolding, hoisting arrangements and ladders, etc., required for the facility of concreting shall be provided by the contractor at his own expense and removed on the completion of work. The scaffolding, hoisting arrangements and ladders, etc., shall be strong enough to withstand all live, dead and impact load expected to act and shall be subjected to the approval of the Engineer. However the contractor shall be solely responsible for the safety of scaffolding, hoisting arrangement, ladders, work and workmen. The contractor shall pay the necessary compensations arising out of the use of the scaffolding hoisting arrangements and ladders and for damages to work, properties and injuries to persons.

The scaffolding, hoisting arrangements and ladders shall allow easy approach to work spot and afford easy inspection.

B.5.5.(b) Forms - Forms shall generally comply with I.S.456-1964, para.7.2.

B.5.5.(b).1. Design - The detailed design of the formwork and falsework shall be prepared by the contractor and got approved by the Engineer well in time. Such an approval however will not relieve the contractor of his responsibility for the adequacy and strength of the formwork and falsework.

B.5.5.(b).2. Materials - The forms and false work shall be made of wood or metal. The timber from which the forms are prepared should preferably be partially seasoned as too dry a timber will swell for absorption of moisture while green timber will dry and shrink. It shall be free from sap, shakes, loose knots, wormholes or other defects. The plants and scantlings shall be sawn straight and all edges and planes shall be straight and free from warps. Partially seasoned soft wood is generally preferable for formwork as it is difficult to drive nails in hard wood. The dimensions of scantlings should conform to the design. The strength of the wood shall not be less than that assumed in the design.

In metal form, steel sheets of designed gauge strengthened with framing of angle or other sections shall be used.

Wooden forms may also be lined with thin steel sheets or plywood to give the required surface or finish.

B.5.5.(b).3. Fabrication - The timber plans and scantlings of designed dimensions shall be used in the formwork with appropriate spacing of studs, yokes, joists, girders, etc., as provided in the design. All timber in contact with concrete shall be wrought on one face and two edges, the unwrought face being on the outside. The joints should be made mortar tight. This may be done either by providing tongued and prooved or rebated joints or by caulking or nailing metal strips or applying adhesive tape on the joints. The forms shall be built with sufficient strength and rigidity and held in shape by bolts, clamps, ties, nails, wales or other contrivance to prevent distortion or collapse due to pressure of concrete and other loads incidental to the construction operations. The nuts and bolt heads inside the formwwork adjoining the concrete should be countersunk. The formwork should allow finish concrete to have a smooth surface and conforms to the shapes, lines and dimensions shown on the plans and true to line and grades. The effect of vibration shall be taken into account in the design and fabrication of forms and falsework.

Forms shall be so designed and constructed as to be removable in sections without damaging the surface of the concrete and with facilities of removal in the ascending order of removal time, without disturbing the remaining forms required to be removed later.

B.5.5.(b).4. Treatment of inside of forms - Before placing concrete, the inside of the forms which comes in contract with concrete shall coated with mineral oil or any other suitable material approved by the Engineer which will prevent adhesion to concrete to the forms but will not discolour the concrete. When oil is used, it shall be applied before

reinforcement is placed. Care shall be taken to see that reinforcement does not came in contact with the coating. All chipping, saw dust and other rubbish shall be removed from the interior of the forms before concrete.

B.5.5.(b).5. Falsework - Falsework shall be built on foundation or base of sufficient strength to carry the loads without settlement. Falsework which can not be founded on solid footing must be supported by piles or other similar devices. Falsework shall be

designed to carry the full loads including that due to construction operations coming upon it.

B.5.5.(b).6. Erection - Falsework and formwork shall be erected with an eye for absolute safety of the formwork and concrete work before, during and after pouring concrete. Watch must be kept to see that the behaviour of centering and formwork is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed later.

If there is failure of falsework and/or formwork the contractor shall be responsible for all the consequent damages to work, injury to life and damage to property.

B.5.5.(b).7. Inspection - The forms and falsework will be inspected, checked and approved by the Engineer before concreting is commenced. But this will not relieve the contractor of his responsibilities for strength, adequacy and safety of the formwork and falsework.

B.5.5.(b).8. Removal of forms - Formwork shall be removed carefully without damaging the concrete or giving sudden shocks. It should be ascertained from the exposed sides of concrete that it has gained adequate strength before the bottoms and supports of the formwork are removed.

Unless otherwise specified in the special provisions, forms of concrete work using ordinary Portland cement may be struck after expiry of the following periods in normal circumstances :-

(1)	Vertical faces of all structural	28 hrs. to 48 hrs. members, wall
(2)	Slabs (props left under)	3 days
(3)	Beam soffits (props left under)	7 days
(4)	Slabs spanning upto 4.5 m.	7 days
(5)	Slabs spanning over 4.5 m.	14 days
(6)	Beams spanning upto 6 m.	14 days
(7)	Beams spanning over 6 m.	21 days

For Pozzolana Grade 43 or Grade 53 and other types of cements the striking period may be suitably modified.

In important structures, the sequence of striking formwork shall be approved by the Engineer.

B.5.5.(b).9. Reuse - Before reuse, all forms shall be thoroughly scraped and cleaned, joints gone over and repaired and the insides retreated to prevent adhesion, all to the entire satisfaction of the Engineer. The shape, strength, rigidity, mortar tightness and surface smoothness of reused forms shall be maintained at all times.

Transporting - The concrete shall be handled from the place of mixing to the final position as quickly as practicable by methods which will prevent segregation and loss of ingredients. In no case shall the operation take more than 15 minutes.

Placing - The concrete shall be placed into its final position, compacted and finished within 30 minutes of mixing the water and before setting commences. The method of placing shall be such as to avoid segregation. Placing shall be done in a balanced manner to avoid eccentric loads on formwork.

As far as practicable the concrete for a particular portion shall be done in one continuous operation. The construction joints when required shall be made only where located on the plans or shown in the pouring schedule unless otherwise approved by the Engineer. The joint shall be regular and vertical and shall be made by placing a bulk head at the joint. Before commencing subsequent concreting, all loose particles, laitance, etc., shall be

removed and the surface shall then be covered by thick cement slurry as part of placement. Care shall be taken during

The concrete shall be normally laid in the dry. If the area is under water, it shall be pumped dry and kept so while placing concrete and till it sets. Where it is necessary to deposit concrete under water, it shall be done as per I.S. 456-1964* para. 13.2. No extra payment will be made for the special arrangements, plant, etc., need for the purpose or for the additional 10% cement required to be the placing not to disturb the forms or the reinforcement. Concrete compacted manually, shall preferably be laid in layers of 15 cm. to 20 cm. the layers being decided by the time lapse between the successive layers. The time of laying one layer shall not exceed 30 minutes. The successive layers shall commence within 30 minutes.

When work is to be resumed on a surface which has hardened, such a surface shall be roughened and scrubbed with brushes to remove laitance, care being taken to avoid dislodgement of coarse aggregate, swept clean, thoroughly wetted and covered with 6mm. thick mortar layer composed of cement and sand in the same proportion as the cement and sand in the concrete, immediately before the commencement of concrete, for securing good bond.added.

Compacting - The concrete shall be thoroughly compacted during depositing to get a dense concrete and thoroughly worked into the edges and corners of the formwork as also along its faces and around reinforcement in the case of R.C.C., by means of suitable tools such as spades and rods to get a good cast finish without honey combing. Concrete shall not be disturbed once it is set.

For important or big works where stiffer mix with less slump is adopted, use of mechanical vibrators is essential. The vibrators shall have not less than 3600 and preferably about 5000 impulses per minute and shall be worked at an interval of about 60cm. It shall be worked in one place for only such time as will allow formation of dense concrete without sinking and segregation of the coarse aggregate. Over vibration shall be avoided. Vibration shall be aided by spading and rodding.

Curing - The concrete shall be initially protected from damage on account of impact, undue pressure, excessive heat of sun, rain, etc., and covered with wet sacking, hessian or similar absorbent material soon after the initial set. After the final set the concrete shall be kept continuously wet preferably by pounding water for a period of not less than 14 days from the date of placement. On Sundays, holidays and days of cessation of work, arrangement shall be made to keep the concrete continuously watered.

Should the contractor fail to water the concrete continuously, the Engineer may provide labour, materials and equipment required for watering and recover the cost from the contractor.

When atmospheric temperature exceeds 40oC (104oF) following precautions should be taken:-

(1) Stacking aggregates under shades and keeping them moist.

(2) Using cold water.

(3) Reduce the time between mixing and placing to the minimum.

(4) Cooling formwork by sprinkling water.

(5) Starting curing before concrete dries out.

(6) Restricting concreting to mornings and evenings.

Finishing - Immediately after the removal of forms, any undulations, depressions, cavities, honeycombing, broken edges or corners, high spots and other defects shall be made good and finished with cement mortar 1:2 But the necessity of such finishing must be

exceptional and the total surface requiring finishing shall not exceed 1 per cent. on an average. If the initial experience shows that this percentage is exceeded the method of working itself should be changed to get the required cast finish.

Where the concrete surface is to receive plaster, the surface shall roughened immediately after removal of forms and within a day thereof to secure a hold for the plaster. The rate for concrete is inclusive of this roughening and finishing. Concrete after finishing shall be cured for the full period.

Retempering - Concrete shall be mixed only in such quantities as are required for immediate use and any concrete which has developed initial set shall not be used. Concrete which is partially hardened shall not be retempered or re-mixed but shall be destroyed or thrown away.

Sampling and Testing - Sampling of materials and concrete shall be done carefully by the contractor under the direct supervision of the Departmental staff as per I. S. 456- 1978 at the cost of contractor. All necessary labour, materials, equipments, etc., for sam- pling, preparing test cubes, curing, etc., shall be provided by the contractor. Testing of the materials and concrete will be arranged by the Department in an approved laboratory at the cost of the contractor. No plea will be entertained later on the ground that casting of the test specimen was faulty and that the result of the test specimen did not give a correct indication of the actual quality of concrete. Compressive strength of ordinary concrete shall not be less than those specified below :-

No.	Mix	Works test on 15cm. cubes	
		Kg./sq.cm. at 7 days	Kg./sq.cm. at 28 days
1	1:1:2	160	250
2	1:1.5:3	130	200
3	1:2:4	100	150
4	1:3:6	66	100
5	1:4:8	48	70

One set of six 15cm. cubes shall be prepared from the concrete to be used in the work for compression test on each of the three days operation and thereafter for every 60 cu. m. of concrete or three days' work whichever is less, by the contractor in the presence of a responsible officer of the Department of a rank not less than that of an overseer. If the source of aggregate or grading is changed, one set of six test cubes shall be taken for each changed batch. Three cubes shall be used for test at 7 days' age and three at 28 days.

After the relation between strength at 7 days and 28 days is reliably established for the particular set of materials for the same sources, subsequent tests may be carried out only on three cubes at 7 days and above. 20% of the tests results may be less than the average strength given above. If the average strength of the cubes show ultimate compressive strength less than the above the Engineer shall have right to order a change in the mix or water content for the remaining concrete without extra cost. Defective concrete having strength below 80 % of the required strength is liable to be rejected. Concrete of strength

up to 80% of the required strength may be accepted as substandard work at a reduced rate provided such weak concrete is restricted to such members and in such quantities as will not endanger the safety of the structure.

Keeping record - A day to day record authenticated by a responsible officer of the department and the representative of the contractor, in the proforma approved by the Engineer shall be maintained by the contractor on the work site and kept open for inspec- tion. This shall contain important information such as receipt of cement on the work site, daily use with details of use on various items, time of starting concreting and closer, number of batches through the mixer, source of water, water cement ratio of concrete, slump, dates of erection of formwork, passing of formwork by the competent authority, dates of striking of forms, periods, and method of curing and other events worthy of note. On completion of the work, the record shall be handed over to the Department.

Item to include –

(1) All labour, materials, use of equipment, tools and plant, installing and removal of scaffolding, falsework and forms and bracing necessary for the satisfactory comple- tion of the item except the reinforcement steel.

(2) Providing cement concrete of specified proportion including transporting, placing and compacting, curing, finishing to the dimensions and shapes shown on the plans or as ordered by the Engineer.

(3) Necessary sampling and tests for material and concrete.

(4) Compensation for injury to persons and damages to work or property.

Mode of measurement and payment - The contract rate shall be for a unit of one cubic metre of concrete. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on the plan or as ordered by the Engineer. No deduction shall be made for reinforcement in concrete in R.C.C. work. Individual dimension shall be measured correct to one cm. and quantities shall be worked out correct upto three places of decimals of a cubic metre.

B.6. DESIGN MIX CEMENT CONCRETE

Design mix concrete is that concrete in which proportion of aggregates, cement and water are determined by the preliminary tests of the materials to be actually used to obtain the specified strength with the use of minimum quantity of cement. It shall generally comply with relevant provisions in I.S. 456-1964*.

Materials - Ordinary Portland cement, fine aggregates, coarse aggregates and water shall comply with specifications laid down for the respective items in specification No. B.5. for ordinary concrete.

The design mix shall be obtained from an approved laboratory or institution and shall be further got approved from the Engineer in charge.

Tests - Tests shall conform to the specification laid down in I.S. 456-1978. Tests shall be got done in an approved laboratory at the cost of the contractor.

Works tests - Works tests shall be taken for quantities of concrete as indicated below :-

Quantity of concrete in cu.m.	No. of samples (each sample shall have three cubes).
Contractor	No of correction University Engineer
1 - 5	1
6 - 15	2
16 - 30	3

31 - 50	4
51 and above	One additional sample for every 50 cu. m.

Depending on the quantity of concrete for each element, random samples as indicated above shall be taken. The required number of samples shall be decided in advance. The random samples should be taken such that whole of the concrete in that element is uniformly represented.

The strength of a sample shall be the average of three cubes of the sample. The variation in the strengths of a particular sample shall not be more than -15% to +15% of the average of that sample.

Standard deviation as defined in I.S. 456-1978 shall be worked out periodically or atleast once in a month. The maximum standard deviation shall be as under :-

Grade of concrete	Maximum standard deviation N/sq.mm.
M 10	2.3
M 15	3.5
M 20	4.6
M 25	5.3
M 30	6.0
M 35	6.3
M 40	6.6

Acceptance criteria - The acceptance criteria shall be as per I.S. 456-1978 cl. 15 according to which every sample (average of three specimen) shall have strength equal to or more than characteristic strength. One or more samples may have strength less than characteristic strength, in which case such strength shall not be less than 0.8 times characteristic strength and the average strength is - [1.65 - {1.65/(number of samples)^1/2}] x Standard deviation or more. The strength of any sample shall also not be less than characteristic strength minus 1.35 times the standard deviation.

For concrete not complying with these requirements acceptance shall be subject to further provisions of I.S. 456-1978 cl. 15.

Field mix - The actual proportions of the fine and coarse aggregates will be determined by preliminary tests. In the works tests, bulkage of sand due to moisture if any, should be allowed for different batches according to the moisture actually present at the time of mixing. This moisture will be taken into account in controlling the mixing water also. The proportions once fixed by preliminary tests shall not be changed so long as the materials are the same, subject only to the quantities of fine aggregate and water being adjusted to compensate for bulkage due to the moisture in sand and free water in fine aggregate at the time of use.

No change of materials shall be allowed unless fresh tests with new materials show satisfactory results.

Water and cement content per batch of concrete as determined by preliminary tests shall be maintained constant except for suitable allowances to be made for surface moisture of the aggregates at the time of actual use.

The minimum quantity of cement to be used shall be as under :-

~~Contractor~~ ~~No of correction~~ ~~University Engineer~~

Exposure	Plain concrete	Reinforced concrete
1. Mild	220 Kg/cu.m.	250 Kg/cu.m.
2. Moderate	250 Kg/cu.m.	290 Kg/cu.m.
3. Severe	310 Kg/cu.m.	360 Kg/cu.m.

For greater details I.S. 456-1978 Appendix - A shall be referred.

For any particular item, compressive strength required to be attained by the concrete at 28 days in the preliminary and works tests on 15 cm. cubes, minimum cement content required to be used and approximate proportions of approved fine and coarse aggregates shall be specified in the special provisions. These particulars will be only for the guidance of the contractor for quoting rates.

Immediately upon the receipt of the award of the contract, the contractor shall inform the Engineer the exact location of the sources of the acceptable materials which he proposes to use and get the materials approved. The mix with the actual approved materials to be used shall be got designed in an approved laboratory by the contractor with minimum quantity and cement to give the specified strength in the preliminary tests and the proportions got approved by the Engineer in writing. These proportions shall be used so long as the materials continue to be of the same quality and from the same sources subject only to slight changes in the relative quantities of fine and coarse aggregates for the purpose of promoting workability provided the works tests also show the required strengths.

If such preliminary tests involve change in the theoretical cement factor originally set forth in the special provisions upto 2% on the higher or lower side, no adjustment in the cost of the item to be paid to the contractor shall be made. if such alterations change the theoretical cement factor by more than 2% on the higher or lower side the source and quality of aggregate remaining the same, payment will be adjusted for against the contractor in whatever amount the total cost of cement to the contractor has been increased or decreased by more than 2%. The amount of such increase or decrease shall be calculated on the basis of quantity of cement determined and prescribed in the special provisions. In adjusting the cost, only the cost of cement shall be considered and handling or other charges which shall be prepared as incidental to the item.

