

NTS

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**SHREE SOMNATH TRUST
PRABHAS - PATAN
SOMNATH**

**NOTICE INVITING TENDER
(INVITATION TO BID)**

I/s General manager, Shree Somnath trust invites sealed item rate tender from reputed eligible contractors for furnishing the necessary labour, material, equipments and services for construction and completion of the following works:

1. Name and place of work : CIVIL,STRUCTURAL AND INTRNAL ELECTRIFICATION WORK FOR 8 NOS STAFF QUARTERS AT SOMNATH & 6 NOS STAFF QUARTERS AT BHIDIYA PRABHAS PATAN & UNDER GROUND WATER TANKS FOR BOTH SITE AT PRABHAS PATAN SOMNATH TA.VERAVAL DIST. GIR, SOMNATH
2. Name of owner : Shree Somnath Trust, Prabhas – Patan, Somnath. Pin: 362268
3. Address of Communication : I/s General Manager, Shree Somnath Trust, Prabhas – Patan, Somnath. Pin:362268
4. Estimated Cost : **Rs.2,00,00,000/- Amount in(Rs. Two Crore.only)**
5. Earnest Money Deposit (E.M.D.) : **Rs. 2,00,000/-**(Refundable) Amount in(Rs Two lac only) payable in the form of A/c payee Demand draft in favor of Shree Somnath Trust **Payable at Prabhas Patan. Somnath.**
6. Time Limit : **12 (Twelve) Months**
7. Minimum value of work for Interim certificate : Rs. 20,00,000.00 (Rupees Twenty Lac only)
8. Tender Document : Available on web site:- www.somnath.org
9. Tender sale and place : From Dt 27/03/2017 to 20 /04/2017
(1) Only Available on www.somnath.org and also at
10. Last Date & time of Receipt of Tender & Place : To reach by 16.00 Hrs before of Dt . 20 /04/2017 office by registered Post, courier, or by Hand delivery only. At (1) Shree Somnath Trust, Sad vichar parivar, nr.hotel marriot, Sattelite road, Ahmedabad-380 004.

Or (2) I/s General Manager, Shree Somnath Trust, Yatri
Suvridha Mahiti kendra,; Prabhas – Patan, Somnath.
Pin:362268.

11. Time and Date of opening Tender : On Dt. 21/04/17 at 11.00 am In the presence
of those bidders or their authorized representatives
who wish to attend at the place of Tender opening.
(the date can be change if required)
12. Place of Tender Opening : I/s General Manager, Shree Somnath Trust, Yatri
Suvridha Mahiti kendra,; Prabhas – Patan, Somnath.
Pin:362268.
13. Validity of tender rates : 180 days after given the work order.

The I/s General manager, Shri Somnath Trust Prabhas- Patan, Somnath reserves the rights to
reject wholly or partly of any or all tenders received without assigning any reason. Any
tender not accompanied by EMD by demand draft will be summarily rejected.

Issued by

I/s General Manager,
Shree Somnath Trust, Prabhas – Patan,
Somnath. Pin:362268

ISSUE LETTER OF TENDER DOCUMENT

NAME OF WORK : CIVIL,STRUCTURAL AND INTRNAL ELECTRIFICATION WORK FOR 8 NOS STAFF QUARTERS AT SOMNATH & 6 NOS STAFF AT BHIDIYA PRABHAS PATAN & 15000 LIT UNDER GROUND WATER TANKS FOR BOTH SITE AT PRABHAS PATAN SOMNATH TA.VERAVAL DIST. GIR, SOMNATH

The tender document set consisting of drawings and text as shown in the index sheet is issued to :

Name of Tenderer : _____

Address of Tenderer : _____

The fees for this set of tender document is Nil.

Date of sale of tender document vide receipt
No. _____ Date _____

Issued by

For and on behalf of

I/s General Manager

Shree Somnath Trust
" Prabhas-Patan "
Somnath.
Dist.Gir SOMNATH.

Consultants
TORSION ENGINEERS & CONSULTANTS
304,Supath Appt.,
Opp. Rasranjan,
Nr. Vijay Cross Road,
Navrangpura,
Ahmedabad - 380009.
Phone No.079-26464361
E-mail : vgstorsion@yahoo.co.in

PROJECT INFORMATION GENERAL

OWNER : Shree Somnath Trust, Prabhas -Patan,
Somnath. Pin:362268

ARCHITECT :
CONSULTANTS : TORSION ENGINEERS & CONSULTANTS
304,Supath Appt., Opp. Rasranjan,
Nr. Vijay Cross Road, Navrangpura,
Ahmedabad - 380009. Ph.079-26464361
E-mail :vgstorsion@yahoo.co.in

PROJECT TITLE : CIVIL,STRUCTURAL AND INTRNAL ELECTRIFICATION WORK
FOR 8 NOS STAFF QUARTERS AT SOMNATH & 6 NOS STAFF AT
BHIDIYA PRABHAS PATAN & 15000 LIT UNDER GROUND
WATER TANKS FOR BOTH SITE AT PRABHAS PATAN
SOMNATH TA.VERAVAL DIST. GIR, SOMNATH.

LOCATION : Site is located at Prabhas patan ,Somnath,
Ta.Veraval

NEAREST : Veraval Railway Station
RAILWAY STATION

ACCESS ROADS : Site is directly accessible by road

NATURE OF SOIL : Tenderer shall collect this data when they
visit the site

WATER TABLE : Tenderer shall acquaint themselves with
site condition before bidding.

PLANNED COMMISSIONING:
DATE : 12(twelve)Months from the date of notification of
award which shall include the non-working
periods during monsoon and festivals.

SITE CONDITIONS : Collection of Data, tenderer's responsibility
The tenderer shall acquaint himself with the
topographical and other site condition prevailing
at the site.
Tenderer shall visit the site to check the
actual site conditions, availability of labour,
communication, transport, accessibility to site,
etc. and these factors shall be taken care of in
the quoted unit rates.
Failure to ascertain such conditions by the
tenderer at the time of tendering shall not
constitute any reason for any dispute later
on as regards the rates etc.

The tenderer shall visit the site and acquaint himself fully of the site and no claims whatsoever will be entertained on the pleas of ignorance or difficulties involved in the execution on work of carriage of materials.

SITE OFFICE :

The owner will at his own discretion and convenience and for duration of the execution of the work make available at site, land for construction of contractor's field office, godown, workshops and assembly yard required for the execution of the contract. The contractor shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement approved by the Engineer-in-charge.

On completion of the work undertaken by the contractor, he shall remove all temporary works created by him and have the site cleaned as directed by Engineer-in-charge. If the contractor fails to comply with these requirements, the Engineer-in-charge at the expenses of the contractor remove such surplus and rubbish material and dispose off the same as he deems fit and get the site cleared as aforesaid ; and the contractor shall forth with pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus material disposed off as aforesaid. But the owner reserves the right to ask the contractor any time during the pendency of the contract to vacate the land by giving 7 days notice on security reasons or on national interest or otherwise.

Water Supply : The contractor shall make his own arrangement at his cost for pumping installations, pipe net work and distribution system from the available source at one point supplied by the Client and 0.5% will be deducted on total amount of work done from each running & final bill of the contractor.

Power Supply : Power source shall be given at site by the client at one point. Contractor will make his own arrangements for power consumption and net work at his own cost. The temporary lines shall be removed by the contractor after the completion of the work or if there is any hindrance to other works due to the alignment of these lines and 0.5% will be deducted on total amount of work done from each running & final bill of the contractor.

Mobilization Advance : No Mobilization advance shall be given. Contractor will make his own arrangements for fund to initiate the work.

SECTION 1. INSTRUCTIONS TO BIDDERS

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SECTION I - INSTRUCTIONS TO BIDDERS

A. GENERAL

1.0 General Information

1.1 Description of Works : CIVIL, STRUCTURAL AND INTERNAL ELECTRIFICATION WORK FOR 8 NOS STAFF QUARTERS AT SOMNATH & 6 NOS STAFF AT BHIDIYA PRABHAS PATAN & 15000 LIT UNDER GROUND WATER TANKS FOR BOTH SITE AT PRABHAS PATAN SOMNATH TA. VERAVAL DIST. GIR, SOMNATH.

1.2 Owner : SHREE SOMNATH TRUST, PRABHAS- PATAN

1.3 Location and Area : Somnath, - Veraval Road,
Dist. GIR SOMNATH.

(a) Nearest Railway Station : Veraval

(b) Nearest Airport : Diu

(c) Nearest Major Town : Veraval

(d) Access Roads : Junagadh - Veraval Road

1.3 Period of Completion : The period of completion shall be 12 (SIX) months from the date of notification of award which shall include the non-working periods during monsoon and festivals.

2.0 Source of funds : "SHREE SOMNATH TRUST" has arranged funds for the execution of project.

3.0 Eligibility and Qualification requirements:-

For the purposes of this Contract, bidders shall meet the following qualifying criteria as minimum:

3.1 The bidder should be in business as civil works Contractor for a minimum period of five years at the time of bid opening in the same name and style.

3.2 The bidder's annual financial turnover in the same name and style during any one of the last three year shall not be less than 1.20 crore of the value of the Contract as specified in the Invitation to Bid.

3.3 The bidder, in the same name and style, shall have completed at least two projects of similar nature and of value 0.60 crore of the estimated value of the Contract, for which this Invitation to Bid is issued, during the last three years.