If during the progress of the work, the contractor wishes to change the materials, the proportions shall be fixed on the basis of fresh preliminary tests to give the required strength after the Engineer is satisfied that the materials satisfy the specifications. No adjustment of cost shall be made for change of proportions of cement fixed in the original preliminary tests.

Mixing - Mixing shall comply with specification No. B.5.4. Mixing shall be done only by mechanical mixers.

Forms - Forms shall comply with specification No. B.5.5.(b).

Transporting - Transporting shall comply with specification No. B.5.6.

Placing - Placing shall comply with specification No. B.5.7.

Compacting - Compacting shall comply with specification No. B.5.8.

Compaction shall necessarily be done by mechanical vibrators. No hand compaction will be permitted except (i) to supplement vibration near the edges and faces of forms, to fill the corners completely and to prevent honeycombing or (ii) in members where vibration is not possible nor desirable in the opinion of the Engineer.

Curing - Curing shall comply with specification No. B.5.9.

Finishing - Finishing shall comply with specification No. B.5.10.

Contractor No of correction University Engineer

Retempering - Specification No. B.5.11. shall be followed.

Sampling and testing - Sampling and testing shall comply with B.6.3. above, special provision in the tender and relevant provision of B.5.12.

Keeping records - Records shall be maintained and dealt as per specification No. B.5.13.

Item to include - All the provisions prescribed in specification No. B.5.14. and also the preliminary laboratory tests to determine the exact proportions of the concrete mix to give the specified strengths and control tests during the concreting operations.

Mode of measurement and payment - Measurement and payment shall be as per specification No. B.5.15. Where adjustment of cost is necessary for use of more or less cement, only actual cost of cement shall be considered and not handling or other charges.

Cement content of the concrete shall be as specified in the special provisions.

In the absence of special provisions the cement requirement shall be taken as under :

M 15 - 6.4 Bags/cu.m

M 20 - 7.8 Bags/cu.m

M 25 - 9.2 Bags/cu.m

M 30 - 9.6 Bags/cu.m

M 35 - 10 Bags/cu.m

If the initial preliminary tests before starting work indicate variation of cement actually necessary to be within a range of +2% of the quantity specified in the special provision, no adjustment shall be made in the cost for such variations. If the variation of the cement content is more than + 2%, the cost of concrete shall be adjusted for or against the contractor by whatever amount the total cost of cement to the contractor at work site is increased or decreased above or below 2% respectively per unit of finished concrete for which the rate is quoted in the tender. In case of revision in the mix due to change in materials any extra cement required over the original mix design shall not qualify for additional payment. In the case the cement contents are reduced, the cement contents as per the original mix design shall continue.

B.7. BURNT BRICK MASONRY FIRST CLASS IN LIME/CEMENT MORTAR

Burnt brick masonry first class in lime/cement mortar of specified proportion including necessary scaffolding, watering masonry, etc., complete.

Materials - Bricks - First Class Bricks shall be used for this item and shall comply with specification No. A.9.1. Sample shall be got approved by the Engineer who will keep it in his office for reference.

Mortar - Mortar shall conform to specification No. B.3.(a). for lime mortar/ B.5.(a). for cement mortar. The quantity of mortar to be used in one cu. metre of masonry shall vary from 0.24 cu. metre or 240 litre for thin masonry to 0.26 cu. metre or 260 litres for massive masonry of conventional bricks and 0.25 cu. metre or 250 litres for thin masonry and 0.27 cu. metre or 270 litres for thick masonry for I.S. bricks. The proportion of lime/cement mortar shall be as specified in the item and special provisions of the tender.

Construction Details -

Size - Bricks of different dimensions will not be allowed on the same work except when specially permitted by the Engineer.

Face work - Bricks of entirely uniform colour and of best shape and which have greater resistance to weathering and penetration by rain should be selected for the face work when it is not to be plastered.

Soaking - All bricks shall be immersed in water for two hours before being put into work so that they will be saturated and will not absorb water from the mortar. Immersion will also assist in removing dirt and dust. The surfaces should just be moist but not too wet at the time of laying.

Bats - No bats or but bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closers, in which case, full bricks shall be laid at corners, the bats being placed in the middle of the courses.

Laying - The bricks shall be laid in mortar to lime, 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 edges. They should not also be thrown from any height to ground but should be put down gently. All courses shall be laid truly horizontal and all vertical 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 of a brick length. For battered faces bedding shall be built in at places shown in the plans while laying the course only and not later by removal of bricks already laid.

Care should be taken during construction to see that edges of bricks at quoins, sills, heads, etc., are not damaged.

The verticality of the walls and horizontality of the courses shall be checked very often with plumb-bob and spirit-level respectively.

Bond - Bond used shall be English or such other as may be ordered and shall be carried throughout the work. All the corners, alternate courses of brick work shall be laid header strecherwise as seen on the face so as to secure good bond. The arrangement of bond at quoins shall be symmetrical.

Joints - Joints shall not exceed 10m. in thickness and this thickness shall be uniform throughout. The joints shall be raked out not less than 10mm. deep when the mortar is green and pointing is to be done. Otherwise joints shall be struck flush with face at the time of laying.

Uniform raising - Brickwork shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60 cm. lower than another. But where building at different levels is necessary, the brakes shall be stepped so as to give later a uniform level and effectual bond. Horizontal courses should be to line and level and even and face plumb to batter as shown on the plan. The rate of laying masonry may be up to a height of 60cm. per day if cement mortar is used and 45 cm. if lime mortar is issued. Greater heights may be built only if permitted by the Engineer in writing.

Scaffolding - Scaffolding is double or single as is warranted for the particular work.

The ends of pole if required to rest on the brick work shall be located at convenient places. Scaffolding shall be erected with bullies, steel sections, pipes or bamboos of adequate strength so as to be safe for all the dead, live and impact loads likely to come on them due to construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials, or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of a work. Overhead work shall not be allowed.

Put log holes shall be made good by bricks to match the face work when put logs are removed after ensuring that the holes behind are solidly filled in with 1:4:8 cement concrete.

Dewatering - Where water is meet with, the work space shall be kept free of water by the contractor while the brick work is in progress and until the Engineer considers the mortar has sufficiently set. Dewatering shall also be done when required for taking measurements, etc. Dewatering shall be carried out in such a manner as not to injure masonry in any way. Dewatering will be included in the rate of brick work unless separately provided in the tender.

Watering - The brick work shall continuously be kept well watered for 14 days after laying. Brick work laid shall be initially protected against hot sun if necessary by wet stacking or straw or similar absorbent materials. At no time during the curing period shall the mortar be

allowed to dry. Initial watering should be done carefully through a rose so as not to disturb or wash out mortar. On Sundays or holidays or at the close of day's work or other periods of cessation of work, the masonry shall be kept well watered by employing sufficient number of labour. Should the contractor fail to water the work as specified, the Engineer may employ the requisite labour, materials and equipments to water the work properly and change the cost to the contractor.

Final finish - If the brick work is not to be plastered, the face. After pointing is properly cured, shall be washed down and all stains and adhering mortar lumps removed. Put log holes, etc, shall be solidly filled in the interior with cement concrete 1:4:8 and the face with bricks to match adjoining work.

Bad work - Should the mortar perish, i.e., become dry or powdery through neglect of watering or masonry be hollow or the work not done according to plan and specifications, the work shall be pulled down and rebuild at contractors expense. If hollows or other defects are suspected a brick may be removed here and there for confirmation. If hollows or other defects are confirmed such portions shall be dismantled and rebuild at the cost of the contractor.

Item to include –

(1) All labour, materials, use of tools, equipment and other items incidental to the satisfactory completion of brick masonry.

(2) Erecting and removing all scaffolding, leaders and plant required for the execution of the work to the height and depths and shapes as shown on the plan or as ordered by the Engineer.

(3) Dewatering required for completing of this item and till the mortar of masonry, pointing, plastering is properly set, unless separately provided in the tender.

(4) Constructing brick work to lines, levels, batters, curves and to any position or shape, to the height and depth shown on the plans or as ordered by the Engineer including striking joints and taking out joints and housing frames, fixtures, etc and rectifying defective work.

(5) Watering masonry work.

(6) Clearing the site round the brick work so as to restore the area to its original condition.

Measurement and payment - The contract rate shall be for a unit one cubic meter of Brick masonry fully completed. The quantity of Brick work to paid under this item shall be in number of cubic metres measured for completed work and to the limiting dimensions not exceeding those shown on the plan or as order in writing by the Engineer. Battered, tapered and curved portions shall be measured net. Dimensions shall be measured and quantity of individual item work out correct to two places of decimals of a metre and a cubic metre respectively.

No deduction shall be made for (1) ends of dissimilar materials like girders, beams, lintels, rafters, etc., up to 500 sq. cm. in section and (2) opening up to 0.1sq. m. in face area.

When the brick work is to plaster, measurements will be exclusive of plaster.

Brick work shall normally be measured as under :-

Half brick wall shall be measured in sq.m. stating the thickness.

Brick walls upto and including three brick in thickness shall measured in multiples of half bricks which shall be deemed to be inclusive of the mortar joints, as under :-

	width for conventional bricks	width for modular I.S.I. bricks
One brick wall shall be measured as	23 cm.	20 cm.
One and half brick shall be measured as	25 cm.	30 cm.
Two brick shall be measured as	47 cm.	40 cm.
Two and half brick shall be measured as	60 cm.	50 cm.
Three brick shall be measured as	71 cm.	60 cm.

Width of more than three bricks in wall will be actually and limited to the width specified.

Where the fractions of half bricks occur due to architectural or other requirements the measurement shall be taken as actual.

B.8 BURNT BRICK MASONRY SECOND CLASS IN LIME/CEMENT MORTAR

Burnt brick masonry second classes in lime/cement mortar of specified proportion including necessary scaffolding, water masonry, etc., complete.

Materials -

Bricks - Brick shall comply with specification No.A.9.2. for second class bricks.

Mortar - Mortar shall conform to specification No. B.3. for lime mortar/B.5 for cement mortar.

Quantity of mortar to be used in one cu. m. of masonry shall vary form 0.30 cu. m. or 300 litre for thin masonry to 0.32 cu.m. or 310 litres for thin masonry to 0.33 cu.m. or 330 litres for massive masonry of I.S.I. bricks.

Joints - Joints shall not exceed 12mm.in thickness and this thickness shall be uniform throughout.

All other specifications of first class B.B. masonry shall apply to this class of masonry also.

B.9. STONE MASONRY (GENERAL)

General - The following instructions are to be complied with for all classes of stone masonry.

Materials -

Building stone - Building stone shall comply with the specifications detailed in A.8. Stones of the specified type and quality shall be obtained from the quarries defined in the special provisions or from other sources approved by the Engineer. The size of the stones shall be as specified for the item. The stone shall be kept free from dirt, dust, oil or any other injurious materials which may attack the stone or mortar or prevent adhesion of mortar. Stones with skins shall not be used.

Different categories of stones such as face stones headers, quoins, etc., shall be collected in advance to suffice atleast for a week's requirement and shall be stacked separately categorywise.

Mortar - The mortar to be used shall be of the type and proportion maintained in the item or special provisions. Lime mortar if used, shall comply with specification No. B.3. Cement mortar if used shall comply with specification No. B.5. Water for curing shall comply with specification No.A.4.

Dressing - Different type of dressing . The stone shall be dressed to one of the following types specified for the item or as detailed in the specification for the particular item itself.

(a) Rough tooled dressing - Rough tooled surface shall have series of band, 4 to 5cm. wide, more or less parallel to tool marks all over the surface. These marks may be either horizontal, vertical or at an angle of 45øas required. The dressed stones may have depressions on the surface, the depth of gap between the surface and the straight edge held against it shall not exceed 3mm. This is also called as " one line dressing ".

(b) Chisel or punch dressing - A chisel dressed surface shall have series of parallel ridges. Chisel marks shall be left all over the surface. This dressing shall be more even than the rough tooled dressing. The depth of the gap between the surface and a straight edge held against the surface shall not exceed 2mm. This surface dressing is also called " two line dressing ".

(c) Close punch or picked dressing - A closed punched surface shall be closer dressed further giving finer surface than the chisel or punch dressing.The depth of gap between the surface and the straight edge held against it shall not exceed 1mm. This is also called " three line dressing ".

(d) Fine tooled dressing - A fine-tooled dressing is one that is finer than the close punch dressing such that all the unevenness is removed and a fairly smooth surface is obtained. The surface shall have 5 to 4 lines per centimeter width. Other types of dressing may also be specified in the special provisions.

(e) Samples - Samples of each category of stones of the specified quality and dimensions dressed to the specific requirements shall be got approved by the Engineer who will keep them in his office for reference.

Method of laying stone - The masonry shall be laid to lines levels, curves and shapes shown in the plans. Fixtures, plugs, frames etc. if any, shall be built in at places shown on the plan or directed by the Engineer while laying the masonry and not latter by removing the stones already laid :-

(a) Stones in the hearting shall be laid on their broadest face which gives better opportunity to fill the space between stones

(b) In battered walls, the beds of stone and the plane of courses should be at right angles to the batter.

(c) The courses of masonry shall ordinarily be pre-determined. They shall generally be of the same height. Where there is to be variation in height of courses, larger courses are to be placed at the lower levels, the height of courses decreasing gradually towards the top of the wall, unless plans specify otherwise due to architectural requirements.

(d) The stones shall be wetted before laying in mortar. The contractor with a vessel full of water shall supply each mason and a tumbler for wetting stones, care being taken not to spill any water on green masonry. The bed, which is to receive the stone, shall be cleaned, wetted and covered with a layer of fresh mortar. All stones shall be laid full in mortar both in bed and vertical joints and settled carefully in place with a wooden mallet immediately on placement and solidly bedded in mortar before it has set. Clean chips and spalls, carefully selected to fit in the spaces shall be wedged into the mortar joints and beds wherever necessary, to avoid thick beds or joints of mortar. When the foundation masonry is laid directly on rock, the face stones of the first course shall be dressed to fit into the rock sungly when pressed down in the mortar bedding over the rock. No dry or hollow space shall be left anywhere in the masonry and each stone shall all the embedded faces completely covered with the mortar. If a portion of Masonry is dismantled, every stone must be found with mortar adhering fast to all its embedded surfaces and there shall be no hollows. This will be one of the tests in deciding if the masonry is good or bad if need arises. Where hollows or other defects are suspected a stone here or there may be removed for confirmation. If these are confirmed such portions shall be dismantled and rebuilt at the cost of the contractor.

(e) Face work and hearting shall be brought up evenly but the top of each course shall not be leveled up by flat chips.

(f) In case any stone already set in mortar is disturbed or the joint broken, the stone shall be taken out without disturbing the adjoining stones and joints, the mortar thoroughly cleaned from the joints and stone and the stone reset in fresh mortar. Attempts must never be made to slide one stone over another already laid.

(g) Shaping and dressing shall be done before the stone is laid in the work. No dressing and hammering which will loosen the masonry will be permitted after it is once placed.

(h) There shall be good collection of stones and spalls within easy reach of each mason to enable proper selection of stones for individual location while laying. The stones shall be continuously replenished.

(i) Bond –

1) To give sufficient lateral bond a stone in any course shall break joint with the stone in the course below or above about half the height of the course and generally not less than 8cm., i.e., joints parallel to the pressure in courses above and below shall not lie to closely near the same vertical line.

2) To give sufficient bond, the prescribed number of headers shall extend from front to back of thin walls up to a width of 60cm. or prescribed number of lines of over- lapping headers from face to back of walls over 60cm. thick. Overlaps shall be 15cm.

at each end. To ensure provision of full number of headers of the required size, they shall be kept at specified intervals in each course in advance of starting masonry and then embedded in mortar. Their position in each course shall be staggered, so that each will be near about the middle of the two in the courses below and above. Their faces shall be marked distinguishing signs to identify them.

3) To bond work at all angle junctions of walls, the stones at each alternate course shall be so carried into each of the respective walls as to join the work thoroughly. Quoins shall be laid header and stretcherwise when seen on each side of the wall.

4) When new work has to be started on the old or one completed a long while ago or in the previous working season, care shall be taken to roughen and clean old surface satisfactorily without disturbing the masonry before laying the new. It shall be wetted before laying the bedding mortar.

5) Where practicable the whole of the masonry in any structure shall be carried out up to a uniform level throughout. But where breaks are unavoidable in carrying up the work continuously in horizontal courses, sufficiently long step shall be left out to join the courses to be laid later. All junctions of wall shall be formed at the time the walls are being built; cross walls should be carefully bonded into the main walls.

6) The practice of building two thin faces tied with two occasional through stones and filling up the middle with dry packing and putting mortar on top must be strictly guarded against. Putting dry chips in the joints of stones before filling them with mortar shall not be permitted.

7) For ensuring good bond masonry shall be left uneven at the top of each course.

Treatment of joints - When joints are to pointed, they shall be raked to a depth not less than their width when the mortar is still green. When pointing is not to be done, the mortar in the joints shall be placed and trowelled smooth while masonry is being laid. If this is not done, joints shall be raked when the mortar is green as mentioned above, cleaned and wetted filled with 1:3 cement mortar, pressed and trowelled smooth. Joints shall be raked when plastering is to be done.

Watering - All masonry built in lime or cement mortar shall be initially protected form sun, rain, etc., by wet hessian or straw till set and thereafter kept continuously wet for 14 days from the date of laying, unless other length of period is ordered in the special provisions. Watering shall be done carefully in beginning through a rose so as not to wash the mortar out of the joints. On Sundays, holidays, at the close of day's work and other periods of cessation of work, the masonry is kept continuously wet for the specified period of curing and labourers are to be employed for the purpose. Should the contractor fail to water the work to the satisfaction of the Engineer, the latter may supply requisite men, materials and equipment to water the work properly and charge the cost to the contractor.

Bad work - Should the mortar perish, i.e., become dry white or powdery through neglect of watering or if the masonry shows hollow joints or non-adherence of mortar to the work or if the work does not conform to plans and these specifications, the work must be pulled down and rebuilt at the contractor's expense.

Final finish - All masonry shall be washed down on completion and all stains adhering mortar removed from the face as the scaffolding is lowered and removed.

Iron, stone, concrete or other fixtures, buttresses, etc. - All iron, stone, concrete or other fixtures, shall be built and bonded into the work in proper place as work proceeds not inserted or joggled on after the masonry is advanced.

Wet foundations - In wet foundations, or other situations where water is met with, the

work place shall be kept free of water by the contractor while the masonry is in progress and until the Engineer considers the mortar has sufficiently set. Dewatering shall be carried out in such a way as not to injure the concrete or masonry in any way. Dewatering shall also be done when required for taking checking measurements, passing foundations, etc. Dewatering will be included in the rate of masonry unless separate provision is made in the tender.

Scaffolding - the contractor at his expense shall provide Scaffolding required for facility of construction.

Scaffolding will be double or single as is warranted for the particular class of masonry. But the ends of poles should not be in the position of header stones. Scaffolding shall be erected with steel sections or pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be compiled with. The contractor shall be entirely responsible for any damage to property or injuries to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Put log holes shall be made good by stones to match the face work when scaffolding is being removed after ensuring that all holes behind are solidly filled in with 1:4:8 cement concrete.

Clauses of this General Specification shall be applicable in all pertinent points to the specifications for all classes of masonry.

B.9.(A). RANDOM RUBBLE MASONRY 1ST SORT

Random rubble masonry 1st sort in cement/lime mortar of specified proportion including striking joints, scaffolding, curing etc., complete.

B.9.(a).1. General - Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. Random Rubble masonry shall also comply with the following in addition.

B.9.(a).2. Materials - Materials shall conform to Specification No.

B.9.2. B.9.(a).3. Dressing and size.

B.9.(a).3.1. Face stones - Height shall not be greater than breadth of face and no stone shall have its length less than 1.5 times its height. All the sides of the stones on the face shall be dressed in straight lines and all the sides on the face shall be in one plane. The stone face shall be roughed tooled (one line dressed) and the sides shall be rough tooled square up to and afford a bearing of atleast 5cm. (average) from face. Individual stones shall have generally a face area of not less than 0.05 sq.m. Face stones shall generally with Specification No. A.7. The face stone shall be selected from the mass of quarry stones for their larger size, good beds, close grain and uniform colour. 50% of the stones shall be more than 0.010 cu.m. or 10 litres in walls up to 50 cm. in thickness and 0.015 cu.m. or 15 litres in thicker walls. They shall be as far as possible of equal size on the face and rough tooled.

B.9.(a).3.2. Through stones - One through stone shall be provided per half square metre of facing evenly distributed in a staggered pattern. They shall be about 0.05 sq.m. in face and shall have a tailing of full width of the masonry when the width is 60 cm. or less. If the wall or masonry be over 60 cm.thick a line of headers overlapping each other

by atleast 15 cm. shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm.and their average cross sectional area shall not be less than 0.03 sq.m. Header shall be distinctly marked on its face.

B.9.(a).3.3. Vertical headers - For massive work with a width of a metre and more, vertical headers 45 cm. long or depth of two courses whichever is more shall be provided at the rate of one for every sq.metre of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. The average sectional area of each should not be less than0.03sq.m.

B.9.(a).3.4. Hearting and backing stones - These stones shall comply with specification No.A.8.3. These stones shall not be less than 15 cm. in any direction. In walls of 50 cm. and less about 30% of stones shall not be less than 0.015 cu.m. or 15 litres. Backing shall conform to U.C.R. masonry when it is to be plastered.

B.9.(a).3.5. Quoins - Quoins shall be of selected stone and shall have rough/fine tooled dressing. They shall be cut to the required size and shall normally have a height of one course. If the plans show a height equal to two courses they shall be provided accordingly. The beds and tops shall be square to the face and rough tooled to 10 cm. from the face and vertical joints square and rough tooled to 4 cm. from the face. The length of the quoins shall not be less than twice the height or 45 cm. whichever is more on the longer face nor less than the height on the shorter face. In the embedded portion the length of the side shall not be less than that of the side opposite by more than 8 cm. for the longer side and 5 cm. for the shorter side.

B.9.(a).4. Scaffolding - Scaffolding shall comply with specification no.

B.9.11. B.9.(a).5. Wet foundation - To comply with specification no. B.9.10.

B.9.(a).6. Construction details.

B.9.(a).6.1. Laying - Specification in B.9. shall generally apply.

The face stones shall be laid absolutely without any pinnings on the exposed faces. In each course the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified lapse where such lapse are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

Quoins shall be laid stretcher and headerwise as seen on each face and shall correspond to the arrangement of quoins in the same course.

The quantity of mortar for one cu.m. of thin and massive masonry shall range from 0.25 cu.m. to 0.30 cu.m. and for water retaining masonry from 0.44 cu.m. to 0.46 cu.m.

B.9.(a).6.2. Joints - No face joints shall exceed 6 mm. in thickness. Stones shall be arranged to break joint as much as possible and long vertical lines of jointing shall be carefully avoided in the face work.

B.9.(a).6.3. Striking joints - The face joints should be properly struck while the mortar is fresh. Joints which cannot be so struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 6 mm. when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted throughly and filled with good fresh cement mortar 1:3 and finished off by being trowelled smooth.

B.9.(a).6.4. Rate of raising masonry - The rate of raising random rubble masonry brought up in uniform levels may be limited to a height of 60 cm. per day in case of cement mortar and 45 cm. in case of lime mortar. But no fresh course shall be laid over masonry

previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(a).7. Item to include -

1) Random rubble stone masonry first sort laid in cement/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as offered by the Engineer with headers, quoins etc., including striking joints and curing. Cutting grooves holes, etc., for fixing frames, fixtures, etc., is also included.

2) Erecting and removing all scaffoldings, ladders and use of plant required for execution of the item, safety of the labour and inspection of the work including compensation for any injury, damage, etc.

3) Dewatering to allow construction in the dry and proper setting of masonry unless separately provided in the tender.

4) Clearing the site round the masonry and backfilling so as to restore it to the original condition.

5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(a).8. Mode of measurement and payment - The quantity of random rubble masonry to be paid under this item shall be in number of cubic metres of the completed work including quoins, etc., and with the limiting dimensions not exceeding those shown on the plans or as fixed by the Engineer. The contract rate shall be based on a unit of one cubic metre of masonry. Dimensions shall be measured correct to a centimetre and individual quantities shall be calculated upto two places of decimals of a cubic metre.

B.9.(B). RANDOM RUBBLE MASONRY 2ND SORT

Random Rubble Masonry 2nd sort in cement/lime mortar of specified proportion including striking joints, scaffolding, curing etc., complete.

The specification for this item shall be exactly same as standard specification B.9.(a). for Random Rubble masonry 1st sort except for the following changes :-

1) Faces shall be only hammered dressed as explained below. The bed and the joint faces shall afford a square bearing of 2.5 cm. average from face by hammer dressing or chiselling.

   The flat end of the scabbing or spalling hammer shall knock off the sharp and irregular projections on the stone face. Lifting the hammer and then allowing the pointed end to drop on the surface freely shall further dress the surface. This process shall be continued till a fairly uniform and even stone surface is obtained.

   Chisel may be used to obtain straight edges for the sides and square surfaces for the beds and joints.

2) The width of the joints shall not be more than 12 mm.

   If pointing or plastering is to be provided the joints shall be raked to not less than 12 mm. when the mortar is green. Otherwise they shall be struck.

3) The quantity of mortar for one cubic metre of masonry shall range from 0.30 cu.m. to 0.35 cu.m. for thin and massive masonry respectively and 0.46 cu.m. to 0.48 cu.m. for water retaining masonry.

B.9.(C). COURSED RUBBLE MASONRY 1ST SORT

Coursed Rubble masonry 1st sort in cement-mortar/lime mortar of specified proportion including scaffolding, curing etc., complete.

B.9.(c).1. General - Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. C.R. masonry 1st sort shall also comply with the following in addition :-

B.9.(c).2. Materials - Materials shall conform to specification No. B.9.2.

B.9.(c).3. Dressing and size -

(a) face stones -

(i) Khandki - The khandki stones received from quarry shall be dressed so as to have the vertical and horizontal sides perfectly straight, parallel and right angles to adjacent sides. The four sides of the stone on the face shall lie in one plane. Brushing on the face of the stones shall not project more than 4 cm. The beds and tops shall be square to the face and rough tooled to atleast 8 cm. from the face. The side vertical joint faces shall be squared to the face and rough tooled to atleast from the face. The face shall have no depression below the plane of the sides.

All the khandki stones shall be more in breadth than in height and shall run back into the masonry for not less than 1.5 times the height 30% of the khandkis shall have tailing of twice their height. 30% of these face stones shall not be less than 0.02 cu.m. or 20 litres.

The height of the khandki shall not be less than 15 cm. or specified for the particular item.

(ii) These khandkis shall be provided for the interior face also when it is to remain exposed or so specially provided.

(b) Hearting and backing stones - When interior face is to be plastered or otherwise permanently remaining covered, backing stones shall be as specified for U.C.R. masonry. Hearting and backing stones shall be as big as possible 30% of these stones shall not be less than 0.010 cu.m. or 10 litres for walls 50 cm. or less in thickness and for walls thicker than 50 cm. 30% of them shall not be less than 0.015 cu.m. or 15 litres.

(c) Quoins - The quoins shall be selected stone and shall normally be of the same height as that of the course in which they are to be used. If the plans show a height of two courses they shall be provided accordingly. The faces of quoins shall be rough tooled or hammer dressed as directed by the Engineer. A chisel draft of about 40 mm. shall be provided on each side of the exposed corners.

The beds and the tops shall be dressed square to the face and rough tooled to 10 cm. from the face and the vertical joints similarly dressed to 4 cm. from the face. The length of the quoins shall not be less than twice their height or 45 cm. whichever is more on the longer face or less than their height on the shorter face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. for the longer side and 5 cm. for the shorter side.

(d) Through stones - The height of the through stones shall be the full height of the course and width shall not be less than the height. The face, beds and joints shall be dressed similar to khandkis.

They shall be about 0.05 sq.m. in face and shall have a tailing of full width of the masonry when the width is 60 cm. or less. If the wall or masonry be over 60 cm. thick a line of headers overlapping each other by atleast 15 cm. shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm. and their average cross sectional area shall not be less than 0.03 sq.cm. Face header shall be distinctly marked on its face.

(e) Vertical headers - For massive work with a width of a metre and more, vertical headers 45 cm. long or depth of two courses whichever is more shall be provided. The average sectional area of each should not be less than 0.03 sq.m.

B.9.(c).4. Construction - The stones shall be laid in horizontal course or not less than 15 cm. height. The stones in each course shall be of equal height and all courses shall be of the same height unless otherwise specified or directed by the Engineer. But no course shall be thicker than any course below it unless otherwise shown on the plans or directed. The height of different courses shall be predetermined and shall match with the corresponding courses in other parts of the structure.

Khandki stones shall be provided for faces, remaining exposed.

The through stones shall be placed 1.5 metres apart in the clear in every course before starting the construction of that course and finally embedded in the course.

Vertical headers shall be provided in the case of massive masonry where the thickness of the masonry is one metre or more at the rate of one for every sq. metre of area in plan. For every course, a new set of headers shall be introduced shall be introduced at this rate, in a staggered pattern.

Quoins shall be laid stretcher and headerwise as seen on each face of the wall and shall correspond to the arrangement of quoins in the same course.

The faces of masonry to be plastered or remaining permanently unexposed shall conform to U.C.R. masonry unless otherwise directed.

The thickness of joint shall not exceed 10 mm. Where pointing is to be done, the joints shall be raked to a depth of not less than 10 mm. when the mortar is green.

The quantity of mortar for one cu.m. of thin and massive masonry shall range from 0.25 cu.m. to 0.30 cu.m. and from 0.44 cu.m. to 0.46 cu.m. for water retaining masonry.

B.9.(c).5. Rate of raising masonry - The rate of raising masonry in cement mortar shall be limited to 60 cm. and in lime mortar shall be limited to 45 cm. per day. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(c).6. Striking joints - The joints of non-exposed face when pointing is not to be done shall be neatly struck while the mortar is green. Joints which cannot be so struck at the time of laying, shall be prepared first by raking joints to a depth of not less than 10 mm. when the mortar is fresh. These joints shall be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1:3 and finished off by being trowelled smooth.

B.9.(c).7. Cement pointing - When cement pointing is included in the item, it shall be done according to specification no. B.13.

B.9.(c).8. Scaffolding - Scaffolding shall conform to specification no.

B.9.11. B.9.(c).9. Wet foundations - To comply with specification no.

B.9.10.

B.9.(c).10. Item to include -

1) Coursed rubble masonry first sort laid in cement mortar/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including striking joints, raking out joints and curing for the specified period. Chisel drafting, chamfering and dressing the stones to lines, shapes and curves shown on the working drawings, cutting grooves etc., for fixing frames, fixtures, etc., headers and rough tooled quoins are also included.

2) Erecting and removing all scaffoldings, ladders and use of plant required for execution of the item satisfactorily, including compensation for any injury, damage, etc.

3) Inspection facilities.

4) Dewatering unless separately provided for in the tender.

5) Cost of all labour, materials, use of tools and equipment and incidental items required for satisfactory completion of the item.

6) Clearing the site round the masonry.

B.9.(c).11. Mode of measurement and payment - The contract rate shall be for a unit of one cubic metre of masonry completed in all respects, in place and accepted. The quantity of coursed rubble masonry to be paid under this item shall be in number of cubic metres of the finished work and the limiting dimensions shall not exceed those shown on the plans or as ordered in writing by the Engineer.

Dimensions shall be measured and individual quantities shall be calculated upto two places of decimals of a metre and cubic metre respectively.

Battered, tapered or curved portions shall be measured net.

B.9.(D). COURSE RUBBLE MASONRY 2ND SORT

Coursed Rubble masonry 2nd sort in cement-mortar/lime mortar of specified proportion including scaffolding, curing etc., complete.

The specification for this item shall be exactly the same as standard specification B.9.(c). for the coursed rubble masonry 1st sort except for the following changes :-

1) Two stones may be used for height in one course upto 50%, for the face area.

2) The thickness of joint shall not exceed 12 mm.

3) Backing shall be of U.C.R. masonry, when unexposed or plastered. **B.9.(e).7**

4) The quantity of mortar for one cu.m. of thin and massive masonry shall range from 0.28 cu.m. to 0.33 cu.m. and from 0.46 cu.m. to 0.48 cu.m. for water retaining masonry.

5) The faces of quoins shall be roughed tooled or provided the same type of dressing as Khandkies as directed by the Engineer. A chisel draft of about 40 mm. shall be provided on each side of the exposed corner.

B.9.(E). COURSE RUBBLE MASONRY 3RD SORT

Coursed Rubble masonry 3rd sort in cement-mortar/lime mortar of specified proportion including scaffolding etc., complete.

B.9.(e).1. General - Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. C.R. masonry 3rd sort shall also comply with the following in addition
:-

B.9.(e).2. Materials - Materials shall conform to specification No. B.9.2.

B.9.(e).3. Dressing and size - Stones to be set in the work shall be as received from the quarry after merely knocking off weak corners and edges with a mason's hammer. All the sides of the stones on the face shall be dressed in straight lines and all these sides shall be in one plane. The beds and joints shall afford a bearing of at least 2.5 cm. average. Individual stones shall have a width of not less than 20 cm. in its thickest part and no stone shall be less in width than height and less in length than 1.5 times its height. Each stone shall be about 0.015 cu.m. or 15 litres or more.

B.9.(e).4. Face stones shall generally comply with specification no. A.8. The face stone shall be selected from the mass of quarry stones for their larger size, good beds, close grain and uniform colour. 50% of the stones shall be more than 0.015 cu.m. or 15 litres in walls up to 50 cm. in thickness and 0.02 cu.m. or 20 litres in thicker walls.

B.9.(e).5. Through stones - Each through stone on the face shall have its width not less than the height and shall tail into the work atleast three times its height.

One through stone shall be provided per half square metre of facing evenly distributed in a staggered manner. Through stones of successive courses should not be placed one above the other. They shall be about 0.05 sq.m. in face area and shall have a tailing of 60 cm. or the width of the wall whichever is less. If the wall of masonry be over 60 cm. thick a line of headers overlapping each other by atleast 15 cm. shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm.and their average cross sectional area shall not be less than 0.025 sq.m. Face header shall be distinctly marked on its face.

C.C. 1:2:4 headers may be used if so permitted in writing by the Engineer in charge.

B.9.(e).6. Vertical headers - For massive work with a width of a metre and more, vertical headers 45 cm. long shall be provided at the rate of one for every sq.metre of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. Their average sectional area shall not be less than 0.03 sq.m.