- 3.4 Contractor shall be registered with state Government Class 'B', Or above or equivalent.
- 3.5 The bidder shall furnish a certified true copy of the Income tax Returns of the last three year(s) along with Permanent Account Number of Income Tax (PAN), service tax number.
- 3.6 Solvency certificate for at least 20% of the Contract value in the relevant financial year.
- 4.0 Cost of Bidding
The bidder shall bear all costs associated with the preparation and submission of his bid and the SHREE SOMNATH TRUST, PRABHAS-PATAN here in after referred to as "SHREE SOMNATH TRUST" will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.
- 5.0 Site visit :-
- 5.1 The bidder is advised to visit and examine the site of works and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into a Contract. The costs of visiting the site shall be at bidder's own expense.
- 5.2 The bidder and any of his personnel or agent(s) will be granted permission by the SHREE SOMNATH TRUST to enter upon the premises and lands for the purpose of such inspection, but only upon the express condition that the bidder, his personnel or agent(s), will release and indemnify the SHREE SOMNATH TRUST and his personnel and agent(s) from and against all liabilities in respect thereof and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss or damage, costs and expenses however caused, which, but for the exercise of such permission would not have arisen.
- 5.3 R.O.STANDS FOR RATE QUOTED ONLY.
This is the item rate tender and the rate quoted shall include the cost of all the material, labor and all the expenses incurred bidder for executing the such items as per specifications given in bills of quantities and in detailed specifications and shall include the reasonable profit, all taxes etc all. Nothing shall be paid extra once the tender is accepted and work is entrusted to the successful tenderer.

B. BIDDING DOCUMENTS

6.0 Contents of Bidding Documents

6.1 The set of Bidding documents issued for the purpose of bidding includes the number of copies as stated below, together with any Addenda thereto issued in accordance with clause-8 and any minutes of the pre-bid meetings issued in accordance with clause-16.

Number of copies	Volume	Section	Description
1	I	0	Issue letter of Tender Document & Invitation to Bid
		I	Instruction to bidders
		II	General Conditions of Contract
		III	Special Conditions of Contract
		IV	Technical Specifications
		V	Form of Bid
		VI	Schedule of Rates for Labor & Materials
		VII	Schedules of Supplementary Information
		VIII	Form of Agreement
		IX	Acceptable forms of Bank Guarantees.
	II	X	Schedule of Quantities
		XI	Drawings

6.2 The Bidder is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Pursuant to clause-25, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

7.0 Clarification of bidding documents

A prospective bidder requiring any clarification of the bidding documents may notify the SHREE SOMNATH TRUST in writing or by telegram at the address of communication indicated in the Invitation to bid. The SHREE SOMNATH TRUST will respond in writing or by telegram to any request for the clarification which is required earlier than 10 days prior to the dead line for the submission of the bids. Written copies of the response of the SHREE SOMNATH TRUST (including a description of the enquiry without identifying its source) will be sent to all prospective bidders who purchased the bidding documents.

8.0 Amendment of bidding documents

8.1 At any time prior to the dead line for the submission of bids, the SHREE SOMNATH TRUST may for any reason whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding document by the issuance of amendment.

8.2 The amendment will be sent in writing or by telegram/telex to all prospective bidders who have purchased the bidding documents and will be binding upon them. Prospective bidders shall promptly acknowledge receipt thereof by telegram/telex to the SHREE SOMNATH TRUST. However, the late receipt of the amendments by the prospective bidder due to postal delays shall not bind the SHREE SOMNATH TRUST to extend the deadline for the submission of the bids. The amendment will be attached to the bidding document sold subsequently.

8.3 In order to afford prospective bidders reasonable time in which to take an amendment into account in preparing their bids, the SHREE SOMNATH TRUST may, at its discretion, extend the deadline for the submission of bids in accordance with clause-19.

C. PREPARATION OF BIDS

9.0 Language of Bid

The bid prepared by the bidder and all correspondence & documents relating to the bid exchanged by the bidder and the SHREE SOMNATH TRUST shall be written in the English language. Supporting documents and the printed literature furnished by the bidder with the bid may be in another language provided they are accompanied by an appropriate translation of pertinent passage in the above stated language. For the purpose of the interpretation of the bid, the English language shall prevail.

10.0 Documents comprising the Bid:-

The bid to be prepared by the bidder shall comprise the following;

- (a) the form of bid Appendix there to; (sec v)
- (b) Earnest Money Deposit (EMD)
- (c) the Schedule of Quantities;
- (d) the Schedules of supplementary information, the information on eligibility and qualifications;
- (e) alternative offers where invited, and any other materials required to be completed and submitted in accordance with the Instructions to Bidders embodied in these bidding documents.

The forms, Schedule of quantities and Schedule provided in this volume of the bidding document shall be used without exception (subject to the extension of the Schedules in the same format and to the provisions of sub-clause 14.2 regarding the alternative forms of Bid Security.)

11.0 Bid Prices

11.1 Unless stated otherwise in the bidding documents, the Contract shall be for the whole works as described in the Invitation to bid based on the schedule of unit rates and prices submitted by the bidder.

11.2 The bidder shall fill in rates and prices for all items of works described in the schedule of quantities, whether quantities are stated or not. Items against which no rate is entered by the bidder shall not be paid for by the SHREE SOMNATH TRUST when executed and shall be deemed to have covered by the other rates in the schedule of quantities.

11.3 All duties, taxes and other levies shall be payable by the bidder under the Contract or for any other cause, shall be included in the rates and the prices and total bid price submitted by the bidder and the evaluation and the comparison of bids by the SHREE SOMNATH TRUST shall be made accordingly.

11.4 Fixed prices

The rates and prices quoted by the bidder shall be fixed for the duration of the Contract and shall not be subjected to adjustment on any account. A bid submitted with any price adjustment condition shall be treated as non-responsive and rejected, pursuant to clause 25 of this section.

11.5 Price Adjustment

The rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract, if the duration of the contract, as stated in the Invitation to Bid is more than 12 months. The price adjustment provision shall not be taken into consideration in Bid Evaluation, pursuant to clause 28 of this section.

12.0 Currency of Bid & payment

The unit rates and prices shall be quoted by the bidder entirely in Indian currency and all payment shall be made in Indian currency only.

13.0 Bid Validity :

13.1 Bids submitted shall remain valid for acceptance for a period of 90 days from the date of bid opening.

13.2 In exceptional circumstances, prior to expiry of the original bid validity period, the SHREE SOMNATH TRUST may request the bidder for a specified extension in the period of validity. The request and the response thereto shall be made in writing or by telegram/telex. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request shall not be permitted to modify his bid, but shall be required to extend the validity of his bid security correspondingly. The provisions of clause 14 shall continue to apply during the extended period of bid validity.

14.0 Bid Security: (Earnest Money Deposit)

14.1 The bidder shall furnish, as part of the bid, a bid security for the amount as specified in the Invitation to bid.

- 14.2 The bid security shall be in the form of a Bank Draft or a Pay Order drawn in favor of SHREE SOMNATH TRUST, PRABHAS-PATAN payable at any Schedule Bank at Somnath.
- 14.3 Any bid not accompanied by an acceptable bid security pursuant to clause 14.1 and 14.2 hereof shall be rejected by SHREE SOMNATH TRUST as non-responsive.
- 14.4 The bid securities of the unsuccessful bidders shall be refunded as promptly as possible, but not later than 30 days after the expiry of the period of bid validity as prescribed in these documents.
- 14.5 The bid security of the successful bidder(s) shall be refunded when the bidder has signed the Agreement and furnished the required performance security.
- 14.6 No interest shall be paid by the SHREE SOMNATH TRUST on the bid security furnished by the bidder.
- 14.7 The bid security may be forfeited :
- (a) If a bidder withdraws his bid during the period of bid validity; or
 - (b) in the case of a successful bidder, if he fails within the time limit to:
 - (i) sign the agreement, or
 - (ii) furnish the required performance security

15.0 Variations in Bidding conditions

- 15.1 The bidder shall submit offer which comply fully with the requirements of the bidding documents, including the basic technical design as indicated in the drawings and specifications. Conditional bids are liable to be considered as non-responsive in accordance with clause-25.

16.0 Pre-Bid Meeting

Not Applicable

17.0 Format and signing of Bids

- 17.1 The bidder shall prepare and submit the original copy of the documents comprising the bidding documents purchased by him.
- 17.2 All pages of the bidding documents shall be signed by person(s), duly authorized, to bind the bidder to the Contract. Proof of authorization shall be in the form of a written power of attorney which shall accompany the bid. All pages of the bid documents, where entries and amendments had been made, shall additionally be initialed by the person(s)

17.3 The complete bid shall be without alterations, interlineations or erasures, except those in accordance with instructions issued by the SHREE SOMNATH TRUST, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person(s) signing the bid. No over writing shall be permitted.

17.4 Only one bid may be submitted by each bidder. No bidder may participate in the bid of another for the same Contract in any relation whatsoever.

17.5 The bidder shall quote the rate of each item both in figures and words.

D. SUBMISSION OF BIDS

18.0 Sealing and marking of bids

18.1 The bidder shall seal the bid in an inner and an outer envelope, duly marking the envelopes as "ORIGINAL".

18.2 The inner and the outer envelopes shall be addressed to the address as given in the address for communication in Tender Notice shall bear the following identifications:

- (i) Name of the Works - as stated in the clause 1.0 of Invitation to Bid.
- (ii) Words "DO NOT OPEN BEFORE" (Mention the date and time of opening of the bid as given in Invitation to Bid.)

18.3 The inner envelope shall indicate the name and the address of the bidder to enable the bid to be returned unopened in case it is declared late or is otherwise unacceptable.

18.4 If the outer envelope is not sealed and as marked as instructed above, the SHREE SOMNATH TRUST shall not assume any responsibility for the misplacement or premature opening of the bid submitted. A bid opened prematurely for this cause will be rejected by the SHREE SOMNATH TRUST and returned to the bidder.

19.0 Deadline for Submission of bids

19.1 Bids must be received by the SHREE SOMNATH TRUST at the address of communication on or before the date & time of submission as stated in the Invitation to Bid.

19.2 The SHREE SOMNATH TRUST may, at its discretion, extend the deadline for the submission of bids by issuing an amendment in accordance with clause 8 hereof, in which case all rights and obligations of SHREE SOMNATH TRUST and the bidders previously subject to the original deadline shall thereafter be subject to the new deadline as extended.