B.9.(e).7. Hearting and backing stones - These stones shall comply with specification No.A.8.3. These stones shall not be less than 15 cm.in any direction. In walls of 50 cm.and less about 30% of stones should not be less than 0.010 cu.m. or 10 litres and for thiccker walls about 30% of the stones shall not be less than 0.015 cu.m. or 15 litres.

B.9.(e).8. Quoins - Quoins shall be of selected stone and shall normally be 20 cm. x 25 cm. x 40 cm. or as directed by the Engineer. The faces of quoins shall be rough tooled or provided the same type of dressing as that of the face stones as directed. Chisel draft of about 40 mm. shall be provided on each side of the exposed corner.

The beds and tops shall be dressed square to the face and rough tooled to 10 cm. from the face and vertical joints similarly dressed to 4 cm. from the face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. for the longer side and 5 cm. for the shorter side. The sizes of quoins shall be unifrom.

Use of 1:2:4 c.c. blocks or brick-work quoins may be done if so permitted by the Engineer in charge in writing. No extra payment shall be made in such cases.

B.9.(e).10. Wet foundation - To comply with specification no. B.9.10.

B.9.(e).11. Construction details - Laying - Specification in B.9. for stone masonry shall generally apply. The face stones shall be laid without any pinnings on the exposed faces. The edges of adjoining stones shall be parallel to allow joints of fairly uniform width. In each course, the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified lapse where such lapse are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

A horizontal joint shall be introduced at intervals specified on the drawings or as ordered by the Engineer throughout the masonry. The height of the course shall be a whole multiple of the height of the quoins.

Quoins shall be laid stretcher and headerwise as seen on each face and shall correspond to the arrangement of quoins in the same course.

Where the height of courses is less than 20 cm. 30% of the face area shall be made up of stones of full height of the course. In the remaining area not more than 3 stones shall be used to make up the height.

Where the height of courses is between 20 cm. and 40 cm. 30% of the face area shall be made up by stones each with a face area of not less than 0.30 cu.m. and for the remaining area the stones shall have a face area of not less than 0.015 sq.m.

The quantity of mortar for one cu.m. of thin and massive masonry shall range from 0.30 cu.m. to 0.35 cu.m. respectively and for water retaining masonry from 0.46 cu.m. to 0.48 cu.m.

Joints - The face joint width shall not exceed 16 mm.

Striking joints - The face joints shall be properly struck while the mortar is fresh. Joints which cannot be struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 15 mm. when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1:3 and finished off by being trowelled smooth.

Rate of raising masonry - The rate of raising coursed rubble 3rd sort masonry per day shall be limited to a height of 60 cm. or the height of course whichever is less in case of cement mortar and 45 cm. in case of lime mortar. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(e).12. Item to include -

1) Coursed rubble stone masonry third sort laid in cement/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including headers, quoins etc. and striking joints and curing.

2) Erecting and removing all scaffoldings, ladders and use of plant required for execution of the item satisfactorily, safety of the labour and inspection of the work including compensation for any injury, damage, etc.

3) Dewatering unless separately provided in the tender.

4) Clearing the site round the masonry.

5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(e).13. Mode of measurement and payment - The contract rate shall be for one cubic metre of finished masonry including quoins, etc.

The dimensions shall be limited to the dimensions shown on the plan or as ordered by the Engineer.

Dimensions shall be measured correct to a centimetre and cubic contents calculated correct upto two places of decimals of a cubic metre.

B.9.(F).UNCOURSE RUBBLE MASONRY

Uncoursed Rubble masonry in cement/lime mortar of specified proportion including striking joints, scaffolding, watering etc., complete.

B.9.(f).1. General - Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. U.C.R. masonry shall also comply with the following in addition :-

B.9.(f).2. Materials - Materials shall conform to specification No. B.9.2.

B.9.(f).3. Dressing and size - Stones to be set in the work shall be as received from the quarry after merely knocking off weak corners and edges with a mason's hammer. In the case of face stones all the sides of the stones shall be dressed in straight lines and the sides shall be in one plane. Individual stones shall have a thickness and width of not less than 15 cm. in its thickest part and no stone shall be less in length than 1.5 times its height.

B.9.(f).4. Face stones - Face stones shall generally comply with specification no. A.8. The face stone shall be selected from the mass of quarry stones for their greater size, good beds, close grain and uniform colour. 50% of the stones shall be more than 0.010 cu.m. or 10 litres in walls up to 50 cm. in thickness and 0.015 cu.m. or 15 litres in thicker walls. The beds and joints shall have an average bearing of not less than 2 cm.

B.9.(f).5. Through stones - One through stone shall be provided per half square metre of facing evenly distributed. They shall be about 0.03 sq.m. in face area and shall have a tailing of full width of the masonry when the width is 60 cm.or less. If the wall of masonry be over 60 cm. in width line of headers overlapping each other by atleast 15 cm. shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm.and their average cross sectional area shall not be less than 0.025 sq.m. Face header shall be distinctly marked on its face.

C.C. 1:2:4 headers may be used if so permitted in writing by the Engineer in charge.

B.9.(f).6. Vertical headers - For massive work with a width of a metre and above, vertical headers 45 cm. long or depth of two courses whichever is more shall be provided at the rate of one for every sq.metre of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. Their average sectional area shall not be less than 0.03 sq.m.

B.9.(f).7. Hearing and backing stones - These stones shall comply with specification No.A.8.3. In walls of 50 cm.and less about 30% of stones shall not be less than 0.010 cu.m. or 10 litres and for thicker walls about 30% of stones shall not be less than 0.015 cu.m. or 15 litres.

B.9.(f).8. Quoins - Quoins shall be of selected stone and shall normally be 20 cm. x 25 cm. x 40 cm. or as directed by the Engineer. The faces of quoins shall be rough tooled or provided the same type of dressing as that of the face stones as directed. Chisel draft of about 40 mm. shall be provided on each side of the exposed corner.

The beds and tops shall be dressed square to the face and rough tooled to 10 cm. from the face and vertical joints similarly dressed to 4 cm. from the face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. for the longer side and 5 cm. for the shorter side.

Use of 1:2:4 c.c. blocks or brick-work quoins may be done if so permitted by the Engineer in charge in writing. No extra payment shall be made in such cases.

B.9.(f).9. Scaffolding - Scaffolding shall comply with the specification No. B.9.11.

B.9.(f).10. Wet foundation - To comply with specification no. B.9.10.

B.9.(f).11. Construction details - Laying - Specification in B.9. for stone masonry (general) shall generally apply.

The face stones shall be laid without any pinnings on the exposed faces. In each course the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified lapse where such lapse are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

Quoins shall be laid stretcher and header wise fashion on each face and shall invariably be laid in the arrangement of quoins in the same course.

The quantity of mortar for one cu.m. of thin and massive masonry shall range from 0.30 cu.m. to 0.35 cu.m. respectively and for water retaining masonry from 0.46 cu.m. to 0.48 cu.m. Joints - No face joints shall exceed 15 mm.

Striking joints - The face joints should be properly struck while the mortar is fresh. Joints which cannot be struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 15 mm. when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1:3 and finished off by being trowelled smooth.

Rate of raising masonry - The rate of raising uncoursed rubble masonry brought up in uniform levels may be limited to a height of 60 cm.per day in case of cement mortar and 45 cm. in case of lime mortar. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(f).12. Item to include -

1) Uncoursed rubble masonry laid in cement/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including headers, quoins etc. and striking joints and curing.
2) Erecting and removing all scaffoldings, ladders and use of plant required for execution of the item, safety of the labour and inspection of the work including compensation for any injury, damage, etc.
3) Dewatering to allow construction in the dry and proper setting of masonry unless separately provided in the tender.
4) Clearing the site round the masonry.
5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(f).13. Mode of measurement and payment - The quantity of uncoursed rubble masonry to be paid under this item shall be in number of cubic metres of the finished work including quoins, etc., and with the limiting dimensions not exceeding those shown on the plans or as fixed by the Engineer. The contract rate shall be based on a unit of one cubic metre of finished masonry. Dimensions shall be measured and individual quantities calculated correct upto two places of decimals of a cubic metre respectively.

B.9.(G). LATERITE MASONRY

Providing and constructing laterite stone masonry in cement mortar/lime mortar of specified proportions, including scaffolding striking joints, raking out joints, curing, etc., complete.

B.9.(g).1. General - Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. Laterite stone masonry shall also comply with the following in addition
:-

B.9.(g).2. Material -

B.9.((g).2.1. Mortar - Cement mortar/lime mortar shall be of proportion as mentioned in the wording of the item or special provisions and shall comply with specification No. B.5./B.3.

B.9.(g).2.2 Stones - The laterite stone shall comply with specification No.A.7 in all

respects. Laterite of specified quality shall be obtained from the quarries defined in the contract or from other sources approved by the Engineer. It shall be the best procurable in the region, known for soundness and satisfying the specification No. A.8 for laterite

stone. Laterite shall be dug from the approved quarry and allowed to harden as long as possible before being placed in the work.

B.9.(g).3. Dressing and size -

1) The stone shall be quarried in blocks and dressed true and square to the sizes ordered. The least thickness of stones shall not be less than 15 cm. and breadth shall not be less than the thickness and length not less than twice the thickness, unless other sizes are ordered.

2) In walls 50 cm. thick and under, the header shall run right through the wall.

B.9.(g).4. Scaffolding - Shall comply with specification No. 9.11. B.9.(g).5.

Construction -

1) The stones dressed according to the architectural details shown on the drawings or as directed by the Engineer shall be laid regular courses not less than shown on the plan or specified. All the courses shall be of same height unless otherwise shown on the plan or specified. No courses shall be thicker than any course below it, unless specially shown on the drawings. Each stone must be fitted into its place dry in order that any inaccuracy of figure may be discovered and corrected before it is finally laid in mortar and settled in its bed.

2) The stones shall be laid in the work header and stretcher alternately to break joints atleast 8 cms., the joints being no case more than 12 mm. in thickness. Each stone shall be carefully laid in place in mortar to bring it to solid bearing both as to bed and joint.

   The quantity of mortar for one cu.m. of masonry shall be about 0.18 cu.m. to 0.20 cu.m.

3) Courses shall be horizontal and side joints vertical throughout unless otherwise indicated on the drawings.

4) The joints in the face shall be struck smooth while laying the masonry only.For face of masonry for which pointing or plastering has to done later on, the joints shall be raked to a depth not less than 12mm. when the mortar is green.

B.9.(g).6. Item to include -

1) Erecting and removing scaffolding, ladders, and use of plant required for execution of item.

2) Constructing the Laterite masonry as specified above to lines, levels, batters and shapes as per working drawings or as directed by the Engineer.

3) Striking and raking out joints.

4) Watering the masonry for the specified period.

5) All labour, materials, use of tools, equipment, tackle, required to complete the item as specified.

6) All chamfering, rebates, holes, etc., required to dressed as per drawings or required to be cut for fixtures, frames, dowels, railing, bars, anchors, etc.

7) Dewatering where necessary unless separately provided in the tender.

8) Clearing the site round the masonry.

B.9.(g).7. Mode of measurement and payment - The contract rate shall be per cubic metre of the work finished as specified above. Any stone masonry constructed in excess of the dimensions shown on the drawings or as directed by the Engineer will not be measured and paid. The linear dimensions shall be measured and total quantity worked out correct up to two places of decimals of a metre and cubic metre respectively.

B.10. MILD STEEL BAR REINFORCEMENT FOR R.C.C. WORK

General - The item provides for the supply of mild steel bars, cutting, bending, binding with galvanised iron wire and erecting in position for reinforcement inR.C.C.

Materials -

1) Mild steel bar shall conform to the specification No. A.9.

2) The binding wire shall conform to the specification No. A.11.

Supply - When the supply is made by the Department, the contractor shall convey the mild steel bars from the place of delivery mentioned in schedule `A' of the tender to the site of work. The contractor shall be solely responsible for any damage during the conveyance and till it is used.

When the contractor supplied mild steel reinforcement bars obtained from the market they shall be supplied to the site of work without damage.

Fabrication - Reinforcing steel shall be thoroughly cleaned of all coatings of any characters that would destroy or reduce the bond.

Bending reinforcement shall conform accurately to the dimensions and shapes shown on the plans or as directed by the Engineer. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks, bends or cracks shall not be used. Bars shall be bent cold to the shapes and dimensions shown on the drawings or as directed by the Engineer in writing. Bar bender may be used to attain proper radii of bends and shapes. Bars which may be bend in transport or handling shall be properly straightened before being placed in work without heating them. Bending bar by heating to cherry red heat not exceeding 815øc may be allowed for only M.S. bars larger than 25mm. diameter except for bars which depend for their strength on cold working . Hot bars shall not be cooled by quenching. HYSD bars shall not be heated for bending.

B.10.4.1. Details of length, sizes, laps and bending diagrams shall be got approved by the Engineer. This is to secure additional precautions against errors.

Splicing and lapping - All reinforcement shall be furnished in full lengths indicated on the plans as far as possible. splicing bars except as shown on the plans will not available, bars shall be spliced. spliced of tensile reinforcement at points of maximum stress and of adjacent bars at the same place shall be avoided. Splices shall be staggered as far as possible and located at suitable points. A welded or mechanical connection if adopted, shall develop the full strength of the bars . Welding of HYSD bars shall not be done. However welding of HYSD bars may be done with written permission of the Engineer in charge by special methods as may be suitable. Unless otherwise shown on the plans, bars shall be lapped as specified in I.S. 456-1964* with due regard to the grade of concrete. In lap- splices, bars shall be placed in contact and just wired together to keep in place.

Coupling - Whenever plans and specifications call for the use of coupling-boxes or bottle nuts to join bars, they shall have sufficient cross section to transmit the full strength of the bars. The ends of the bars which are jointed by coupling shall be upset for a sufficient length so that effective cross section after cutting the screw threads shall not be less than the normal cross section of the bars. Screw threads shall be standard Whitworth threads.

Coupled joints will be paid for separately. Number of tensile test shall be as indicated in specification No. B.10.7.

Welding - Whenever plans and specifications call for the welding of joints in reinforcement bars in lieu of lapping them, the bars shall be butt-welded so as to transmit their

full strength. Welding shall generally conform to specification No.B- 18 and I.S. 456- 1964* except as modified below and when otherwise directed by the Engineer. Welded joints shall be so staggered that in any one section equal to the lap length of the bars, not more than 33% of the bar are welded. Electric arc welding or oxyacetylene process of welding, using a process that will exclude air from the molten metal and conforming to any special provisions for the welding as laid down by the Engineer in writing will be accepted. Suitable means shall be provided for holding the bars securely in position during the process of welding. The ends of the bars shall be cleaned of all loose scale, rust, grease, paint, and other foreign matter and clean original metal exposed before welding.

Only competent and experienced welder shall be employed on the work. Preliminary test of the weld shall be carried out at the contractor's cost to see that the actual field welding method is satisfactory and gives the required strength. Two welds in 100 welds or a minimum of 2 welds shall be made on the site on the test pieces under conditions exactly similar to the field welding of actual reinforcement bars and tested for their tensile strength. The strength of the welded joint shall not be less than that of the original bar. If the tests are not satisfactory, change of welding procedure and the Engineer may order further tests. Bars welded along with the welded samples, found unsatisfactory on tests shall be cut and rewelded. Additional welds if required on this account shall not be paid for. All the tests shall be at the cost of the contractor.

When welded joints are required they will be paid for separately.

No part of the reinforcement embedded in concrete shall be used for conducting electric current.

Substitution - Substitution of size of bars different from those specified will be permitted at the request of the contractor only if authorised by the Engineer. The steel substituted shall have area not less than the designed area provided further that the safe bond stress is not exceeded. If such substituted steel has larger area than that originally specified, such excess weight due to larger area will not paid for.

placing and fastening - All reinforcement shall be accurately placed in position with spacing and cover shown on the plan and firmly held so during the placing and setting of concrete. Bars shall be tied at all intersections. Binding wire of 1.63m. or 1.22mm diameter shall be used. Alternatively the Engineer may permit spot welding instead of tying wire. Spacing of bars shall be maintained by means of stays, blocks, ties, spacers, hangers or other approved supports at sufficiently close interval so that bars will not sags between supports nor be displaced during placing, vibrating or compacting concrete or by any other operation. Metal supports which extends to the surface of the concrete except where shown in the plans and wooden supports shall not be allowed. Placing bars for reinforcement on a layer of fresh concrete as the work progress, will not be permitted. The use of pieces of broken stones or bricks or wooden blocks for maintaining spacing or cover shall not be permitted. Layers of bars shall be separated by pre cast cement mortar blocks, spacer bars or other approved devices. Special care shall be taken to prevent any disturbance of the reinforcement in concrete that has already been placed. Reinforcement after being placed in position shall be maintained in a clean condition till it is completely embedded in the concrete. All bars protruding from concrete to which other bars are to be spliced and which are likely to be exposed for an indefinite period shall be protected from rusting from rusting by a thin coat of cement wash.

Inspection - Full details of the numbers, sizes, lengths, weights, laps, welds, spacing of the bars placed in position in different parts of the work shall be recorded, certified and signed by the Engineer to show that all reinforcement has been placed cor- rectly as per the sanctioned drawings or as ordered by the Engineer in writing before placing concrete. No concrete shall be deposited until the Engineer has inspected and certified the correctness of reinforcement, recorded the steel measurements and given permission to place the concrete in writing. After the approval of

reinforcement by the Engineer it will be the contractor's responsibility to see that the reinforcement spacing and arrangements are not tempered with in any way before or during concreting.