20.0 Late Bids

20.1 Any bid received by the SHREE SOMNATH TRUST later than the dead line for the submission of bids as prescribed by the SHREE SOMNATH TRUST in accordance with clause 19 shall be returned unopened to the bidder.

21.0 Modification and Withdrawal of Bids

21.1 The bidder may modify or withdraw his bid after bid submission provided that the modifications or notice of withdrawal is received in writing by the SHREE SOMNATH TRUST prior to the prescribed dead line for the submission of bids.

- 21.2 The bidder's modification or notice of withdrawal shall be prepared, sealed, marked and delivered in accordance with the provisions of clause 18 for the submission of bids, with the inner envelope additionally marked "MODIFICATION" or "WITHDRAWAL" as appropriate.
- 21.3 Subject to clause 24, no bid shall be modified subsequent to the deadline for the submission of bids.
- 21.4 Withdrawal of the bid during the interval between the dead line for the submission of bids and the expiry of the period of bid validity shall result in the forfeiture of the Bid Security pursuant to clause 14.

E. BID OPENING AND EVALUATION

22.0 Bid Opening

22.1 The SHREE SOMNATH TRUST will open the bids, including submissions made pursuant to clause 21, at the office of the SHREE SOMNATH TRUST, PRABHAS-PATAN SOMNATH in the address of the communication at the time and date stated in the Invitation to Bid if possible or any subsequent date as may be decided by SHREE SOMNATH TRUST. The bidder's representatives who are present shall sign a register evidencing their attendance.

22.2 Bids for which an acceptable notice of withdrawal has been submitted pursuant to clause 21.0 shall not be opened. The SHREE SOMNATH TRUST will examine the bids to determine whether they are complete, whether the requisite bid security have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

22.3 At the bid opening the SHREE SOMNATH TRUST will announce the bidder's names, the bid prices, written notifications of bid modifications and withdrawals, if any, the presence of requisite bid security, and such other details as the SHREE SOMNATH TRUST may consider appropriate.

22.4 The SHREE SOMNATH TRUST shall prepare, for its own records, the minutes of the bid opening, including the information disclosed to those present in accordance with sub-clause 22.3.

23.0 Process to be Confidential

23.1 After the public opening of bids, information relating to the examination, clarification, evaluation and comparison of bids and recommendations concerning the award of Contract shall not be disclosed to bidders or other persons not officially concerned with such process until the award of

23.2 Any effort by a bidder to influence the SHREE SOMNATH TRUST in the process of examination, clarification, evaluation and comparison of bids and in the decision concerning the award of Contract may result in the rejection of the bidder's bid.

24.0 Clarification of Bids

24.1 To assist in the examination, evaluation and comparison of bids, the SHREE SOMNATH TRUST may ask the bidders individually for clarification of their bids, including break down of unit rates. The request for clarification and the response shall be in writing to confirm the correction of arithmetic errors discovered by the SHREE SOMNATH TRUST during the evaluation of the bids in accordance with clause 26.

25.0 Determination of Responsiveness

25.1 Prior to the detailed evaluation of the bids, the SHREE SOMNATH TRUST will determine whether each bid is substantially responsive to the requirements of the bidding documents.

25.2 For the purpose of this clause, a substantially responsive bid is one which conforms to all terms, conditions and specifications of the bidding documents without material deviation or reservation. A material deviation or reservation is one which affects in any substantial way the scope, quality or the performance of the works or which limits in any substantial way, inconsistent with the bidding documents, the SHREE SOMNATH TRUST's rights or the bidder's obligations under the Contract, and the rectification of which deviation or reservation would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

25.3 If a bid is not substantially responsive to the requirements of the bidding documents, it will be rejected by the SHREE SOMNATH TRUST and may not be subsequently made responsive by the bidder having corrected or withdrawn the non-conforming deviation or reservation.

26.0 Correction of Errors

26.1 Bids determined to be substantially responsive will be checked by the SHREE SOMNATH TRUST for any arithmetic errors in computation and summation. Errors will be corrected as follows:

- a) Where there is a discrepancy between rates or amounts in figures and in words, the rate or amounts in words shall govern and
- b) Where there is a discrepancy between the unit rate and the total amount derived from the multiplication of the unit rate and the quantity the unit rate as quoted shall govern.

26.2 The amount stated in the form of bid will be adjusted by the SHREE SOMNATH TRUST in accordance with the above procedures for the correction of errors and, with the concurrence of the bidder, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, his bid shall be rejected and the bid security shall be forfeited.

27.0 Conversion to Single Currency

27.1 All bid prices shall be submitted in Indian currency only.

28.0 Evaluation and comparison of the Bids

- 28.1 The SHREE SOMNATH TRUST shall evaluate and compare only bids determined to be substantially responsive to the requirements of the bidding documents in accordance with clause 25.
- 28.2 In evaluating bids, the SHREE SOMNATH TRUST will determine for each bid the evaluated price by adjusting the bid price making any correction for errors pursuant to clause 26.0
- 28.3 The SHREE SOMNATH TRUST reserves the right to accept or reject any variation, deviation or alternative offers. Variations, deviations and alternative offers and other factors which are in excess of the requirement of the bidding documents shall not be taken in to account in bid evaluation.
- 28.4 After the evaluating bids and after bringing the tenders of all the bidder at par as per design and drawings envisaged by SHREE SOMNATH TRUST, the first and second lowest bidder will be called for negotiation separately.
- 28.5 If the bid of the successful bidder is seriously unbalanced in relation to the SHREE SOMNATH Trust's estimate of the real cost of the work to be performed under the Contract, the SHREE SOMNATH TRUST may require that the amount of the performance security deposit set forth in the clause 33.0 be increased at the expense of the successful bidder to a level sufficient to protect the SHREE SOMNATH TRUST against financial loss in the event of subsequent default of the successful bidder under the Contract.

F. AWARD OF CONTRACT

29.0 Award Criteria

29.1 Subject to clause 30, the SHREE SOMNATH TRUST shall award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest Evaluated bid price pursuant to clause 28, provided further that the bidder has the capability and the resources to carry out the Contract effectively.

30.0 SHREE SOMNATH TRUST Reserves Right to Accept any Bid and to Reject any or all bids

30.1 Not with standing clause 29 or any other clauses stated above, the SHREE SOMNATH TRUST reserves the right to accept or reject any bid and to annul the bidding process and reject all bids, at any time prior to the award of the Contract, without thereby incurring any liability to the affected bidder(s) or any obligation to inform the affected bidder(s) of the grounds for the SHREE SOMNATH TRUST 's action.

30.2 SHREE SOMNATH TRUST reserves the right to split up the entire work into two parts and to award the contract to two bidders whose bids have been determined to be substantially respective.

31.0 Notification of Award

31.1 Prior to the expiry of the period of bid validity prescribed in the bid documents, the SHREE SOMNATH TRUST will notify the successful bidder by telegram/telex confirmed in writing that his bid has been accepted. This letter (hereinafter and in the Conditions of Contract referred to as "Letter of Acceptance") shall name the sum which the SHREE SOMNATH TRUST will pay to the Contractor in consideration of the execution, completion & the maintenance of the works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of the Contract referred to as the "Contract price")

31.2 The notification of the award will constitute the formation of the Contract.

31.3 Upon the furnishing by the successful bidder of a performance security in accordance with the clause 33 the SHREE SOMNATH TRUST will notify the unsuccessful bidders that their bids have been unsuccessful.

32.0 Signing of Agreement

32.1 At the same time that the SHREE SOMNATH TRUST notifies the successful bidder that his bid has been accepted, the SHREE SOMNATH TRUST will send the bidder the Form of Agreement provided in the bidding documents, incorporating all agreements between the parties.

32.2 Within 15 days of the receipt of the Form of Agreement the successful bidder shall sign the Form and return it to the SHREE SOMNATH TRUST.

33.0 Performance Security

33.1 On the receipt of the notification of award from the SHREE SOMNATH TRUST, the successful bidder shall furnish to the SHREE SOMNATH TRUST a Performance Security for an amount of 2% of the Contract value in the form of bank guarantee or demand draft from nationalize bank in favor of Shree Somnath Trust pursuant to clause 10.0 of General Conditions of Contract.

33.2 Within 15 days of the receipt of the Form of Agreement the successful bidder shall sign the Form and return it to the SHREE SOMNATH TRUST.

33.3. The Earnest Money Deposited by the successful bidder along with the tender shall be converted against the amount of security deposit.

33.4 No interest shall be paid by SHREE SOMNATH TRUST for the sum deposited as Security Deposit.

33.5 Failure of the successful bidder to comply with the requirements of the clause 32 or 33 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.

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SECTION - II GENERAL CONDITIONS OF CONTRACT

DEFINITIONS AND INTERPRETATIONS

- 1.0 In the Contract, as hereinafter defined, the following words and expressions shall have the meanings hereby assigned to them, except where the context otherwise requires:-
- 1.1 OWNER shall mean 'SHREE SOMNATH TRUST' shall include his successors and assignees, as well as his authorized representatives.
- 1.2 CONSULTANT shall mean the Consultants employed by the client.
- 1.3 "SHREE SOMNATH TRUST" shall mean the Shri Somnath Trust, Prabhas - Patan, Somnath, Veraval. May be required to as the OWNER for the project of this tender.
- 1.4 ENGINEER shall mean the Engineer or any other authorized representative of the SHREE SOMNATH TRUST \ Consultant.
- 1.5 Bidder shall be the firm/party/individual who submits the bid against the Invitation to Bid.
- 1.6 Contractor shall mean the successful bidder whose Bid has been accepted by the SHREE SOMNATH TRUST and on whom a work order has been placed and shall include his heirs, legal representatives and assignees.
- 1.7 Sub-Contractor shall mean the person/firm/party named by the Contractor whom a part of the Contract has been sublet with the consent of owner (SHREE SOMNATH TRUST) and shall include his heirs, successors, legal representatives, and assignees.
- 1.8 Contract price/rate shall mean the prices/rates of the accepted Bid.
- 1.9 Contract shall mean the articles of agreement, the conditions, the appendix, the schedule of quantities, and/or specifications attached herewith.

1.10 "Notice in writing"

shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered/ordinary post to the last known address or the registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.

1.11 Site

shall mean the actual place of the proposed project or any other place where work is to be executed under the Contract. It shall also include any other land allotted by the SHREE SOMNATH TRUST for the Contractor's use.

1.12 Month

shall mean from the beginning of a given date of a calendar month to the end of the preceding date of the next calendar month.

1.13 Week

shall mean seven consecutive days.

1.14 Day

shall mean a day from midnight to midnight.

1.15 Building

shall mean the proposed building (s), roads, fencing, sanitary and water supply etc. under the Contract.

1.16 Bid Security

shall mean the sum paid along with the bid as a token to bind the Contract or termed as Earnest Money Deposit.

1.17 Award

shall mean the written acceptance of Bid by the SHREE SOMNATH TRUST given to the successful bidder.

1.18 Performance Security shall mean the amount pledged with the owner while signing the agreement for faithful and satisfactory performance of the Contract.

1.19

whatsoever nature required in or about the execution and maintenance of the Works but does not include the materials or other things required/ intended to form or forming part of the Works.

1.20 Specifications

shall mean the specification referred to in the bid and any modification there of or addition there to as may from time to time be furnished or approved in writing by the SHREE SOMNATH TRUST/Engineer/Consultant.

1.21 Drawings

shall mean drawings referred to in the specifications and any modification of such drawings approved in writing by the Engineer and such other drawings as may from time to time be furnished or approved in writing by the SHREE SOMNATH TRUST/PMC/Engineer/Consultant.

1.22 Temporary Works

shall mean temporary works of every kind required in or about the execution or maintenance of works.

1.23 Permanent Works

shall mean the permanent works to be executed and maintained in accordance with the Contract.

1.24 Works

shall include both temporary works and permanent works.

1.25 Approved/Approval

shall mean approved in writing, including subsequent written confirmation of previous verbal or written approval .

1.26 I.S.S.

shall mean Indian Standard Specifications

1.27 Government

shall mean the Government of India or any other State Government.

1.28 Tender

shall mean the Bid.

1.29 Headings and Marginal notes:

All headings of and notes to the clauses of these Conditions of Contract or of and to the Specifications or any other bid document are solely for the purpose of giving concise indication and not a summary of the contents thereof, and they shall never be deemed to be the part of the or be used in the interpretation or construction thereof or of the Contract.

1.30 Singular and Plural.

In this Contract document unless otherwise stated specifically the singular shall include the plural and vice-versa wherever the context so requires.

1.31 Cost

The cost shall be deemed to include overhead costs whether on or off the site.

ENGINEER & ENGINEER'S REPRESENTATIVE

2.0 Duties and Powers of the Engineer and the Engineer's Representative

2.1 The field management shall be the responsibility of the Engineer. The Engineer shall carry out such duties as taking decisions and issuing certificates and orders as specified in the Contract. The Engineer is empowered to take decisions on the following matters:

- (a) approval of subletting of any part of the works pursuant to clause 4.0 hereof;
- (b) certification of additional sums under sub clause 53.2 hereof;
- (c) determination of an extension of time pursuant to clause 44.0 hereof
- (d) issuance of a variation order pursuant to clause 52.0 hereof;
- (e) fixing rates or prices for the additional works executed under the Contract pursuant to clause 52.0 hereof.

2.2 The Engineer's Representative shall be responsible to the Engineer and his duties are to watch and supervise the works and to test and examine any materials to be used or workmanship employed with the works. The Contractor shall get the materials or the workmanship tested, as instructed by the Engineer's Representative, at his own cost. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract nor, except as expressly provided hereunder or elsewhere in the Contract, to order any work involving delay or any extra payment by the SHREE SOMNATH TRUST, nor to make any variation of or in the works.

2.3 The SHREE SOMNATH TRUST may from time to time in writing delegate to the Engineer's Representative any of the powers and authorities vested in the Engineer. Any written instruction or approval given by the Engineer's Representative to the Contractor within the terms of such delegations, but not otherwise, shall bind the Contractor as though it had been given by the Engineer provided always as follows:-

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

- (b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative he shall be entitled to refer the matter to the Engineer, who shall there upon confirm, reverse or vary such decision.

3.0 Inspection of Works

- 3.1 The SHREE SOMNATH TRUST and his representatives shall have Full power and authority to inspect the works at any time wherever the work is in progress either on the site or at the Contractor's premises/workshop wherever situated, premises/workshop of any person, firm or corporation where the work in connection with the Contract may be in hand or wherefrom materials are being produced or are to be supplied, and the Contractor shall afford or procure for the Engineer every facility and assistance to carry out such inspection. The Contractor shall at all times during usual working hours and at all other times at which reasonable notice of the intention of the Engineer or the Engineer's Representative to visit the works shall have been given to the Contractor, either himself be present to receive the orders and instructions, or have a responsible agent /representative duly accredited in writing present for the purpose. Orders given to the Contractor's agent/representative shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than three days notice in writing to the Engineer's Representative before covering up or otherwise placing beyond the reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of the above the same shall be uncovered at the Contractor's expenses for carrying out such measurement or inspection.
- 3.2 No materials shall be removed from the site before obtaining the approval in writing of the Engineer. The Contractor is to provide at all times during the progress of the work and the maintenance period proper means of access with ladders, gangways , etc. and the necessary attendance to move and adopt as directed for inspection or measurement of the works by the Engineer's Representative .
- 3.3 The Contractor shall make available to the Engineer's Representative free of cost all necessary instruments and assistance in checking of setting out of works and checking of any works made by the Contractor for the purpose of setting out and taking measurements of works.

4.0 Sub-letting of work:

4.1 The Contractor shall not sub-let the whole of the works. Except where otherwise provided by the Contract, the Contractor shall not sub-let any part of the works without prior written consent of the Engineer, which shall not be unreasonably withheld, and such consent, if given shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and negligence's of any sub-contractor, his agents, servants or workmen as fully as if they were the acts, defaults or negligence's of the Contractor, his agents, servants or workmen. Provided always that the provision of labor on a piece work basis shall not be deemed to be a sub-letting under this clause.

CONTRACT DOCUMENTS

5.0 Languages and Law of Contract

- 5.1 i) All written material and correspondence shall be in English.
- ii) The law to which the Contract is to be subjected and according to which the Contract is construed, shall be the law being in force in India and/or the state where the Contract shall be performed.

5.2 Documents mutually explanatory

Except if and to the extent otherwise provided by the Contract, the provisions of the General Conditions and Special Conditions of the Contract shall prevail over those of any other documents forming part of the Contract. Several documents forming the Contract are to be taken as mutually explanatory. Should there be any discrepancy, inconsistency, error or omission in the Contracts or any of them the matter may be referred to Engineer who shall give his decisions and issue to the Contractor instructions, directing in what manner the work is to be carried out. The decision of the Engineer shall be final and conclusive and the Contractor shall carry out the work in accordance with this decision.

- 5.3 Works shown upon the drawing but not mentioned in the specifications or described in the specifications without being shown on the drawings shall nevertheless be held to be included in the same manner as if they had been specifically shown upon the drawings and described in the specifications.

6.0 Drawings : their purpose and the custody

- 6.1 The Contract drawings read together with the Contract specifications are intended to show and explain the manner of executing the work and to indicate the type and the class of materials to be used.
- 6.2 In case any feature of the work is not set forth in the drawings and specifications, the Contractor shall forthwith apply to the Engineer for further instructions , drawings or specifications

- 6.3 The drawings shall remain in the sole custody of the Engineer, but two copies shall be issued to the Contractor free of charge. One copy of the drawings, furnished to the Contractor as aforesaid, shall be kept by the Contractor on the site and the same shall at all reasonable times be available for inspection and use by the Engineer or the Engineer's Representative and by any other person authorized by the Engineer in writing. At the completion of the Contract the Contractor shall return to the Engineer all drawings issued under the Contract.
- 6.4 The Contractor shall give written notice to the Engineer whenever planning or progress of the works is likely to be delayed unless any further drawing or instruction is issued by the SHREE SOMNATH TRUST/Engineer within a reasonable time. The notice shall include the detail of the drawing or instruction required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.
- 6.5 The contractor shall submit the following information, in triplicate, to the Engineer for approval within the time stipulated against each item below:
- a) A general layout plan of construction plant and equipment for the execution of work within fourteen days from the date of notice to proceed with the work; and
 - b) Drawings or prints showing the location of major plants and other facilities which he proposes to put up at the site, including any changes in the general layout, at least fourteen days prior to the commencement of the respective work.
- 7.0 Further Drawings and Instructions
- 7.1 The Engineer may also authorize his representatives to perform his duties and functions. The Contractor shall carry out and be bound by the same. The Engineer shall have full powers and authority to supply to the Contractor from time to time, during the progress of the works, such further drawings and instructions as shall be necessary for the proper execution of the project.

GENERAL OBLIGATIONS

8.0 Contractor's General Responsibilities

8.1 The Contractor shall, subject to the provisions of the Contract, and with due care and diligence, execute and maintain the Works and provide all labor, including the supervision thereof, materials, Construction Plant and all other things, whether of a temporary or permanent nature, required in and for such execution and maintenance, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract.

8.2 The Contractor shall take full responsibility for the adequate stability and safety of all site operations and methods of construction, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the Permanent Works, or for the design or specification of any Temporary Works prepared by the Engineer.

9.0 Contract Agreement

9.1 The Contractor shall called upon so to do enter into and execute a Contract Agreement, in the form annexed with such modification as may be necessary.