Tests - When the contractor supplies his own steel, he shall produce the test certificate. If there is any doubt about the quality, tensile and cold bend tests shall be carried out according to I.S. 432 - 1978 in an approved laboratory and the cost of the tests shall be borne by the contractor if the results are unsatisfactory and by the Department if the results are satisfactory.

Item to include -

1) Cost of labour, material, use of tools, plant and tackle and other incidental items to complete the work included under the item satisfactorily.
2) Supplying, conveying, cleaning, cutting, bending, binding with 1.63 mm. or 1.22 mm. (16 or 18 gauge) wire or spot-welding and placing reinforcement in position and maintaining it clean and in position till the concrete is laid.
3) Cost of sampling and testing.

Measurement and payment - The contract rate shall be on weight basis for 1 quintal of mild steel reinforcement. The weight of steel reinforcement incorporated in the concrete will be measured in quintal based on the total computed weights for the sizes and lengths of bars, as shown on the plan or as ordered by the Engineer. The lengths of the bars shall be measured correct to two planes of decimals in metres and the weight payable would be worked out on the following basis correct to 0.10 of a Kg.

Diameter of bars in millimeters (1)	Weight in Kg. per metre (2)
6	0.22
10	0.60
12	0.90
16	1.60
20	2.50
22	3.00
25	3.80
28	4.80
32	6.30
36	8.00
40	9.90

The steel will be issued to the contractor on the actual weighment. However, while paying for the item of reinforcement, the weight of steel used on the work will be calculated on the basis of running length and standard weight per unit length. Claims on account of difference in actual weights and weights calculated on the basis of length will not beentertained.

The wire for tying and devices for supporting bars and maintaining various clearances will

not be measured or paid.

No payment will be made for clips, binding wires, tack welding done in lieu of tying, separators, wire chairs and other materials used for fastening and supporting reinforcement in place. If the bars are substituted at the contractor's request and as a result more steel is used than specified, only the quantity specified shall be paid. Authorised lap lengths shall be paid for. If the lengths of bars contemplated in the designs are not available and the Engineer certifies the fact, steel involved in more number of laps will be paid for. When laps are made for splices other than those shown on the plans for the convenience of the contractor or lengths of laps more than indicated above, the extra steel will not be paid for. Any extra lengths of bars over the design if used (as shown on the plans) shall not be paid for.

When splicing of main tensile bars is required to be done by welding or by coupling boxes, such joints will be paid for separately in terms of numbers for the diameter of the bars jointed.

When the steel is supplied by Government, the pieces of the bars will not be taken back by the Department. Such wastages then shall be the property of the contractor and the contractor will be permitted to dispose off the same with the permission of Iron and Steel Controller or in accordance with the prevailing orders of the Government. Surplus steel (full length bars only) out of the steel issued to the contractor will be taken back at the rate which it was issued to the contractor, the conveyance to the place of original issue for such steel being at the contractor's cost.

When steel is supplied free by Government, the rate will include all the items except supply of steel bars in available lengths at the place of delivery specified. If wastage of steel is more than the minimum possible, the cost of steel wasted in excess shall be recovered from the contractor at the Divisional issue rate plus a penal rate as decided by the Engineer.

B.11 CEMENT PLASTER

Plastering concrete, stone, or brick masonry surface in cement mortar of specified proportion and specified thickness including, scaffolding, curing, etc., complete as deducted.

Materials - Cement mortar - Cement mortar shall have the proportion of cement to sand as mentioned in the wording of the item or in the if the special provisions and shall comply with specification No. B.5.(a) for cement mortar for plaster.

Scaffolding - Shall be as per B.9.11.

Preparatory work - All joint in the face work that is to be plastered shall be raked out to depth equal to not less than the width of the joints or as directed by the Engineer. The raking shall be done taking care not to allow any chipping of masonry. In new work the raking out shall be done in mortar in the joint is still green. Smooth surfaces of concrete, old plaster, etc., must be suitable roughened to provide necessary bond for the plaster. All dirt, soot, oil, paint or any other material that might interfere with satisfactory bond shall be removed. In the case of stone masonry, bushing on the walls to receive the plaster shall not be more than 12 mm. The surface to be plaster shall be cleaned and scrubbed with fresh water and kept wet 6 hours prior to plastering. It shall be kept damp during the progress of the work. The plastering shall not be commenced unless the preparatory work is passed in writing by the Engineer.

Gauges - Patches of plaster 15 cm.x 15 cm. shall be put on about 3 m. apart as gauges to ensure even plastering in one plane.

Plastering - In all plaster work mortar shall be firmly applied with some what more

than the required thickness and well pressed into the joints and on the surface and rubbed and leveled with a flat wooden rule to give required thickness. Long straight edge shall be freely used to ensure the perfectly plane and even surface. All corners must be finished to plane or curved surfaces as shown on the plan or directed by the Engineer and shall present a neat appearance.

The mortar shall adhere to the masonry surface intimately when set and there should be no hollow sound when struck. Cement plastering should be done in squares or strips as directed. Plastering shall be done from top downward.

Finishing - In any continuous face of a wall, finishing treatment of any type should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions.

Moulding - All moulding shall be worked true to template and drawn neat, clean and level. All exposed angles and junctions with door frames, etc., shall be carefully finished and shall be beaded if ordered.

Watering and curing - All plaster work shall be kept damp continuously for a period of 14 days. to prevent excessive evaporation on the sunny or windward side of the buildings in hot, dry weather, matting or gunny bags may be hung over the outside of the plaster in the beginning and kept moist.

Item to include -

1) Erecting, dismantling and removing the plastering.
2) Preparing the surface to receive the plaster.
3) Providing cement plaster of the specified average thickness with specified number of coats.
4) Dewatering if necessary if not separately provided in the tender.
5) All labour materials, use of tools and equipment to complete the plastering as per specification.
6) Curing for 14 days.
7) Any moulding work shown on the drawings or as specified unless separately provided in the tender.

B.11.11. Mode of measurement and payment - The contract rate shall be per square metre of plastering of specified thickness. All work shall be measured net in square metres. Dimensions shall be measured and quantity worked out correct up to two places of decimals in metre and square metre respectively. If the average thickness of plaster provided by the contractor is more than what is specified on any account, no extra payment is made.

B.11.(a). Cement plaster in one coat - The above specification in B.11 will apply in all pertinent particulars besides following -

In case of stone masonry the bushing on the walls to receive the plaster shall be removed to within 12 mm. before laying in masonry ad the plaster shall cover all projections by atleast 6 mm.

The plaster shall then be laid on the somewhat more the required thickness and pressed and levelled with a flat wooden rule or float to required thickness. The average finished thickness of plaster shall be as required in the wording of the item. The surface shall be rubbed smooth after floating with a thick coat of pure portland cement while the base coat is still fresh. If neeru finish is specified floating with neat cement will not be required.

B.11.(b). Cement plaster in two coats - Specification No.B.11 will apply in all pertinent

particulars.

When plaster is to be laid in two coats, the average thickness of first coat of plaster is generally 10 mm.on Brick work and 20 mm. on rubble masonry. The first coat is applied as per B.11.(a) but the surface is not floated or polished or roughened to give the key to second coat of plaster. Before the first coat hardens, it shall be combed in wavy lines about 12 mm. apart and 3mm. deep. The first coat shall be kept damp for at least 2 days immediately following its application.It shall then be allowed to become thoroughly dry. Before starting to apply the second coat the surface of the first coat shall be damped evenly the finishing coat shall be of such thickness as to make the total average finished thickness equal to the required plaster thickness as per item. The finished surface shall be true and even and present a uniform texture throughout and all joining marks shall be eliminated.

B. 12. LIME PLASTER

Plastering concrete, brickwork or stone masonry surfaces in lime mortar of specified proportions and specified thickness, including scaffolding, curing, etc., complete as directed.

Materials - 1) Lime mortar - Lime mortar of proportion as mentioned in the wording of the item or in the special provisions shall comply with specification No. B.3.

Scaffolding - Shall be as per B.9.11.

Preparatory work - Shall be as per B.11.3.

Gauges - Shall be as per B.11.4.

Plastering - Shall be as per B.11.5. Lime mortar shall be used instade of cement mortar.

Finishing - Shall be as per B.11.6. During the process of finishing, neeru as specified in specification No. A.3 of the consistency of thick cream should be applied and rubbed in to give a smooth and even surface when neeru finish is specified in the item or special provisions.

Moulding - Shall be as per B.11.7.

Watering and curing - Shall be as per B.11.8.

Bad work - Shall be as per B.11.9.

Item to include - Shall be as per B.11.10. except that the lime mortar shall be used instade of cement mortar.

Mode of measurement and payment - Shall be as per B.11.7.

B.13 CEMENT POINTING

Cement pointing with mortar of specified proportion to stone masonry or brickwork including raking out joints, watering, etc., complete.

Materials - Cement mortar - Cement mortar for pointing shall be of the specified mix and be as per specification No.B.4.

Scaffolding - Scaffolding to be as per specification No.B.9.11.

Construction details -

Unless other types of pointing are specified in the item or the special provisions, pointing shall be of grooved type. The joints in the masonry shall be raked out to a depth not less than a width of the joint or as directed in the special provisions or by the Engineer, when the mortar is green. The joints are to be brushed clean of dust and loose

particles with a stiff brush. The area shall then be washed and the joints thoroughly wetted before pointing commenced.

The raked out joints shall be filled with mortar of the specified mix and required consistency and well pressed and rubbed smooth.

A semicircular depression 3 mm. diameter shall be made in the joint by pressing a clean string with trowel keeping the string exactly horizontal and on the centre line of the joint. The vertical joints shall be similarly marked. These depressed lines will then be immediately rubbed with a nayla till they become uniformly 6 mm. deep and 6 mm. wide and assume fairly blackish colour. Intersection of the vertical and horizontal joints shall be finished neatly with a vertical line just touching the horizontal line but not crossing it. Where the joints are not horizontal or vertical as in the case of uncoursed rubble masonry, the pointing shall be made along the centre line of actual joints and the junctions of pointing made neatly. The pointing mortar shall not spread over the adjoining stones. Mortar pointing shall be restricted to the width of the joint and all superfluous mortar shall be removed with the trowel.

Watering - The pointed face shall be kept continuously wet for 14 days after initial set.

Item to include - Cement pointing shall include erecting and removal of scaffolding, all labour, materials and equipment incidental to complete the pointing, dewatering if necessary till the mortar is set unless separately provided for, raking out joints, clearing, watering, filling with mortar, trowelling, pointing with nayla and watering.

Measurement and Payment - The contract rate shall be per square metre of cement pointing. The dimensions measurement shall be correct up to a centimeter and quantity calculated correct up to two places of decimals of a square metre.

B.14 RCC. CAST-IN-SITU PILES THROUGH DRIVEN SHELLS

Providing RCC. cast-in-situ piles of specified capacity place through steel shells driven to the required depth in all strata except rock including driving the shells, concreting, compaction, cast-iron shoes and reinforcement and withdrawing the shell.

General - Cast-in-situ RCC. piles shall be of the design shown on the plans or to the designs of the Patentee subject to the approval of the Engineer. They shall consist of concrete cast in steel shells driven to the required depth and / or set and filled with specified quality of concrete after laying the reinforcement cage. The concrete shall be compacted as the shell is withdrawn.

Equipment - Equipment will consists of heavy shells and steam or air hammer with all other necessary accessories and plant or as may be proposed by the Patentee subject to the approval of the Engineer.

Steel shells - The shell shall be of substantial thickness and of sufficient strength and rigidity to permit their driving with heavy steam hammers and to prevent their distortion caused be soil pressure or the driving of adjacent piles until filled with concrete. The shells shall have their internal diameter equal to the specified diameter of the pile and shall be sufficiently watertight to exclude water during the placing of concrete. The shell shall be equipped with detachable heavy cast-iron shoes or driving points. A watertight gasket usually of hemp dipped in coaltar shall be provided between the shoe and the shell.

Hammer - The steel shell shall be driven with the steam or air hammer of sufficient weight. In no case shell the total energy developed by the hammer be less than 2,200 Kg. metre per blow.

B.14.2.3. Leads - Pile driven leads shall be constructed in such a manner as to afford freedom of movement of the hammer and they shall be held in position by guys and / or steel braces to ensure rigid lateral support to the shell during driving. Inclined leads shall be used in driving battered piles.

Driving - The shell with the shoe shall be driven in the correct position with steam or air hammer to the required depth and/or set on shown on the plan or directed by the Engineer, true and plumb or to the required batter and to give the designed set for the last ten blows. Accurate record of number of blows required for the last 30 cm. whenever possible shall be kept in the required proforma for the guidance of the Engineer in determining allowable load on the pile. Where driving is interrupted before the final penetration is reached, the record for final penetration shall not be taken until at least 20 blows are given on resumption of driving. If the required penetration is not obtained driving will be done more intensively with more blows per minute. As soon as the shell is founded to be sufficiently deep in hard strata, start will be made for taking the set. The set shall be 12 mm. or less for the last 10 blows of the hammer. After the specified set is obtained 10 more shall be given to the shell and the set recorded. If during these blows, the set in 10 blows is found to be more than 12 mm. the driving shall be continued further till the specified set is obtained. If during the process of driving piles, foundation masonry of old structure or boulder is met with, they shall be removed by the contractor by excavation for which no extra payment will be made. If any water pipe lines or drainages are encountered while driving pile shells, the necessary diversion of drainage or water pipe shall be carried out as per municipal requirements and as directed by the Engineer, by the contractor at his expense. The item will cover driving the shell through all strata softer than rock.

The contractor will not be entitled to any compensation or extra rate if the depths to which the piles are required to be driven are increased or decreased, unless specially provided in the tender.

The contractor will be held responsible for any injury to persons and any damage that may be caused to the work or neighbouring structure or property due to the operation of driving piles.

B.14.4 Tolerances - Utmost care shall be taken to see that the shell is driven true and plumb or to the required batter as far as possible. Unless remedial measures are necessary due to design requirements a shift up to 15 cm. in position and a cant up to 2 per 15 cm. appropriate additional construction as approved by the Engineer shall be provided at the contractor's expense.

Reinforcement - Steel reinforcement shall conform to specification No.B.10. Longitudinal bars of the required size, shall be assembled into a cage spiral or stirrups accurately tied accordingly to the design or plan or according to the design of Patentee approved by the Engineer. Splicing of the longitudinal bars may be lap. The stirrups or spirals shall be tied to the longitudinal bars with 1.63 mm. diameter (16 guage) wire. The longitudinal bars shall extend 60 cm. over the top of the pile or as shown on the plans for being connected to the steel of the pile cap or foundation fitting. the exposed length of reinforcement shall not be measured or paid. After driving the shell to the required depth, the cage of reinforcement bar shall be lowered into the shell and held in such a way that the cage remains truly in the direction of the axis of the shell with designed cover of concrete all round during pouring of concrete. The reinforcement of the cage shall be got approved in writing by the Engineer before placing it in the shell.

Concrete - Concrete shall comply with specification No. B.6 for ordinary portland cement concrete of 1:1.5:/1:2:4 proportion. The maximum size of aggregate shall be 20 mm.

The contractor shall be responsible to see that all the materials to be used including those supplied by the Department are of specified quality at the time of use and not damaged in storage. As the concrete is to be poured into the shell, water sufficient to allow flow of the concrete shall be provided. In case the surrounding area is dry, extra water ill have to be added to enable water absorbed from the concrete by the ground , to be made up. The amount of extra water will be decided by the Engineer. The ground around the pile shall also be thoroughly wetted for 6 hours in advance of concreting and kept so for 3 days.

In waterlogged ground special care shall be taken to ensure that the soundness of concrete is not affected due to sub-soil water.

When the concrete is being poured, compaction shall be done by approved means either by vibrators or by vibration of the shell itself as it is being withdrawn. The bottom shell shall be maintained not less than 30cm. below the top of the concrete during withdrawal of shell and pouring operations, unless otherwise permitted by the Engineer. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the shell. In the later case, separate vibration of the concrete during pouring will not required.

Concrete shall be placed in one continuous operation/from the shoe to the correct pile cap evaluation and shall be carried on in such a manner as to avoid segregation.

No shell may be driven nearer than 1.5 metres or 4.5 times the diameters of the pile whichever is grater, to a pile filled within 7 days unless it is substantially proved that no damage can take place to the pile due to vibration.

All the piles shall be cast to a level previously fixed and any extra length of pile cast above that level shall not be paid for. This extra length of pile shall be cut carefully by chiselling in such a way that no damage result to the pile itself. The tops of pile shall be dressed to a plain surface. Both these operation when necessary will be carried out by the contractor at his own cost.

Defective piles - If the shoe has filed before the required depth is reached or the cant and shift are more than permissible, the concrete is of a poor quality the load test is unsatisfactory or there is any defect which in the opinion of the Engineer will affect the strength or life of the pile, the pile will be rejected or the following or other corrective methods approved by the Engineer, shall be adopted for the pile in question at the contractor's expense:-

1) One or more additional piles shall be driven adjacent to the defective one to take the designed load.
2) The pile cap shall be redesigned and extended to properly embed the piles to take the design load.

All the pile shells pushed up by the driving of adjacent piles or by any other cause, shall be driven down again.