10.0 Performance Security

10.1 Within 30 days of the receipt of the notification of the Award of the Contract from the SHREE SOMNATH TRUST the Successful bidder shall furnish to the SHREE SOMNATH TRUST a performance security for an amount of 2% of the Contract value.

10.2 The proceeds of the performance security shall be payable to the SHREE SOMNATH TRUST as compensation for any loss resulting from the Contractor's failure to complete his obligations under the Contract.

10.3 The performance security shall be denominated in Indian Rupees and shall be in the following forms:-

Performance Security for an amount of 2% of the Contract value in the form of bank guarantee or demand draft from nationalize bank in favor of Shree Somnath Trust pursuant to clause 10.0 of General Conditions of Contract.

The guarantees issued by other banks should be confirmed by a Nationalized Indian Bank or a foreign bank operating in India. The acceptable form shall be strictly as provided in Section IX of the Bidding documents.

- 10.4 The bank guarantee shall be valid for the entire period of contract including the Period of Maintenance. The validity of the bank guarantee be suitably extended in the event of extension of time of the contract.
- 10.5 The performance security shall be released by the SHREE SOMNATH TRUST not later than 90 days following the date of delivery of the Maintenance certificate by the Engineer.
- 10.6 In the event of increase in the Contract value, in actual execution, proportionate additional performance security shall be paid by the Contractor if called upon to do so.
- 10.7 In the event of decrease in the Contract value the performance security shall be proportionately adjusted on the completion of the work.
- 10.8 No interest shall be paid by the SHREE SOMNATH TRUST for the amount deposited as Performance security with the SHREE SOMNATH TRUST.
- 11.0 Inspection of site
- 11.1 The Contractor shall be deemed to have inspected and examined the site and its surroundings and information available in connection therewith and to have satisfied himself, before submitting his Tender, as to the form and nature thereof, including the sub-surface conditions, the hydrological and climatic conditions, the extent and nature of work and materials necessary for the completion of the Works, the means of access to the Site and accommodation he may require and, in general, shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Tender.
- 12.0 Sufficiency of Tender
- 12.1 The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the Works and of the rates and prices stated in the priced Schedule of Quantities and the Schedule of Rates and Prices, if any, which Tender rates and prices shall, except insofar, as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and maintenance of the Works.

13.0 Work to be to the Satisfaction of Engineer

13.1 The Contractor shall execute and maintain the Works in strict accordance with the Contract to the satisfaction of the Engineer and shall comply with and adhere strictly to the Engineer's instructions and directions on any matter whether mentioned in the Contract or not, touching or concerning the Works. The Contractor shall take instructions and directions only from the Engineer.

14.0 Program to be Furnished

14.1 The Contractor shall, after the acceptance of his Tender, submit to the Engineer for his approval a programme showing the order of procedure in which he proposes to carry out the Works. The Contractor shall whenever required by the Engineer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution of Works.

14.2 If at any time it should appear to the Engineer that the actual progress of the Works does not conform to the approved programme referred to in sub-clause (1) of this Clause, the Contractor shall produce, at the request of the Engineer, a revised programme showing the modifications to the approved programme necessary to ensure completion of the Works within the time for completion as defined in Clause 43 hereof.

14.3 The submission to and approval by the Engineer of such programmes or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

14.4 The programme shall be reviewed and revised if required at three monthly intervals and shall include a chart of the principal quantities of work forecast for execution monthly and a schedule of payments expected to be made to the Contractor by the SHREE SOMNATH TRUST.

15.0 Contractor's Superintendence

15.1 The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Engineer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor, or a competent and authorized agent or representative approved of in writing by the Engineer, which approval may at any time be withdrawn, is to be constantly on the Works and shall give his whole time to the superintendence of the same. If such approval shall be withdrawn by the Engineer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving written notice of such withdrawal, remove the agent from the Works and shall not thereafter employ him on the Works in any capacity and shall replace him by another agent approved by the Engineer. Such authorized agent or representative shall receive, on behalf of the Contractor, directions and instructions from the Engineer.

16.0 Contractor's Employees

16.1 The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works :

- a) only such technical assistants as are skilled and experienced in their respective fields and sub-agents, foremen and leading hands as are competent to give proper supervision to the work they are required to supervise, and
- b) such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution and maintenance of the Works.

16.2 It shall be the liability of the Contractor to remove forthwith from the works any personnel engaged by the Contractor, in or about the execution or maintenance of the works, who, misconducts himself or is incompetent or negligent in the proper performance of his duties or whose engagement is otherwise considered to be undesirable and such person shall not be again engaged upon the work. Any person so removed, by the Contractor, from the works shall be replaced, by the Contractor, as soon as possible by a competent substitute.

17.0 Setting-out

17.1 The Contractor shall be responsible for the true and proper setting-out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing and for the correctness, subject as above mentioned of the position, levels, dimensions and alignment of all parts of the Works and for the provision of all necessary instruments, appliances and labor in connection therewith. If at any time, during the progress of the Works, any error shall appear or arise in the position, levels dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer shall, at his own cost, rectify such error to the satisfaction of the Engineer, unless such error is based on incorrect data supplied in writing by the Engineer in which case the expense of rectifying the same shall be borne by the SHREE SOMNATH TRUST. The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench-marks, sight-rails, pegs and other things used in setting-out the Works.

18.0 Boreholes and Exploratory Excavation

18.1 If, at any time during the execution of the Works, the Engineer shall require the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be ordered in writing and shall be deemed to be an addition ordered under the provision of Clause 52 hereof, unless a provisional sum in respect of such anticipated works shall have been included in Schedule of Quantities.

19.0 Watching and Lighting

19.1 The Contractor shall in connection with the Works provide and maintain at his own cost all lights, guards, fencing and watching when and where necessary or required by the Engineer, for the protection of the Works, or for the safety and convenience of the public or others.

20.0 Care of Works

20.1 From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works pursuant to Clause 49 hereof the Contractor shall take full responsibility for the care thereof. Provided that if the Engineer shall issue a Certificate of Completion in respect of any part of the Permanent Works the Contractor shall cease to be liable for the care of that part of the Permanent Works from the date stated in the Certificate of Completion in respect of that part and the responsibility for the care of that part shall pass to the SHREE SOMNATH TRUST. Provided further that the Contractor shall take the full responsibility for the care of any outstanding work which he shall have undertaken to finish during the Period of maintenance until such outstanding work is completed. In case any damage, loss or injury shall happen to the Works, or to any part thereof, from any cause whatsoever, save and except the excepted risks as defined in clause 20.3, while the Contractor shall be responsible for the care thereof the Contractor shall, at his own cost, repair and make good the same, so that at completion the Permanent Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the Engineer's instructions. In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the Engineer and subject always to the provision of Clause 66 hereof, repair and make good the same as aforesaid at the cost of the SHREE SOMNATH TRUST. The Contractor shall also be liable for any damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of completing any outstanding work or complying with his obligations under Clause 50 or 51 hereof.

20.2 The Contractor shall not demolish, remove or alter the structures, trees or other facilities on the site without the prior approval of the Engineer.

20.3 Excepted Risks

The "excepted risks" are war, hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, revolution insurrection or military or usurped power, civil war, or unless solely restricted to employees of the Contractor or of his sub-contractors and arising from the conduct of the Works, riot, commotion or disorder, or a cause solely due to the Engineer's design of the Works, or ionizing radiations or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive, nuclear assembly or nuclear component thereof, pressure waves caused by aircraft or other aerial devices traveling at sonic or supersonic speeds, or any such operation of the forces of nature as an experienced Contractor could not foresee, or reasonably make provisions for or insure against all of which are herein collectively referred to as "the excepted risks".

21.0 Insurance of Works, etc

21.1 Without limiting his obligations and responsibilities under Clause 20 hereof, the Contractor shall prior to the commencement of the Works insure in the joint names of the SHREE SOMNATH TRUST and the Contractor against all loss or damage from whatever cause arising, other than the excepted risks, for which he is responsible under the terms of the Contract and in such manner that the SHREE SOMNATH TRUST and the Contractor are covered for the period stipulated in Clause 20.1 hereof and are also covered during the Period of Maintenance for loss or damage arising from a cause, occurring prior to the commencement of the Period of maintenance, and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clauses 50 and 51 hereof :-

- a) The Works for the time being executed to the estimated current Contract value thereof plus 10 percent thereon to allow for any additional costs and professional fees resulting from the loss or damage.
- b) The Constructional Plant and other things brought on to the Site by the Contractor to the replacement value of such Constructional Plant and other things.

c) It shall be the responsibility of the Contractor to notify the insurer of any change in nature and extent of the Works and to ensure the adequacy of the insurance cover at all times in accordance with the provisions of this Clause.

Such insurance shall be effected with an insurer and the Contractor shall, produce to the Engineer/SHREE SOMNATH TRUST the policy or policies of insurance and the receipts for payments of the current premiums.

22.0 Damage to Persons and Property

22.1 The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the SHREE SOMNATH TRUST against all losses and claims in respect of injuries or damage to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of the Works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to :-

- a) The permanent use or occupation of land by the Works or any part thereof.
- b) The right of the SHREE SOMNATH TRUST to execute the Works or any part thereof on, over, under, in or through any land.
- c) Injuries or damage to persons or property which are the unavoidable result of the execution or maintenance of the Works in accordance with the Contract.
- d) Injuries or damage to persons or property resulting from any act or neglect of the Engineer or other Contractors, not being employed by the Contractor, or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of compensation as may be just and equitable having regard to the extent of the responsibility of the Engineer or other Contractors for the damage or injury.

22.2 The SHREE SOMNATH TRUST shall indemnify the Contractor against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the proviso to sub-clause (1) of this Clause.