Test of concrete - One test of three 15cm. cubes shall be made for the concrete poured on the first day and thereafter one for every fifteen piles cast and not less than one test of three 15cm. cubes for each week's operations. The age of test shall be 28 days but 7 days' test may be used if the relation between strength at 28 days and 7 days is established by a sufficient number of test. These cubes shall be got tested in an approved laboratory. All the expenses of materials, moulds, labour, transport, test etc., shall be borne by the contractor. If any test cube result show strength of concrete below the minimum specified, the piles represented by the sample shall be liable to rejected.

Load test - Load test shall be carried out on the pile indicated by the Engineer.
B.15.3

The load test shall be carried out according to the specification No. B.17. If the test are not satisfactory the pile may be rejected or if it is possible in the opinion of the Engineer to

adopt corrective measures by driving additional piles and redesign the pile cap such measures will be provided by the contractor without any extra cost to Department. The load test will be paid for separately.

Item to include -

1) All labour, materials and use of equipment including shoes, use of driving equipment and driving shell, concrete, reinforcement, compaction and withdrawal of the shell required for completing the pile in all respects.
2) Compensation for any injury to persons and damage to property due to the operation of piling.
3) Correction of defective piles.

Load test will be paid for separately.

Measurement and Payment - The contract rate shall be per square metre of pile of specified diameter and capacity driven and concreted to the full depth and accepted including reinforcement.

Quantity of cast in situ RCC, piles to be paid for, shall be actual number of linear metres of pile cast and left in place in the completed and accepted work. He measurement shall be made from the point of shoe of the pile to the bottom of the pile cap or bottom of the footing as the case may be. Pile shoe will not be paid separately. Quantity will be measured correct up to a centimeter.

The tendered unit shall apply even if the actual length is more or less than shown on the plans or specified.

B.15 RCC. CAST IN SITU BORED PILE

Providing RCC. cast in situ bored piles of specified capacity founded on the suitable strata including reinforcement and compaction of concrete.

General - Cast in situ RCC, piles shall be of the design and layout shown on the plans or as proposed by the Patentee and approved by the Engineer. After the casing is sunk to the required depth in a suitable hard strata or rock, the reinforcement cage shall be lowered into the casing. Cement concrete of specified quality is then poured into the casing and compacted and the casing gradually withdrawn.

Equipment - The equipment shall consists of heavy steel casing sections with screwed ends for connection and various types of percussion or rotary boring tools for boring and lifting the bored materials and water if any, from the casing, worked mechanically with suitable machinery. Arrangement for driving the casings boring proceeds within it shall also be provided. The casing shall be of suitable thickness, sufficient strength and rigidity to permit driving the heavy hammers and to prevent its distortion due to soil pressure until filled with concrete.

B.15.3 Driving - The boring tool shall be centred at exact pile location Boring and driving shall then proceed alternately till the appropriate strata is reached. When the casing is being driven in, care shall be taken to check that it is truly vertical. Sequence of boring and driving or vice versa will depend upon the strata passed through. The item will cover boring and driving the casing through all strata softer than rock. The contractor will not be entitled to any compensation or extra rate if the depths to which the piles are required to be driven are increased or decreased.

Contractor will be responsible for any compensation that may have to be paid due to injury to persons or damage to work and property caused by his pile driving operations.

When the boring is done to a satisfactory strata according to plan or as approved by the Engineer and the casing fully driven to the required depth, all loose material existing at the

bottom of the hole after completing the operation shall be removed before pouring the concrete.

Water may be used in the boring operations only to the extent absolutely necessary for facilitating the boring. All necessary steps shall be taken to prevent surface water from entering the hole and all water which may have infiltrated into the hole shall be removed before pouring the concrete. If necessary the inside of the shell shall be inspected by lowering the light and it should be seen that any material like earth, clay, etc., sticking to the casing is removed.

Tolerances - Utmost care shall be taken to see that the shell is driven true and plumb as far as possible. Unless remedial measures are necessary due to design requirements a shift of 8 cm. in position and a cant up to 2 % of height will be permitted. If the cant is more than 2 % and shift more than 8 cm. appropriate remedial measures by way of redesigning the pile caps and/or driving additional piles as approved by the Engineer shall be provided by the contractor without extra expense.

Reinforcement - Steel reinforcement shall conform to specification No.B.10. Longitudinal bars of the required size shall be fabricated into a cage spiral or stirrups accurately according to the design or plan or according to designs of the Patentee approved by the Engineer. Splicing of longitudinal bars may be by lap. The stirrups or spirals shall be tied to the longitudinal bars with 1.63 mm. diameter (16 guage) wire. The longitudinal bars shall extend 60 cm. over the top of the pile or as shown on the plans for being connected to the steel of the pile-cap or foundation- footing. The exposed length of reinforcement shall not be measured or paid. After driving the casting to the required depth the cage of reinforcement bar shall be lowered into the shell and held in such a way that the cage remains truly in the direction of the axis of the shell with designed cover of concrete all- round during pouring concrete. The reinforcement of the cage shall be got approved in writing by the Engineer before placing it in the casting.

Concrete - Cement concrete shall comply with specification No. B.6. for ordinary portland cement concrete of 1:1.5:3 proportion. The maximum size of coarse aggregate shall be 20 cm. The contractor will be responsible to see that all the materials to be used including those supplied by the Department are of specified quality and not damaged in storage. The inside of the casting shall be cleaned if necessary before concrete is poured. As the concrete is to be poured into the casting, water sufficient to allow flow of the concrete shall be provided. In case the surrounding area is dry, extra water will have to be added to enable water absorbed from the concrete by the ground , to be made up. The amount of extra water will be decided by the Engineer. Surrounding area shall also be well watered for 6 hours before concreting and kept well watered for 3 days. In waterlogged ground care shall be taken to ensure that the soundness of concrete is not affected by sub-soil water. When the concrete is being poured, compaction shall be made by approved means. The bottom of the shell shall be maintained not less than 30cm. below the top of the concrete during withdrawal of casting and pouring operations, unless otherwise permitted by the Engineer.

Concrete shall be placed in one continuous operation from the bottom of the bored hole to the bottom of the pile-cap and shall be carried on in such a manner as to avoid segregation.

If water is met with, it shall be removed. If it is impossible to remove it, concrete shall be laid by tremie. All the piles shall be cast to a level previously fixed and any extra length of pile cast above that level shall not be paid for. This extra length of pile shall be cut carefully by chiselling in such a way that no damage result to the pile itself. The tops of pile shall be dressed to plain surface. Both these operation when necessary will be carried out by the contractor at his own cost.

Defective piles - If the cant and shift are more than permissible, the concrete is of poor quality, the load test is unsatisfactory or there is any defect which, in the opinion of the Engineer, will affect the strength or life of the pile, the pile will be rejected or the following or other corrective methods approved by the Engineer shall be adopted for the pile in question at the contractor's expense:-

1) One or more additional piles shall be cast adjacent to the defective pile and so arranged as to take the designed load.
2) The pile-cap or the footing shall be redesigned and extended to properly embed the pile to take the designed load.

Test of concrete - One test of three 15cm. cubes shall be made for the concrete poured on the first day and thereafter one for every fifteen piles cast or one for each week's operation whichever is more. The age of test shall be 28 days; but 7 days' test may be used if the relation between strength at 28 days and 7 days is established by a sufficient number of test. These cubes shall be got tested from an approved laboratory. All the expenses of materials, moulds, labour, transport, test etc., shall be borne by the contractor. If any test cube result show the strength of concrete below the minimum specified, the piles represented by the sample shall be liable to rejected.

Load test - Load test shall be carried out on the pile indicated by the Engineer. They shall generally be about 1 % of the total number of piles . The load test shall be carried out according to the specification No. B.17.

If the test are not satisfactory, the pile may be rejected or if it is possible to adopt corrective measures by driving additional piles and redesigning the pile-cap in the opinion of the Engineer such measures shall be provided by the contractor without any extra cost to Department. The load test will be paid for separately.

Item to include -

1) All labour, materials and use of equipment such as casting, boring and driving equipment, boring, providing concrete, reinforcement, compaction and withdrawal of the casting including dewatering.
2) Compensation for any injury to persons and damage to property due to the operation of pile driving.
3) Test of concrete.
4) Correction of defects if any. Load

test will be paid for separately.

Measurement and Payment - The contract rate shall be for a unit of one linear metre of pile finished and accepted including reinforcement.

Quantity of RCC. cast in situ piles to be paid shall be actual number of linear metres of pile left in place in the completed and accepted work. The measurement shall be made from the bottom of the bored hole to the bottom of the pile-cap or bottom of the footing as the case may be to correct up to one centimeter.

In case the length of the bored hole is more than pile length + 1.5 m. the length in excess shall be paid as empty bore under a separate item.

B.16. UNDER REAMED PILES

Providing under reamed piles dia. with single/double bulb.

16.1 General - The under reamed pile shall be of the dia as specified in the working of the item and shall have single or double bulbs as indicated in the working of the item these piles shall be form by suitable equipment as per the requirement of IS 2911 (Part III) -1980.

Equipment - The piles shall be formed by manual operation of the equipment which shall comprise

a) An auger

b) An under-reamer with bucket

c) Boring guide

d) Accessories like extension rods, cutting tool, rotating bar, concreting funnel etc.

e) portable tripoid, hoist with manually operated winch.

Boring - The hole shall bored by auger operated manually care shall be taken to see that the bore is vertical. For softening the soil water may be used to small extent at the bottom of the hole. Harder lumps etc shall be knocked by cutting tool. The augured material shall be carried to a safe distance beyond the work area and disposed off or stacked as directed. The bore shall extend to the depth as per the design. In the absence of the mention the depth shall be as per the table included in the specification. The boring shall be done taking due care to avoid accidents or injury. The contractor shall be fully responsible for any injury to any person or damage collapse of bore etc. Extra boring if any done shall not be filled. But shall be concreted. The contractor shall not be entitled for payment for such extra length.

Forming Bulb - The bulb shall be formed as per the design requirement or accompanying guide lines as directed by the special equipment. Care shall be taken to see that no loose soil spills the bucket. Such spilled soil shall be promptly removed by auger. In case of two bulbs the upper bulb shall be formed when the length of the bore reaches the required level which shall not be the full length. the upper bulb will be formed by the under reamer. After the upper bulb is formed further boring of the hole shall be continued to reach the final level. Care shall be taken to see that the upper bulb is not damaged during the further operations.

The boring and forming bulb for particular pile shall not be done as a continuous operation and no bore or fully formed pile bore including bulbs left unconcreted for long period. The concrete shall be any case be done before the walls of bores dry up tending to scaling of soil. In any case the concreting shall not be postponed beyond 5 days of boring of the hole. However if any collapse of bore hole side or other damage takes place due to the hole remaining unconcreted it shall be the responsibility of the contractor and he shall not be entitled for any compensation.

Tolerance - The pile shall not deviate more than 75 mm from the centre. The tolerance for verticality shall be 1.5%. Rectification or revision of the design may be necessary due to defective piles not conforming the requirements. Any such modification as may be directed by the Department shall be carried out by the contractor at his cost.

reinforcement - The steel bar reinforcement shall be as per the design. In the absence of design the steel shall be provided as per the details in this specification. The steel shall be measured and paid for separately. The fabrication of reinforcement shall conform to specification No. B.10.

Concreting - The concrete shall be 1:2:4 concrete and shall conform to specification No. B.6.

Before starting concreting any loose material at the bottom of the hole shall be cleared. The reinforcement cap shall be lowered in the hole. Care shall be taken to see that the cage does not rub against the wall causing falling of soil from the wall. The cage shall be suitably hung from the ground level to obtain a minimum cover of 50 mm at bottom. The side cover shall be 20 mm. The concrete shall have adequate slump to allow easy placing through the funnel. Sufficient water shall be used so that the loss of water due to absorption by soil is

compensated. The surrounding area shall be watered for 3 days. The concrete shall be placed carefully so as not to disturb the bore hole wall. Gentle tamping shall be done by rod to obtain dense concrete. The concrete shall be suitably pushed side ways to avoid any hollows being left beyond the cage.

Load Test - Load test if ordered due to suspected defect shall be carried out as directed. The cost of the test shall be borne by the contractor if the pile is found defective. The cost of the test shall be borne by the Department if the pile is found to be acceptable. Any rectification required due to defective piles shall be carried out by the contractor at his cost as approved by the Department.

Item to Include -

1. All labour, materials (excluding reinforcement),use of equipment.
2. Extra length of pile due to contractors default.
3. Compensation due to injury or damage.
4. Load test of pile if the pile is proved to be defective.
5. Correction required due to defective pile.

Measurement and payment - The contract rate shall be for one metre length of pile excluding steel reinforcement. the length shall be measured from bottom of the bore hole (restricting the length to design length) to the bottom of the ground beam. The length shall be measured correct upto one cm.

Details of under reamed piles

Dia.	Size Underreamed	Length	Reinforcement

in cm.	dia. in cm.				
		single	double	Longitudinal	6mm Rings
20	50	3.5 m	3.5 m	3 of 10 mm	18mm c/c
25	62.5	3.5 m	3.5 m	4 of 10 mm	22mm c/c
30	75	3.5 m	3.5 m	4 of 12 mm	25mm c/c
37.5	94	3.5 m	3.75 m	5 of 12 mm	30mm c/c

B.17 LOAD TEST OF PILES

Carrying out loading tests of pile or pile group including construction of test caps, accessories and instruments, dismantling the caps after test, etc., complete.

General - The load test shall be carried out on any particular pile or pile-group selected by the Engineer after period of not less than 28 days after casting. The load test shall be carried out by applying a series of test loads as specified below on a test cap or suitable platform over the pile or group of piles unaided by any other support. Direct loading or application of pressure by hydraulic jacks with gauges or any other suitable methods may be adopted as approved by the Engineer. Before any load test is made, the proposed apparatus and procedure shall be got approved by the Engineer. Readings shall have to be recorded with the help of deflectometers from to sides of the cap or platform, precision levels or any other suitable device approved by the Engineer. Reference points for measuring pile settlement shall be sufficiently removed from the test pile to preclude the possibility of disturbance. A complete record of all load test shall be filed with the Department.

Procedure of test - The pile or pile-group to be tested shall be loaded by a method which will maintained constant load under increasing settlement. The test load shall be 150% of the proposed safe working load on the pile or the pile-group. The load shall be applied in equal increment of 10 tonnes at interval of half an hour till the full test load is reached. Full test load shall remain for a period of 48 hour. During the period of test, careful observation shall be made for settlement taking place before and after each increment of load.

The test load shall be removed in decrements not exceeding 10 tonnes with intervals of not less than 15 minutes. The rebound will be recorded after each decrement. The final rebound shall be recorded 24 hours after entire test load has been removed. Reading of settlements and rebound shall be referred to a pucca Bench Mark. These shall also be recorded to 0.25mm for each increment or decrement of load by means of deflectometer.

The contractor shall himself arrange to provide the necessary loads, R.S. joints, apparatus, test caps or platform and all other materials and equipment, power and labour necessary for successfully carrying out the test to the satisfaction of the Engineer. The contractor shall be responsible for any injury to the life and property, if any, caused during or due to the test. After the test load is removed, the head of the pile should be carefully examined for any damage. Damage, if any, shall be made good to the satisfaction of the Engineer.

If the pile fails to comply with the requirement, due to defective pile or defective driving, the pile will be rejected unless it is possible to carry out effective remedial measures which will be done at the cost of the contractor. The cost of testing such defective piles shall be borne by the contractor.

In the case of precast piles, if the piles sink under test load due to weak strata, the pile shall be extended and driven to the required depth to obtain the specified loading capacity.

Item to include -

1) Building up of test cap or platform or any other arrangement approved by the Engineer for satisfactorily loading of the pile or pile-group with the test load and removal.
2) Necessary suitable material for loading in specified batches up to the total test load or necessary arrangement for applying the test load by hydraulic jack with suitable yokes and tested pressure gauges.
3) Suitable apparatus for accurately measuring the test load, the settlement or rebound of the pile under each increment or decrement of load.
4) All labour, equipment, power, material incidental to making the loading test satisfactorily as directed by the Engineer.
5) If the reinforcement bars projecting beyond the top of the pile are required to be cut for test purposes, the item will include chipping off the pile to the required length to uncover the reinforcing bars for securing sufficient lap length for the bars required to

   be added and rebuilding the pile to the required level, curing, etc.
6) Clearing the site after test.

Measurement and payment - Test one pile or pile-group shall be measured as one test and payment will be made at the rate quoted in the tender for one loading test.

B.18. WELDING

General - The specifications given hereunder shall apply to welding as applied to new and existing mild steel structures and mild steel reinforcement for R.C.C. work welding may be adopted in R.C.C. work in the following cases :-

a) Fillet welding for placing the reinforcement in correct position or for providing cross bars in lieu of hooks.
b) Butt welding for reinforcing bars. Welding shall be made by the metal process unless oxyacetelyne gas welding is specially permitted by the Engineer in writing. The specifications for the former have been given in B.18.(a) and for the later in 18.(b).

Welding contract -

1) The welding work shall not be given to a contractor who does not produce satisfactory evidence of his ability to handle the work in competent manner. The contractor shall also prove the ability of the operators employed by him to produce welding connection of the required strength.
2) The contractor shall employ a competent welding supervisor or charge-hand to ensure that the standard of workmanship is satisfactory.
3) The Engineer shall have a free access to the work being carried out by the contractor at all reasonable times and facility shall be provided so that during the course of welding he may be able to inspect any layer of weld metal. He shall be at liberty to reject any work not conforming to the relevant specifications; defective welds shall be cut out and rewelded.