23.0 Third Party Insurance

23.1 Before commencing the execution of the Works the Contractor, but without limiting his obligations and responsibilities under Clause 22 hereof, shall insure against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the SHREE SOMNATH TRUST, or to any person, including any employee of the SHREE SOMNATH TRUST, or by arising out of the execution of Works or in the carrying out of the Contract, otherwise than due to the matters, referred to in the proviso to Clause 22.1 hereof.

23.2 Such insurance shall be effected with an insurer for at least the amount stated in the Appendix to the Tender. The Contractor shall, produce to the Engineer/SHREE SOMNATH TRUST the policy or policies of insurance and the receipts for payment of the current premiums.

23.3 The terms shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive indemnity under the policy being brought or made against the SHREE SOMNATH TRUST, the insurer will indemnify the SHREE SOMNATH TRUST against such claims and any costs, charges and expenses in respect thereof.

23.4 Such insurance shall be for an amount not less than Rs. 3,50,000/- per occurrence, with the number of occurrences unlimited.

24.0 Accident or Injury to Workmen

24.1 The SHREE SOMNATH TRUST shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any sub-Contractor. The Contractor shall indemnify and keep indemnified the SHREE SOMNATH TRUST against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Where any case is instituted against the SHREE SOMNATH TRUST, the Contractor shall impale himself as a party as if the case has been instituted against the Contractor.

24.2 The Contractor shall insure against such liability with an insurer and shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall, produce to the Engineer/SHREE SOMNATH TRUST policy of insurance and the receipts for the payment of the current premium. Provided always that, in respect of any persons employed by any sub-contractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that the SHREE SOMNATH TRUST is indemnified under the policy, but the Contractor shall require such sub-contractor to produce to the Engineer/SHREE SOMNATH TRUST such policy of insurance and receipt for the payment of the current premium.

24.3 Employee State Insurance (ESI) Act.

The Contractor shall accept full and exclusive liabilities for the compliance with all obligations imposed by the ESI Act 1948, and the Contractor shall further defend, indemnify and hold the SHREE SOMNATH TRUST harmless from any liabilities or penalties which may be imposed by the Central, State or local authorities by reason of any asserted violation by Contractor or sub-contractor of the ESI Act, 1948 and also from all claims, suits or proceedings that may be brought against the SHREE SOMNATH TRUST arising under, growing up or by reason of the work provided for by this Contract whether brought by the employees of the Contractor, by the third parties, or by Central or State Govt. authorities or any political sub-division thereof. The Contractor shall fill in with the ESI the declaration form and all other forms which may be required in respect of the Contractor's or sub-contractor's employees and who are employed by for the works provided for or those covered by ESI from time to time under the agreement. The Contractor shall deduct and secure the agreement of the sub-contractor and deduct the employees contribution as per the first schedule of the ESI Act from wages and affix the employees' contribution cards at wages payment intervals. The Contractor shall remit and secure that agreement of the sub-contractor to remit, the employees contribution as required by the Act. The Contractor shall maintain all codes and records as required under Act in respect of the employees and payment and the Contractor shall secure the agreement of the sub-contractor to maintain such records. Any expense incurred for the contribution or maintaining records shall be to the Contractor's account.

The SHREE SOMNATH TRUST shall retain such amount as may be necessary from the total Contract value until the Contractor shall furnish satisfactory proof the whole contribution as required by the ESI Act have been paid.

25.0 Remedy on Contractor's Failure to Insure

25.1 If the Contractor shall fail to effect and keep in force the insurances referred to in Clauses 21, 23 and 24 hereof, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the SHREE SOMNATH TRUST may effect and keep in force any such Insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the SHREE SOMNATH TRUST as afore said from any payment due or which may become due to the Contractor, or recover the same as a debt to the Contractor, or recover the same as a debt due from the Contractor.

26.0 Giving of Notices and Payment of Fees

26.1 The Contractor shall give all notices and pay all fees required to be given or paid by any Shree Somnath Trust, Prabhas - Patan or State Statute, Ordinance, or Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution of the Works and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works.

26.2 The Contractor shall conform in all respects with the provisions of any such Statute, Ordinance or Law as aforesaid and the regulations or bye-laws of any local or other duly constituted authority which may be applicable to the Works and with such rules and regulations of public bodies and companies as aforesaid and shall keep the SHREE SOMNATH TRUST indemnified against all penalties and liability of every kind for breach of any such Statute, Ordinance or Law, regulation or bye-law.

26.3 The SHREE SOMNATH TRUST will repay or allow to the Contractor all such sums as the Engineer/SHREE SOMNATH TRUST shall certify to have been properly payable and paid by the Contractor in respect of such fees.

27.0 Fossils, etc.

27.1 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site of the Works shall as between the SHREE SOMNATH TRUST and the Contractor be deemed to be the absolute property of the SHREE SOMNATH TRUST. The Contractor shall take precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall immediately upon discovery thereof and, before removal, acquaint the Engineer of such discovery and carry out the Engineer's orders as to the disposal of the same.

28.0 Patent Rights and Royalties

28.1 The Contractor shall save harmless and indemnify the SHREE SOMNATH TRUST from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Constructional Plant, machine work, or material and for in connection with the Works or any of them and from and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works or any of them.

29.0 Interference with Traffic and Adjoining Properties

29.1 All operations necessary for the execution of the Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the convenience of the public, or the access to, use and occupation of public or private roads and footpaths to or of properties whether in the possession of the SHREE SOMNATH TRUST or of any other person. The Contractor shall save harmless and indemnify the SHREE SOMNATH TRUST in respect of all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of, or in relation to, any such matters in so far as the Contractor is responsible there for.

30.0 Extraordinary Traffic

30.1 The Contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his sub-contractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant and material from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such highways and bridges.

- 30.2 Should it be found necessary for the Contractor to move one or more loads of Constructional Plant, machinery or pre-constructed units or parts of units of work over a part of a highway or bridge, the moving whereof is likely to damage any highway or bridge unless special protection or strengthening is carried out, then the Contractor shall before moving the load on to such highway or bridge give notice to the concerned authority of the weight and other particulars of the load to be moved and his proposals for protecting or strengthening the said highway or bridge and obtain approval from that concerned authority at his own cost . He shall keep the Engineer informed of the action taken.
- 30.3 If during the execution of the Works or at any time thereafter the Contractor shall receive any claim arising out of the execution of the Works in respect of damage or injury to highways or bridges he shall immediately report the same to the Engineer and thereafter shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the SHREE SOMNATH TRUST in respect thereof and in respect of all claims, proceedings, damages, costs, charges and expenses in relation thereto.
- 30.4 Where the nature of the Works is such as to require the use by the Contractor of water-borne transport the foregoing provisions of this Clause shall be construed as though "highway" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.
- 31.0 Opportunities for other Contractors
- 31.1 The Contractor shall, in accordance with the requirements of the Engineer, afford all reasonable opportunities for carrying out their work to any other Contractors employed by the SHREE SOMNATH TRUST and their workmen and to the workmen of the SHREE SOMNATH TRUST and of any other duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any Contract which the SHREE SOMNATH TRUST may enter into in connection with or ancillary to the Works. If, however, the Contractor shall, on the written request of the Engineer, make available to any such other Contractor, or to the SHREE SOMNATH TRUST or any such authority, any roads or ways for the maintenance of which the Contractor is responsible, or permit the use by any such of the Contractor's scaffolding or other plant on the Site, or provide any other service of whatsoever nature for any such, the SHREE SOMNATH TRUST shall pay to the Contractor in respect of such use or service such sum or sums as shall, in the opinion of the Engineer, be reasonable.

32.0 Contractor to Keep Site Clear

32.1 During the progress of the Works the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any Constructional Plant and surplus materials and clear away and remove from the site any wreckage, rubbish or Temporary Works no longer required.,

33.0 Clearance of Site on Completion

33.1 On the completion of the works the contractor shall clear away and remove from the Site all constructional plant, surplus materials, rubbish and Temporary works of every kind, and leave the whole of the site and works clean and in a workman like condition to the satisfaction of the Engineer.

L A B O U R

34.0 Engagement of Labor

- 34.1 The Contractor shall make his own arrangements for the engagements of all labor, local or otherwise, and, save insofar as the Contract otherwise provides, for the transport, housing feeding and payment thereof. The Contractor to the extent possible and reasonable to employ staff and labor with required qualifications and experience from source within India.
- 34.2 The SHREE SOMNATH TRUST may at their own discretion and convenience make available at the site, land for Contractor's field office, godowns, workshop and assembly yard required for the execution of the Contract. The Contractor shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement approved by the Engineer.
- 34.3 The personnel so engaged by the Contractor shall be the employees of the Contractor and there shall exist no privities of Contract between the personnel so engaged and the SHREE SOMNATH TRUST.
- 34.4 On completion of the works undertaken by the Contractor, he shall remove all temporary buildings erected by him and have the site cleaned as directed by the Engineer. If the Contractor shall fail to comply with these requirements, the Engineer may at the expenses of the Contractor remove such surplus and rubbish materials and dispose off the same as he deems fit and get the site cleared as aforesaid; the Contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus material disposed off as aforesaid. The owner reserves the right to ask the Contractor any time during the pendency of the Contract to vacate the land by giving 7 days notice without giving any reason.
- 34.5 Land for residential accommodation for staff and labor may be made available at the discretion of the SHREE SOMNATH TRUST / Engineer.
- 34.6 The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site, to the satisfaction of the Engineer an adequate supply of drinking and other water for the use of the Contractor's staff and work people.

- 34.7 The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances and Government Regulations or Orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor, or drugs or permit any such importation, sale, gift, barter or disposal by his sub-contractors, agents or employees.
- 34.8 The Contractor shall not give, barter or otherwise dispose of to any person or person, any arms or ammunitions of any kind or permit the same as aforesaid.
- 34.9 The Contractor shall in all dealings with labor in his employment, have due regard to all recognized festivals, days of rest and religious or other customs.
- 34.10 In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.
- 34.11 The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst his employees and for the preservation of peace and protection of persons and property in the neighborhood of the Works against the same. The Contractor shall be responsible to comply with the various labor laws such as Contract Labor (R&A) Act, 1970, Payment of Wages Act, Minimum Wages Act, Provident Fund Act & Rules etc. in respect of the persons engaged by him.
- 34.12 The Contractor shall be responsible for observance by his sub-contractors of the foregoing provisions.
- 35.0 Returns of Labor, etc
- 35.1 The Contractor shall submit to the SHREE SOMNATH TRUST copies of the license under the Contract Labor Act, if required and obtained by the Contractor and his Provident Fund no. The Contractor shall, if required by the Engineer, also deliver to the Engineer a return in detail in such form and at such intervals as the Engineer may prescribe showing the supervisory staff and the numbers of the several classes of labor from time to time employed by the Contractor on the Site and such information respecting Constructional Plant as the Engineer may require.
- 35.2 The Contractor shall not employ in connection with the works any person who has not completed fifteen years of age.

- 35.3 The Contractor shall in respect of labor employed by him comply with or cause to be complied with the provision of the various labor laws and rules and regulations such as Contract Labor Act(R&A) Act, 1970, Payment of Wages Act, Minimum Wages Act, Provident Fund Act & Rules etc. applicable to them in regard to all matters provided therein and shall indemnify the SHREE SOMNATH TRUST in respect of all claims that may be made against the SHREE SOMNATH TRUST for noncompliance thereof by the Contractor.
- 35.4 Notwithstanding anything contained herein, the Engineer may take such actions as may be necessary for compliance of the various labor laws and recover the costs thereof from the Contractor.
- 35.5 In the event of the Contractor committing a default or breach of any of the provisions of labor laws and rules and regulations as applicable, shall pay penalties as imposed by the statutory Authorities and shall indemnify and keep indemnified the SHREE SOMNATH TRUST all such penalties and compensations.

MATERIALS AND WORKMANSHIP

36.0 Materials and Workmanship

36.1 All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer may direct at the place of manufacture or fabrication, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labor and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Engineer.

36.2 All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the Contract .

36.3 The cost of conducting any test ordered by the Engineer to ascertain the quality of the materials and the workmanship shall be borne by the Contractor.

36.4 All the material procured by the contractor such as cement, reinforced steel, bricks, aggregates, sand etc. shall be tested for their respective confirmation of Technical specifications by the contractor before making use of such material for the work.

37.0 Inspection of Operations

37.1 The Engineer and any person authorized by him shall at all times have access to the Works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

38.0 Examination of Work before Covering up

38.1 No work shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Engineer whenever such work or foundations is or are ready or about to be ready for examination and the Engineer shall, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

38.2 The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Engineer. If any such part or parts have been put out of view after compliance with the requirement of clause 38.1 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating and making good the same shall be borne by the SHREE SOMNATH TRUST, but in any other case all costs shall be borne by the Contractor.

39.0 Removal of Improper Work and Materials

39.1 The Engineer shall during the progress of the Works have power to order in writing from time to time.

a) the removal from the Site, within such time or times as may be specified in the order, of any materials which, in the opinion of the Engineer, are not in accordance with the Contract.

b) the substitution of proper and suitable materials and

c) the removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which in respect of materials or workmanship is not, in the opinion of the Engineer, in accordance with the Contract.

39.2 In case of default on the part of the Contractor in carrying out such order, the SHREE SOMNATH TRUST shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the SHREE SOMNATH TRUST or may be deducted by the SHREE SOMNATH TRUST from any payment due or which may become due to the Contractor.

40.0 Suspension of Work

40.1 The Contractor shall, on the written order of the Engineer, suspend the progress of the Works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work, so far as is necessary in the opinion of the Engineer. The extra cost incurred by the Contractor in giving effect to the Engineer's instructions under this Clause shall be borne and paid by the SHREE SOMNATH TRUST unless such suspension is :

- a) otherwise provided for in the Contract, or
- b) necessary by reasons of some default on the part of the Contractor, or
- c) necessary by reason of climatic conditions on the Site, or
- d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof insofar as such necessity does not arise from any act or default by the Engineer or the SHREE SOMNATH TRUST or from any of the excepted risks defined in Clause 20 hereof.

Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Engineer within fifteen days of the Engineer's order. The Engineer shall settle and determine such extra payment and/or extension of time under Clause 44 hereof to be made to the Contractor in respect of such claim as shall, in the opinion of the Engineer, be fair and reasonable.

40.2 If the progress of the Works or any part thereof is suspended on the written order of the Engineer and if permission to resume work is not given by the Engineer within a period of ninety days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of sub-clause (1) of this Clause, the Contractor may serve a written notice on the Engineer requiring permission within twenty-eight days from the receipt thereof to proceed with the Works, or that part thereof in regard to which progress is suspended and, if such permission is not granted within the time, the Contractor by a further written notice so served may, but is bound to, elect or treat the suspension where it affects only part of the Works as an omission of such part under Clause 52 hereof, or, where it affects the whole Works, as an abandonment of the Contract by the SHREE SOMNATH TRUST.

COMMENCEMENT TIME AND DELAYS

41.0 Commencement of Works

41.1 The Contractor shall commence the Works on Site within the period named in the Appendix to the Tender after the receipt by him of a written order to this effect from the Engineer and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by the Engineer, or be wholly beyond the Contractor's control.

42.0 Possession of Site

42.1 Save insofar as the Contract may prescribe, the extent of portions of the Site of which the Contractor is to be given possession from time to time and the order in which such portions shall be made available to him and, subject to any requirement in the Contract as to the order in which the Works shall be executed, the SHREE SOMNATH TRUST will, with the Engineer's written order to commence the Works, give to the Contractor possession of so much of the Site as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the programme referred to in Clause 14 hereof, if any, and otherwise in accordance with such reasonable proposals of the Contractor as he shall, by written notice to the Engineer, make and will, from time to time as the Work proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with the said programmes or proposals, as the case may be.

42.2 The Contractor shall bear all costs and charges for special or temporary way leaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional accommodation outside the Site required by him for the purposes of the Works.

43.0 Time for Completion

43.1 Subject to any requirement in the Contract as to completion of any section of the Works before completion of the whole, the whole of the Works shall be completed, in accordance with the provisions of Clause 49 hereof, within the time stated in the Contract or such extended time as may be allowed under Clause 44 hereof.

44.0 Extension of Time of Completion

44.1 Should the amount of extra or additional work of any kind or any cause of delay referred to in these Conditions, or exceptional adverse climatic conditions, or other special circumstances of any kind whatsoever which may occur, other than through a default of the Contractor, be such as fairly to entitle the Contractor to an extension of time for the completion of the Works, the Engineer shall determine the amount of such extension and shall notify the SHREE SOMNATH TRUST and the Contractor accordingly. Provided that the Engineer is not bound to take in account any extra or additional work or other special circumstances unless the Contractor has within thirty days after such work has been commenced, or such circumstances have arisen, or as soon thereafter as is practicable, submitted to the Engineer full and detailed particulars of any extension of time to which he may consider himself entitled in order that submission may be investigated at the time.

45.0 No Night Work

45.1 Subject to any provision to the contrary contained in the Contract, none of the Permanent Works shall, save as hereinafter provided, be carried on during the night without the permission in writing of the Engineer except when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer. Provided always that the provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by rotary or double shifts.

46.0 Rate of Progress

46.1 If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any section is at any time, in the opinion of the Engineer, too slow to ensure completion by the prescribed time or extended time for completion, the Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as are necessary and the Engineer may approve to expedite progress so as to complete the Works or such section by the prescribed time or extended time. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor shall seek the Engineer's permission to do any work at night, such permission shall not be unreasonably refused.

47.0 Liquidated Damages for Delay

- 47.1 If the Contractor shall fail to achieve completion of the Works within the time prescribed in the Appendix to the Form of Bid, then the Contractor shall pay to the SHREE SOMNATH TRUST the sum at the rate of 1/2% of the Contract value as Liquidated damages for such default and not as a penalty for every week or part of the week which shall elapse between the time prescribed by clause 43 hereof and the date of certified completion of the particular Works. The SHREE SOMNATH TRUST may without prejudice to any other method of recovery, deduct the amount of such damages from any payment in its hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.
- 47.2 The aggregate maximum of the liquidated damages payable to the SHREE SOMNATH TRUST under this clause shall be subject to a maximum of 10% of the Contract value.
- 47.3 If, before the completion of the whole of the Works any part or section of the Works has been certified by the Engineer as completed, pursuant to Clause 49 hereof, and occupied by the SHREE SOMNATH TRUST, the liquidated damages for delay shall, for any period of delay after such certificate be reduced in the proportion which the value of the part or section so certified bears to the value of the whole of the Works.
- 47.4 The criteria for deriving the liquidated damage shall be the actual value of works executed and the amended time of completion .

48.0 NOT APPLICABLE

Bonus for early completion

- 48.1 If the Contractor achieves completion prior to the time prescribed by the clause 43 hereof , the SHREE SOMNATH TRUST shall pay to the Contractor the sum at the rate as stated in the Appendix to the Form of Bid as bonus for early completion for every complete week which shall elapse between the date of certificate of completion of works issued in accordance with clause 49 hereof and the time prescribed by clause 43 hereof.
- 48.2 The aggregate maximum of Bonus payable to the Contractor shall be subject to a maximum as stated in the Appendix to the Form of Bid as maximum limit of bonus.

48.3 The criteria for deriving the award of bonus shall be only the actual value of the works done and the amended time of completion.