Safety requirements and health provisions - The contractor shall make all safety and health provisions for his welders as are laid in I.S. 818-*** i.e. code of practice of safety and health requirements in electric and gas welding and cutting operations.

B.18.(A). METAL ARC WELDING

B.18.(a).I. Metal arc welding in structural work -

Material - Electrode - Electrodes used for strength welds shall conform to I.S. 814-****. They shall be of shape and size approved by the Engineer. They shall be preserved from oxidation and shall be kept in clean condition.

Welding - The size of the weld and the position where the weld shall be placed shall be entirely as per the drawing supplied or as directed by the Engineer.

Design of welds, drawings , permissible stresses in welds, welding in compression and tension members, welding in plate girderd lacing, battening, weld equipment, electrodes shall be as per I.S. 816-****. Code of practice for the use of metal arc welding for general construction in mild steel.

Welded fabrication of structural steel shall be on the lines given in I.S. 800-1962.

The following instructions shall also be followed from point of view of workmanship

:-

1) Welders and work shall as far as possible be protected from wind and weather.
2) Welds should be made flat in position wherever possible.
3) Adequate steps shall be taken to maintain the correct arc length, rate of travel, current and polarity for the type of electrode and nature of work.
4) Structural steel shall not be painted or oiled on any areas where welding is to be done and shall be well cleaned to remove any paint, scab, rust and expose original clean metal surface immediately before welding.
5) The member shall be securely held in positions by means of tack welds, service bolts, clamps or jigs before commencing welding so as to prevent relative movement due to distortion, wind or other causes. When the wind or manual handling is liable to cause distortion, the work shall be securely held in approved frames or jigs.
6) Freedom of movement of one member of the joint shall be allowed wherever possible. No butt joint shall be welded without allowing one component freedom of movement of the order of 2 mm.
7) The sequence of welding shall be such that when possible, the member which offers greater resistance to compression are welded first.
8) The welding of the joint shall be so arranged that resulting tensile and compressive stress produced by each portion of the weld tend to balance each other. The step back method shall be adopted for continuous run.
9) Fusion faces must be cut to the required shape by shearing, chipping, machining or machine gas cutting. Hand cutting by gas may be substituted for machine gas cutting only if the latter is impracticable; the cutter shall be adequately guided so that the cut edge is clean and uniform If the fusion face is rough it shall be dressed by chipping, filing or grinding in a satisfactory manner.
10) Welds showing slag, inclusions, porosity or lack of proper penetration shall be cut out and rewelded. Overlap of the toe of the weld and under cutting of the parent metal should be avoided and where present to a serious extent shall be rectified.
11) All slack shall be removed from each run before another run is superimposed and from the final run. When cold, the final run shall be protected with cleaned boiled linseed oil and shall not be painted until approved by the Engineer.
12) Grinding of finished weld is permitted provided the weld is not reduced below the prescribed section.

13) All welds which have not been ground shall be scrubbed with a 10% solution of hydrochloric acid which shall be satisfactorily washed off with water before the paint is applied, unless alkali resistant paint is used.`

B.18.(a).II. Metal arc welding of M.S. bar reinforcement in RCC. works -

Materials - Electrode shall comply with I.S. 814-****. They shall be of shape and size of as approved by the Engineer. They shall be preserved from oxidation and shall be in clean condition. Electrode shall be of heavy coated type The electrode shall satisfy the following mechanical properties :-

a) Ultimate strength not less than 44 kg./sq.mm.

b) Yield point not less than 31 kg./sq.mm.

c) elongation of a length equal to 3.54 times the diameter of the rod, not greater than 20%, and

d) Izod impact test 4kgm.

Maximum size of electrode shall be based on following table: -

Diameters of bars in mm	Maximum size of Electrodes		Amperage Corresponding to Max. size of mm. Electrodes
	S.W.G.	mm.	
12 to 25	10	3.25	
25 to 32	8	4.06	As specified by
	10	3.25	the manufacturer
32 to 50	10	3.25	of Electrodes.
	8	4.06	
25 to 50	8	4.06	
	6	4.88	

The forms of butt weld shall be made in one of the following form :-

No.	Type	Diameter range in mm.(D)	Minimum gap. mm.(g)	Angle of V (a)	Root face (E)	Details of welds
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Single V Butt weld	12 to 40	D/4	60 to 70	None	
2	Double V Butt weld 28 and above	3 to 6	---	60 to 70	None	

The form and dimensions of weld surface shall be such as will provide access for the electrode to be welded and enable the welder to see clearly the work in progress.

A butt weld shall be built up so that the effective throat diameter is greater than the diameter of the bars joined. such increase in diameter shall not be less than 10% and not more than 25% of the diameter of the bars joined. Such increase in diameter shall not be less than 10% and not more than 25% of the diameter of the bars joined.

Workmanship -

1) The surface to be welded and the surrounded material for a distance of at least 12 mm. from the

weld shall be freed from scale and cleaned so as to remove dirt, grease, paint, heavy rust or other surface deposit, wire brushing being used necessary.

2) Fusion faces must be cut to the required shape by shearing, chipping, machining or gas cutting.

3) All the bars to be butt welded should be aligned and set in position with their axes in one straight line. This should be done either by wiring to the other reinforcement or by attachment in a jig or clamp or by use of standards and guides and chairs on a prepared platform. One of the bars shall have freedom of movement in the direction of its axis to avoid residual stresses. Turning or rotating the bar till half the bar is welded should be avoided. Turning or rotating the bar shall be done without disturbing the alignment and without introducing any twist in the bar during the process of welding.

4) The welding current shall conform with respect to voltage and amperage (and polarity if direct current is used) to the recommendations of the manufactures of the electrodes being used. The arc length, voltage and amperage shall be suited to the diameter of the bar to be welded.

Test

i) A single layer of weld metal whether deposited on one pass or made up of several parallel beads shall not exceed 3mm. in thickness.

ii) The electrode manipulation during welding shall ensure that,-

a) complete fusion between the base metal and the deposited weld metal is obtained.

b) the melted base metal is replaced by the weld metal so that no under cut remains along the edges of finished welds,

c) the melted weld metal makes all slag, oxide and gases float to the surface behind the advancing arc. All the slag should be removed from each run before another run is superimposed and from the final run by hammering lightly and wire brushing.

d) full penetration into the root of the weld is obtained, and

e) surface of the weld shows regular and even ripples and edges of the weld merge thoroughly with the base metal.

5) Welder shall be provided with such staging and necessary, with protection as will enable them to perform the welding operation properly.

6) All welding shall be in good condition and capable of enabling the welder to provide and maintain the correct arc at all times.

Test - Two welds in 100 welds or a minimum of two welds shall be made on the site on test pieces under condition exactly similar to the field welding of actual reinforcement bars and tested for their strength. The strength of the welded joints shall not be less than that of the original bar i.e. failure shall be in the parent metal and not in a welded joint.

If the tests are not satisfactory change in welding procedure or personnel may be ordered by the Engineer. Bars welded along with the welded samples found unsatisfactory on test shall be cut and rewelded. The test shall be got made at the cost of the contractor.

B.18.(B) OXYACETYLENE WELDING -

B.18.(b) I. Oxyacetylene welding in structural steel work -

Contractor No of correction University Engineer

Material - Filler rods - Filler rods shall conform to I.S. 1278-****. They shall be preserved from oxidation and shall be in a clean condition.

The design method of welding, workmanship in oxyacetylene welding shall be as per I.S. 1923-****, code of practice for oxyacetylene welding for structural work in mild steel. The instructions given in B.18(a) regarding workmanship shall also be adhered to in this type of welding.

B.18.(b).II. Oxyacetylene welding for M.S. reinforcement bars in R.C.C. work -

Materials - Filler rods - Filler rods shall conform to I.S. 1278-****. They shall be preserved from oxidation and shall be in clean condition. They shall satisfy the same mechanical properties as mentioned for electrode in B.18.(a)II.

Welding - Shapes of the ends of the bars at the weld shall be the same as laid down in B.18(a)II. unless other shapes are permitted by the Engineer in writing.

Workmanship - Same as for B.18.(a).II in all relevant

particulars. Test - Same as for B.18.(a).II.

B.19 STRUCTURAL STEEL WORK

General - This specification covers the requirements of providing fabrication and erection of structural steel work including painting.

Materials - Structural steel sections - This shall comply with specification No. A.10.

Rivets - Shall conform to I.S. 1148-**** and I.S. 800-**** .

Bolts - These shall comply with I.S. 1148-**** and I.S. 800-****.

Fabrication and erection - Cutting, holding, assembly, riveting, machining, bending, marking and erection shall be carried out in accordance with approved plans and as directed by the Engineer from time to time and shall comply with I.S. 800-****

Damaged members - any material found damaged or defective shall be stacked separately and shall marked in distinctive colour. Such material is to dealt with expeditiously under the orders of the Engineer.

Riveting, welding and bolting –

1) Riveting or welding shall not be started until such time as the Engineer as personally satisfied himself that the alignment is correct, the vertical plumb, the camber correct with all camber jacks screwed tight, all joints and cover plates fixed tight with service bolts and filled rivet holes coinciding. While assembling, holes in different components shall be made concentric with the use of drifts before service bolts are fixed.

2) Welding if required to be done, shall conform to specification No. B.18.

3) All permanent machine-fitted or other bolt must be perfectly tight and should be burred or otherwise checked, to prevent nuts from becoming loose. No unfilled rivet or bolt hole are to left to any part of the structure.

4) Fitting and riveting (or welding) of connections of steel section, in cases where pieces are short or of full length shall be done in such a manner that the metal not unduly strained or cracks caused.

5) Care shall be taken to see that cracks are not filled with paint, putty, cinders, dirt, oil or fittings for the purpose of deception.

6) Particular care must be taken to ensure free expansion and contraction wherever provided for in drawings or as the Engineer directs.

7) Chipping of rivets, angle flanges, and edges of plates must be done without breaking out the

metal. Chipped edges shall be finished off with a file and all concave corners shall be rounded off.

Painting - Painting shall generally comply with I.S. 800-**** and I.S.1477(Part I)-**** subject to such additions or alterations as may be prescribed in the special provisions for any particular item. It shall also comply with relevant part of specification No. B.21. One priming coat of red lead shall be applied immediately after fabrication. Two coats of oil paint of approver shade shall be applied after complete erection.

Structural steel work to be encased in concrete shall not be painted

Inspection and testing - These shall be carried out in conformity with I.S.800-****.

Item to include -

1) The item shall include supply fabrication and erection in position at site of all structural steel sections of the required dimensions and labour, materials, and use of equipment required for all operations of fabrications, hoisting, erection and satisfactory completion of the item.
2) Item shall also include labour, materials and use of equipment required for painting the structural steel work.

Mode of measurement and payment - The contract rate for the item shall be one quintal or one tonne.B.20.1.

In the case of rolled sections length shall be measured correct to a cm. and weight calculated on the standard weight per metre tabulated in the I.S.I. Hand Book for structural steel sections limited to the length shown on the plans correct up to 0.10 of Kg. weight of steel plates of each thickness shall be calculated separately on the basis of actual shape provided without taking in to account wastage or cut off. In case of bolted work, weight of bolts, nuts, and washers, shall be added in full and no deduction shall be made for bolt holes. In riveted work only the weight of rivet heads shall be added. No deductions shall be made for rivet holes. No increase in weight shall be allowed in welded work due to welding.

B.20. GENERAL WOOD WORK

General - The specifications refer to wood work in general, including carpentry and joinery work in roofs, floors, verandahs, staircases, door and window frames, bridges, coffer dams, shores, struts, large gates, etc.

Materials -

1) Timber shall comply with specification No. A.12 in all respects.
2) Species of timber - The species of timber to be used shall be mentioned in the items. Where no species is mentioned, good Indian teak (Tectona Grandis) alone shall be used. In case a particular jungle wood species has to be changed the Engineer's decision about the alternative shall be final.

Engineer may inspect all logs and scantling previous to use and reject any which he consider defective in the requirement of specification.

3) Glue - Glues are of two types (i) organic type which glue shall be from skin or bone material, and (ii) synthetic type. It shall be such material that it may be used without causing harm and odour. A freshly prepared hot solution shall be of a clear amber colour, translucent, free form black or cloudy spots and shall swell considerably when immersed in cold water without dissolving.

Organic type shall comply with specification No. I.S. 852-**** and synthetic shall comply with I.S. 851-**** in all respect.

4) Nails, Screws, etc - Nails, screws, ties, straps, bolts, etc, shall of the material, make the pattern specified in the item or the special provisions and approved by the Engineer.

Precaution against decaying -

B.20.3.(1) The contractor must be in all cases obtain order from the Engineer regarding time at which he shall do painting or oiling to wood work and permission of the Engineer before he paints, oils or otherwise treats wood work.

B.20.3.(2) All parts of woodwork resting on or set in masonry shall be well painted with 2 coats of hot boiled tar approved by the Engineer. The tar shall be so applied as not to appear on the exposed timber. No extra payment shall be made for such tarring. Timber buried in the ground shall be well coated with tar

When the end of a beam or joist is embedded in masonry and air space of 6 mm. shall be left at the end and sides wherever practicable and necessary in the opinion of the Engineer.

Workmanship - All woodwork shall be neatly and truly finished to the exact dimensions required. Unless otherwise required in the special provisions, woodwork which will remain exposed to view when the work is completed shall be accurately planed to the required dimensions perfectly smooth and to lines, planes or curves as required. Unless otherwise specified all joints shall be simple tenon and mortise joints with the end of the tenon exposed to view. All mortise, tenon and other joints shall fit truly and fully without

wedging or filling, in a workmanlike manner. Only where specially required, the end of the shall not show. All joints shall be of the types shown on the drawing or specified for the item and as directed by the Engineer. Where no specific instructions are given to the contractor, he shall observe the following principles in forming joints :-

1) To cut the joints and arrange fastenings so as to weaken as little as possible the pieces of timber they connect.

2) To place each abutting surface in a joint as nearly as possible perpendicular to the pressure it has to transmit.

3) To form and fit accurately ever pair of surfaces that come in contact.

All framed joinery, for external work shall be put together with white lead and joints pinned with hardwood or bamboo pins. for internal work where joints are not likely to be affected by moisture, the joints may be glued and similarly pinned. Where ordered, the butt joints shall be cross tongued and tongues cut at right angles or diagonally to the grain of the wood. All moulding shall be cleaned and accurately finished and all metres, etc., shall be properly met. Where turning is required it shall be done to the exact shapes shown in the drawings.

Framing - Framed woodwork includes all sawing, cutting, planing, jointing, framing, supply and use of all straps, bolts, hold fasts, nails, trenails, spikes, screws, etc., necessary for framing and fixing.

Framing and trussing are to be done in the best possible manner and all necessary ties, straps, bolts, screws, etc., fitted as shown on the drawings or as directed by the Engineer.

Holes of correct size shall be drilled before inserting screws. Driving in or starting the screws with hammer is prohibited. All screws shall be dipped in oil before inserted in the

wood. the kind of nails and screws shall be to the approval of the Engineer. The heads of nails or screws shall be sunk or dealt with as the Engineer may direct.

Scaffolding - The contractor will provide all labour, scaffolding ladders and tackle necessary for hoisting and fixing woodwork in position and afford facilities for its inspections during constructions. He is also responsible to see that the tackle and scaffolding, etc., are of the requisite strength and that the work is secured in a proper manner during inspection. The contractor shall be responsible for the safety of the work, workman and for action or compensation that may arise in this connection.

Iron work - All iron-work connected with woodwork and going to be embedded in masonry shall before erection, receive 2 coats of hot coaltar. If it is to be painted, it shall be given t5he first 2 coat on the ground before being fixed in position and the third coat afterwards.

Precautions against fire - No woodwork of any kind shall be laid within 60cm. of a fire place or fuel. During the progress of work all shavings, cutting and other rubbish shall be cleaned away as the work progresses, and all precaution shall be taken against fire. No rubbish shall be left under floor boards or in other concealed position on the job.

Inspection - All woodwork shall be inspected and pass by the Engineer before being put in to the work. The Engineer shall not be barred from rejection any wrought timber on account of defective quality by reason of his having previously passed the same before had been worked upon. In no case woodwork shall be painted or otherwise treated before it is inspected and approved by the Engineer.

All woodwork in a building shall after it has been passed by the Engineer, have the primary coat of paint put on or otherwise treated before being fitted in position. The subsequent coat of paint or other finish shall be applied after the woodwork is fixed in position.

Defective-work - If within three month after the work is completed any under shrinkage or bad workmanship is discovered the contractor shall forthwith replace or refix the same to the satisfaction of the Engineer without extra charge.

Item to include –

(1) Supply of specified species of timber sawn to requisite sizes without any defect, wrought, framed and fixed in position with the required standard of workmanship including supply and fixing of fixture, straps, bolts, holdfasts, spikes, nails, screws, etc., applying contractors glue or other joining material, coal-tarring embedded parts and painting joints.

(2) All material, labour. scaffolding, use of equipment etc., for forming and fixing and completing the item as specified.

(3) Applying two coats of double boiled linseed oil to internal woodwork unless other types of finishing is specified in the special provisions.

Mode of Measurement and payment - This will depend upon the item in the tender for which woodwork is executed. All woodwork when put up shall be of the dimensions shown on the drawings or as directed by the Engineer. Woodwork will be paid by net measurements and no allowance will be made for wastage or for dimensions supplied beyond those specified. But the length of each piece shall be measured overall so as to include projection for tenons or tearfs. For curved pieces cut out of the solid, the minimum overall dimensions of the required original rectangular section of scantling will be allowed in the measurements. The3 dimensions of sectional measurement shall be taken correct up to 2mm. and the length will be measured correct up to places of decimal of a metre. The quantity shall be calculated to three places of decimal of a

cubic metre. When the schedule calls for supply of wrought timber, the rate shall as in all other cases include carriage to and delivery at the site of work.

B.21. OIL PAINTING

Material and accessories -

Oil paints - Oil paints shall conform to specification No. A.17. All paints shall be thoroughly stirred with a clean stick before use. While being used the paint shall be stirred often to keep the pigment in uniform suspension. Ready mixed (factory mixed) paints only shall be used unless other type are specifically mentioned. Sample colour boards shall be prepared by the contractor and got approved by the Engineer before painting is started.

Brushes - Unless other methods of application like spraying are specified paint shall be applied with brushes. On no account shall be rags be used in the application of paints. The size of brushes to be used for painting of various works shall be got approved by the Engineer. All brushes shall be either round or oval shaped. Flat brushes when specifically authorised by the Engineer in writing shall not be over 8cm. wide.

Containers - The paint while being applied shall be kept in shallow pans and not in deep cans and must be kept well stirred. All paint cans must be cleaned out at the end of each day's work.

Scaffolding - Scaffolding if necessary shall be as per B.9.11.

Precautions in using lead paints –

(1) White lead, sulphate and all products containing those pigments (but not while pigments containing not more than 2 per cent. of lead) shall be used in internal painting of building except for priming coat and artistic painting or fine lining work.

They shall be as far as possible used in painting operations in the form of paste or ready mixed paint and measures shall be taken whenever practicable, to prevent danger arising from the application of the paint in the form of spray or by dust caused by rubbing down and scraping.

(2) Paint workers must be warned to avoid getting smeared with the above paints.

Cleaning - Cleaning operations shall precede painting so that paint may be applied to clean surfaces. The work shall be carried out in such a manner that dirt and matter removed by cleaning will not come in contact with freshly applied paint. The method to be applied for cleaning and preparing surfaces for painting shall be mentioned in the specifications for each type of surface. When not so mentioned, any suitable method approved by the engineer for exposing the original surface without damage shall be adopted.

Application - The primer coat of paint shall be applied as soon as possible after the surface has been cleaned before deterioration of the surface by rust(in case of steel surfaces) and contamination of the surface by dust, dirt or any other foreign material for all surfaces. Preferably painting should be done immediately; after cleaning on the surface with salts, acids, alkali or other harmful materials before the painting coat is applied and between the application of the remaining coats of paints, the surfaces shall be cleaned again.

Paints shall not be applied when the air is misty or atmospheric conditions are such as to promote condensation or in the opinion of the Engineer, the conditions are otherwise unsatisfactory for the work. Painting shall normally be done only in dry weather. It shall not be applied upon damp and moist surfaces:

Spraying or bushing may apply paint. Unless otherwise specified paint shall be applied with brushes. Paint shall be worked into all crevices and corners where possible and surfaces not accessible to brushes shall be painted by sheepskin or spray or any other method

approved by the Engineer. All runs or sags shall be brushed out. Painting shall be one in a neat and workmanlike manner. Paint shall be applied so as to produce a uniform even coating over the entire surface, free from streaks, pitting, wrinkles or other irregularities.

The number of priming and finishing coat shall be as specified for the particular item. Sufficient time shall be allowed for one coat of paint to dry before the next is applied.

Protection - Painted surface shall be protected from sun, rain, condensation, contamination or surface damage until it is dry to the fullest extent. Boards indicating " Wet Paints" shall be put up where necessary.

B.21.(a) Painting Iron and Steel work - In addition to specifications for oil painting " General" the following shall apply for painting Iron and Steel Work:-

B.21.(a).1. Operation and workmanship for painting Iron and Steel work shall be as per I.S. 1477 (Part I)-1959. code practice for finishing of Iron and Steel in Buildings, painting and allied finishes : subject to the following:-

(1) The method of preparation of the surface for painting shall be as specified in the special, provisions for each item and as in B.21.4. Where Iron and Steel woks need repainting (as maintenance), instructions detailed in clause 8 of I.S.1477 (part I) shall be followed.

(2) Red lead paint shall be used for primer coat unless other paints are specified. The number of primer coats shall be given in detailed specifications for each item. When not given it shall be one coat.

(3) Intermediate protective treatments (pre-treatments) shall be omitted unless specified in the special, provisions.

(4) The finishing coats shall be of the paint as specified for each item by the Engineer. The number of finishing coats of the required shade of colour shall also be specified for each item separately. They shall be two when the number is not specified.

(5) Actual date of painting girders, steel tanks and other steel structures shall be neatly marked by the contractor on the structure according to the instructions of the Engineer.

B.21.(b). Painting New Wood Work - In addition to specifications for `oil painting General`, the following specifications shall also apply for painting new woodwork:-

B.21.(b).1. Paint shall not be applied to a woodwork which is not well seasoned. The surface to be painted must be thoroughly dry, clean, and smooth Woodwork must be passed by the Engineer before any paint is applied.

B.21.(b).2. Preparation of surface - Before any paint is applied the woodwork shall be finished smooth with the plane. The surface shall then be rubbed smooth with sand paper first with coarse grade about 2+1/2 and then finished with a medium grade paper say 1+1/2. Sand papering must be finished with grain. when finished, no scratches from the coarse paper should show.

Before priming coat is applied, the knotting shall be done by one of the following methods as directed by the Engineer:-

(1) Ordinary or size knotting:- This shall be applied in two coats. the first to be made by grinding red lead in water and mixing it with strong glue size, used hot. The second coat shall be of red lead ground in linseed oil and thinned with boiled linseed oil and turpentine.

(2) Lime coating:- Cover the knot with hot lime and leave on for 24 hours; then scrape off and coat the surface with size knotting as above.

(3) Patent knotting:- This consists of 2 coats of a varnish made by dissolving shellac in

methylated spirit of wine.

B.21.(b).3 Printing coat - After preparing the surface of woodwork as above, priming coat shall be applied.

Priming coat shall be as follows:-

(a) On inside woodwork:- It shall consists of 0.25 kg of red lead + 4 kg of white lead + 1.14 litres of boiled linseed oil + 0.57 litre raw linseed oil + 40 gm. of litharge or patent driers and shall be applied before the woodwork is fixed in place.

(b) On outside woodwork:- It shall consists of 4.5 kg of white lead + 2.28 litres of raw linseed oil + 27 gm of red lead + 54 gm of litharge or patent driers and shall be applied before the woodwork in fixed place.

B.21.(b).4. Stopping - After priming, all small holes, cracks, open joints and similar minor defects of every kind if already allowed by the Engineer to remain, shall be stopped with putty made from pure whiting mixed to the proper consistency with raw linseed oil, a little white lead being worked in after mixing to help the hardening of the putty. On no account putty is to be used before the priming coat is put on.

B.21.(b).5. Additional coats - After applying priming coats, the work shall be lightly rubbed down smooth with sand paper and the subsequent coats of paint of the specified shade approved by the Engineer, shall be applied. The paint shall be applied with brushes. It shall be spread as smoothly as possible with brush by means of crossing (at right angles to the grain) and then laying of with the brush in the direction of the grain over the crossing. the final coat shall be very carefully crossed and laid off so that the brush marks are not visible. Each coat of paint shall be allowed to dry thoroughly and shall lightly rubbed down before the next is laid. Every coat shall be passed by the Engineer before the next is laid on it. The finished surface shall not show any hair marks, ridges, or dry patches of paints, and no puddles shall be left in the corners of panels, and angle of moulding.

For new wood work exposed to the weather unless the number of coats of paint is mentioned in the special provisions three coats of paints shall be applied exclusive of the priming coat. In the interior of the building 2 coats shall suffice.

B.21.(b).6. Embedded timber - The outsides of the chowkats of the doors and windows as also other timber embedded in masonry shall be given two coats of hot coal-tar before erection. This is incidental to the item and shall not be paid separately.

B.21.(c). Repainting old wood work - In addition to specification for " oil painting General " the following specification shall also apply for repainting old wood work:-

B.21.(c).1. Cleaning the surface - All the paint shall be removed either by scraping, burning or by a paint remover as ordered by the Engineer. Following precautions shall be taken :-

(1) While removing paint by burning by using a blow lamp, particular care shall be taken to avoid burning wood work. If any wood work is found to be charred it will be replaced at the cost of the contractor.

(2) In the event of a paint remover containing alkali being used, the surface, shall subsequently be washed down with a weak acid such as dilute vinegar, so as to neutralise he alkali.

(3) While removing paint by scraping, care shall be taken not to damage the underlying surface of wood.

The surface shall then be rubbed down smooth with sand paper.

B.21.(c).2. Priming coat - the priming coat shall then be applied as specified for painting in B.21.(b).

B.21.(c).3. Stopping - After priming, the defects shall be stopped with putty .

B.21.(c).4. Finishing - The surface shall again be lightly rubbed smooth with sand paper and specified number of coats of required shade of paint shall then be applied as specified above or ordered by the Engineer.

B.21.(d). Painting plastered surface - In addition to the specifications for " Oil painting General" the following specifications shall also apply for painting plastered surfaces:-

B.21.(d).1. New plaster shall not be primed or painted till it is completely dry and hard.

B.21.(d).2. Preparation of surface - The surface shall be carefully rubbed smooth and thoroughly cleaned with clean fresh water. Supplementary specifications if any, will be laid down in the special provisions for the item according as the particular nature of the surface to be painted, requires. The surface shall be dry, smooth, clean, and free from dirt.

B.21.(d).3. Priming coat - This shall consist of equal parts of white and red lead mixed in boiled linseed oil to the required consistency applied uniformly over the surface. When this coat is dry, all cracks, holes and other such defects shall be filled with a mixture of one part white lead and three parts ordinary putty. the surface shall then be rubbed down with sand paper and dusted clean.

B.21.(d).4. Finishing coats - It may be necessary to give four coats of paints over the priming coat. The first coat shall be thin so that plaster may be thoroughly saturated. The

second coat shall be thicker and shall contain a small quantity of turpentine with some of the colouring pigment. The third coat also shall be thicker having equal parts of linseed oil and turpentine. The last coat shall be as specified for each item of painting. Walls and ceilings shall be given a flat finish as glossy finishing coat shows up the irregularities in the plaster.

The paint shall be applied with brushes. It shall be spread as smoothly as possible.

STANDARD SPECIFICATIONS FOR CEMENT

SPECIAL TESTS

Sr. No.	Name of test	Specified results OPC	PPC	Frequency and Remarks
	Ratio of percentage of lime to percentage of silica Alumina and iron oxide	> 1.02 < 0.66		Since cement leaving the factory undergoes Q.C. tests generally cement is not required to be tested chemically. However, in case of doubtful quality, the cement may be got tested chemically
	Ratio of % alumina to that of iron oxide	< 0.66		
	Weight of insoluble residue	> 1.5 %	* < $x+2.0\frac{(100-x)}{100}$	
	Weight of magnesia	> 6%	< 6 %	
	Total sulphur content Calculated as suphuric anhydride	> 2.75 % SO_3	< 2.75 %	
	Total loss on ignition	> 5 %	5 %	

* Where X(i) declared percentage of pozzolona in given cement.

SPECIAL TESTS		OPC	PPC	
Fineness Test				
a)	After sieving the residue by weight on 90 micron / Indian standard sieve	> 10 %	> 5%	As per requirement.
	Blaines air permeability method specific surface Cm^2/gm	< 22.50	< 3000	As per requirement.

Contractor No of correction University Engineer

	OPC	PPC

Soundness test by Le Chatelier method Expansion	> 10 mm	> 10 mm	The Le Chatelier method may be used for cement having magnesia content of less than 3%. For magnesia of more than 3% the cement will be tested by Auto Clave Test where expansion. > 0.8%
Setting time by Vicats apparatus a) Initial Setting time in minutes	< 30 minutes		< 30 For each consignment of cement
b) Final setting time minutes	< 600 minutes	< 600 minutes	For each consignment of cement
Compressive strength of at least 3 mortar cubes (area of face 50 Sq.Cm.) composed of one part of cement 3 parts of standard sand and P/4 + 3 % (of Combined mass cement plus sand) water Where P = % of water required to produce a paste of standard consistency.			
a) 72 Hr. ± 1 Hrs.	< 160Kg/Cm^2		
b) 168 Hr. ± 2 Hrs.	< 220Kg/Cm^2 Kg/Cm^2		< 220
c) 672 Hrs.	Not specified	< 310 Kg/Cm^2	
If single size Encore sand is used. a) 72 Hr. ± 1 Hrs.	< 115 Kg/Cm^2		For PPC average drying shrinkage of mortar shall not be more than 0 - 15 %
b) 168 Hr. ± 2 Hrs.	< 175 Kg/Cm^2		

FIELD TEST ON CEMENT

[A] FIELD TESTS FOR FINDING OUT ADULTERATION OF CEMENT WITH STONE OR COAL DUST

1) **Purpose of the test -** The aduitoeration tests are required to be done to ascertain that cement is free from any adulteration.

a) A sample of cement shall be heated on a steel plate for 20 minutes on a stove. The adulterated sample changes its colour.

b) A normal solution of HCL shall be added to an equal volume of water and the resultant soultion shall be slowly added to small quantity of cement of about 10 gms taken in a test tube. If any large insoluble residue is noticed it indicates presence of siliceous materials. Efflorescence and frothing indicates presence of admixture of lime stone dust.

c) A small quantity of cement is taken in a test tube or a measuring cylinder and water added till the container is half full. The mixture is shaken and allowed to settle for few minutes. The Cement particles settle down and the coal ash particles are found to be floating or in suspension as they are lighter.

SCHEDULE B&C

Name of work :- Colouring and Repairing in Agriculture Technical School Selsura, Dist. Wardha Under Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola.

Item No.	Particulars of Item	Qty.	Rate	Unit	Amount
1	Providing and applying plastic emulsion paint of approved quality, colour and shade to old and new surfaces in two coats including scaffolding, preparing the surface. (excluding the primer coat)etc. complete S.S.R. It. No. 36.12 Page No. 227	762.72	80.00	Sqm	61018.00
2	Providing and applying Two coats of wall care Putty on plastered surface and Ceiling and Walls to prepare surface even and smooth of approved make, etc complete. S.S.R. It. No. 32.34 Page No. 212	25.20	90.00	Sqm	2268.00
3	Providing and applying two coats of flat oil paint of approved colour and shade to internal / external plastered surfaces including scaffolding if necessary, cleaning and preparing the surface (excluding primer coat) etc. complete S.S.R. It. No. 35.12 Page No. 224	82.32	101.00	Sqm	8314.00
4	Providing internal cement plaster 12mm thick in single coat in cement mortar 1:5 without neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing etc. complete S.S.R. It. No. 32.03 Page No. 209	0.71	0.00	Sqm	0.00
5	Providing and applying two coats of lead/zinc base oil paint/bituminious paint of approved colour and shade to old **wood work** and fiber boards previously painted including if necessary scaffolding, preparing the surface excluding priming coat etc. complete S.S.R. It. No. 35.03 Page No. 223	31.50	72.00	Sqm	2268.00
6	Providing and fixing heavy duty inter locking concrete Coloured paving blocks of 60 mm thickness of having a strength of 300 Kilogram/Sq.cm. of approved quality and shape on a bed of crushed sand of 25 to 30 mm thick including skirting joints and cleaning etc. complete S.S.R. It. No. 33.51 Page No. 218	82.50	919.00	Sqm	75818.00
7	Excavation for foundation in earth, soil of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 m. beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (Lift upto 1.5 m.) By Mechanical Means S.S.R. It. No. 21.02 Page No.153	2.03	207.00	Cum	419.00
8	Providing and laying Cast in situ/Ready Mix cement concrete in **M-10** of trap/granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, Steel centering, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade) S.S.R. It. No. 24.01 Page No.175	0.68	0.00	Cum	0.00
9	Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete. S.S.R. It. No. 26.33 Page No.139	0.11	0.00	MT	0.00

10	Providing and laying Cast in situ/Ready Mix cement concrete M-20 of trap / granite/quartzite/ gneiss metal for R.C.C. **beams** and lintels as per detailed designs and drawings or as directed including steel centering, formwork, cover blocks, laying/pumping, compactionand roughening the surface if special finish is to be provided and curing etc. complete. (Excluding reinforcement and structural steel). with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade) S.S.R. It. No. 25.50 Page No.181	1.19	0.00	Cum	0.00
11	Providing and applying two coats of exterior acraylic emulsion paint confirming to corresponding I.S. of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface, applying primer coat ,scaffolding if necessary , and watering the surface for two days etc complete S.S.R. It. No. 35.25 Page No. 225	281.18	261.00	Sqm	73387.00
12	Providing and fixing sheet glass of 24 oz. for all size including putty etc. complete SSR It. No. 39.28 P.No. 249	1.35	0.00	Sqm	0.00
				Total	**223492.00**

Schedule B

SD/-
Deputy Engineer
Construction Sub Div -I Nagpur
Dr.PDKV.,Akola

SD/-
University Engineer
Dr.PDKV.,Akola