49.0 Certification of Completion of Works

49.1 When the whole of the Works have been virtually completed and have satisfactorily passed any final test that may be prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer accompanied by an undertaking to finish any outstanding work during the period of Maintenance. Such notice and undertaking shall be in writing and shall be deemed to be a request by the Contractor for the Engineer to issue a Certificate of Completion in respect of the Works. The Engineer shall, on receipt of such notice either issue to the Contractor, with a copy to the SHREE SOMNATH TRUST, a Certificate of Completion stating the date on which, in his opinion, the Works were virtually completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, requires to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting virtual completion that may appear after such instructions and before completion of the works specified therein. The Contractor shall be entitled to receive such Certificate of Completion, or on the completion, to the satisfaction of the Engineer, of the works so specified and making good any defects so notified.

49.2 Similarly, in accordance with the procedure set out in sub-clause (1) of this Clause, the Contractor may request and the Engineer shall issue a Certificate of Completion in respect of :-

- a) any section of the Permanent Works in respect of which a separate time for completion is provided in the Contract and
- b) any substantial part of the Permanent Works which has been both completed to the satisfaction of the Engineer and occupied by the SHREE SOMNATH TRUST.

49.3 If any part of the Permanent Works shall have been virtually completed and shall have satisfactorily passed any final test that may be prescribed by the Contract, the Engineer may issue a Certificate of Completion in respect of that part of the Permanent Works before completion of the whole of the Works and, upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete any outstanding work in that part of the Works during the

Period of Maintenance.

49.4 Provided always that a Certificate of Completion given in respect of any section or part of the Permanent Works before completion of the whole shall not be deemed to certify completion of any ground or surfaces requiring reinstatement, unless such Certificate shall expressly so state.

MAINTENANCE AND DEFECTS
(DEFECT LIABILITY)

50.0 Definition of Period of Maintenance

50.1 In these Conditions the expression "Period of Maintenance" shall mean the period of maintenance named in the Appendix to the Tender, calculated from date of the completion of the Works, certified by the Engineer in accordance with Clause 49 hereof, or, in the event of more than one certificate having been issued by the Engineer under the said Clause, from the respective dates so certified and in relation to the Period of Maintenance the expression "the Works" shall be construed accordingly.

50.2 To the intent that the Works shall at or as soon as practicable after the expiry of the Period of Maintenance be delivered to the SHREE SOMNATH TRUST in the condition required by the Contract, fair wear and tear excepted, to the satisfaction of the Engineer, the Contractor shall finish the work, if any, outstanding at the date of completion, as certified under the clause 49 hereof, as soon as practicable after which date and shall execute all such work of repair, amendment, reconstruction, rectification and making good defects, imperfections, shrinkages or other faults as may be required of the contractor in writing by the Engineer during the period of Maintenance, or within fifteen days after its expiry as a result of any inspection made by or on behalf of the Engineer prior to its expiry.

50.3 All such work shall be carried out by the Contractor at his own expense if the necessity thereof shall, in the opinion of the Engineer, be due to the use of materials or workmanship not in accordance with the Contract, or to neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract.

50.4 If the Contractor shall fail to do any such work as aforesaid required by the Engineer, the SHREE SOMNATH TRUST shall be entitled to employ and pay other persons to carry out the same and if such work is work which in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract, then all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the SHREE SOMNATH TRUST or may be deducted by the SHREE SOMNATH TRUST from any payment due or which may become due to the Contractor.

51.0 Contractor to Search.

51.1 The Contractor shall, if required by the Engineer in writing, search under the direction of the Engineer for the cause of any defect, imperfection or fault appearing during the progress of the Works or in the Period of Maintenance. Unless such defect, imperfection or fault shall be one for which the Contractor is liable under the Contract, the cost of the work carried out by the Contractor in searching as aforesaid shall be borne by the SHREE SOMNATH TRUST. If such defect, imperfection or fault shall be one for which the Contractor is liable as aforesaid, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his own expense in accordance with the provisions of Clause 50 hereof.

ALTERATIONS, ADDITIONS AND OMISSIONS

52.0 Variations

52.1 The Engineer shall make any variations of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion be desirable, he shall have power to order the Contractor to do any of the following :-

- a) increase or decrease the quantity of any work included in the Contract,
- b) omit any such work,
- c) change the character or quality or kind of any such work,
- d) change the levels, lines, position and dimensions of any part of the Works, and
- e) execute additional work of any kind necessary for the completion of the works
- f) change any specified sequence, method or timing of construction of any part of the works and no such variation shall in any way vitiate or invalidate the Contract, but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

52.2 No such variations shall be made by the Contractor without an order in writing of the Engineer. Provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Schedule of Quantities. Provided also that if for any reason the Engineer shall consider it desirable to give any such order verbally, the Contractor shall comply with such order and any confirmation in writing of such verbal order given by the Engineer, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this clause. Provided further that if the Contractor shall within seven days confirm in writing to the Engineer and such confirmation shall not be contradicted in writing within fourteen days by the Engineer, it shall be deemed to be an order in writing by the Engineer.

53.0 Valuation of Variations

53.1 All extra or additional work done or work omitted by order of the Engineer shall be valued at the rates and prices set out in the Contract if, in the opinion of the Engineer, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the extra or additional work, then suitable rates or prices shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such rates or prices as shall, in his opinion, be reasonable and proper.

53.2 Provided that if the nature or amount of any omission or addition relative to the nature or amount of the whole of the Works or to any part thereof shall be such that, in the opinion of the Engineer, the rate or price contained in the Contract for any item of the Works is, by reason of such omission or addition, rendered inapplicable, then a suitable rate or price shall be agreed upon between the Engineer and the Contractor. In case of disagreement the Engineer shall work out and fix the rate or the price.

53.3 In case of any class of work for which there is not such specification supplied by the SHREE SOMNATH TRUST as is mentioned in the tender documents such work shall be carried out in accordance with Indian Standard Specifications and if the I.S.S. do not cover the same the work should be carried out as per the standard Engineering practice subject to the approval of the Engineer.

Provided also that no increase or decrease under clause 53.1 or variation of rate or price under clause 53.2 of shall be made unless, as soon after the date of the order as is practicable and, in the case of extra or additional work, before the commencement of the work or as soon thereafter as is practicable, notice shall have been given in writing :-

a) by the Contractor to the Engineer of his intention to claim extra payment or a varied rate or price or

b) by the Engineer to the Contractor of his intention to vary a rate or price.

53.4 If, on certified completion of the whole of the works it shall be found that a reduction or increase greater than 25 per cent of the sum named in the Letter of Acceptance, results from :-

a) the aggregate effect of all Variation Orders, and

b) all adjustments upon measurement of the estimated quantities set out in the Schedule of Quantities, hereof,

but not from any other cause, the amount of the Contract Price shall be adjusted by such sum as may be agreed between the Contractor and the Engineer or, failing agreement, fixed by the Engineer having regard to all material and relevant factors, including the Contractor's site and general overhead costs of the Contract.

53.5 The Contractor shall send to the Engineer once in every month an account giving particulars, as full and detailed as possible, of all claims for any additional payment to which the Contractor may consider himself entitled and of all extra or additional work ordered by the Engineer which he has executed during the preceding month.

No final or interim claim for payment for any such work or expense will be considered which has not been included in such particulars. Provided always that the Engineer shall be entitled to authorize payment to be made for any such work or expense, notwithstanding the Contractor's failure to comply with this condition, if the Contractor has, at the earliest practicable opportunity, notified the Engineer in writing that he intends to make a claim for such work.

PLANT, TEMPORARY WORKS AND MATERIALS

54.0 Plant, etc., Exclusive Use for the Works

54.1 All Constructional Plant, Temporary Works and materials provided by the Contractor shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the site to another, without the consent, in writing, of the Engineer, which shall not be unreasonably withheld..

54.2 Upon completion of the Works the Contractor shall remove from the Site all the said Constructional Plant and Temporary Works remaining thereon and any unused materials provided by the Contractor.

54.3 The SHREE SOMNATH TRUST shall not at any time be liable for the loss of or damage to any of the said Constructional Plant, Temporary Works or materials save as mentioned in Clauses 20 and 66 hereof.

55.0 Approval of Materials, etc., not implied

55.1 The operation of Clause 54 hereof shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

MEASUREMENT

56.0 Quantities

56.1 The quantities set out in the Schedule of Quantities are the estimated quantities of the work, but they are not to be taken as the actual and exact quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract.

57.0 Works to be Measured

57.1 The Engineer shall, except as otherwise stated, ascertain and determine by measurement the value in terms of the Contract of work done in accordance with the Contract. He shall, when he requires any part or parts of the Works to be measured, give notice to the Contractor's authorized agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer in making such measurement, and shall furnish all particulars required by either of them. Should the Contractor not attend, or neglect or omit to send such agent, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work. For the purpose of measuring such permanent work as is to be measured by records and drawings, the Engineer shall prepare records and drawings month by month of such work and the Contractor, as and when called upon to do so in writing, shall, within fourteen days, attend to examine and agree such records and drawings with the Engineer and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree to such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree to the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen days of such examination, lodge with the Engineer, for decision by the Engineer, notice in writing of the respects in which such records and drawings are claimed by him to be incorrect.

58.0 Method of Measurement

58.1 The Works shall be measured net, as prescribed in the specification of works, notwithstanding any general or local custom, except where otherwise specifically described or prescribed in the Contract. Wherever not specifically mentioned in the Contract, the mode of measurement as prescribed in the relevant IS codes shall be applicable and binding to the Contract. A list of ISS code of practices, which shall be referred to in that event, is attached as annex to the Section IV of Technical Specifications. Only the latest editions of all the codes of practices including all latest official amendments and revisions shall be applicable.

58.2 For measurement of items of work in foundation and plinth & in super structure the criteria shall be the plinth level of the individual buildings covered under this Contract.

NOMINATED SUB-CONTRACTORS

59.0 Definitions of "Nominated Sub-Contractors"

59.1 All specialists, merchants, tradesmen and others executing any work or supplying any goods, materials or services, who may have been or be nominated or selected or approved by the SHREE SOMNATH TRUST or the Engineer, and all persons to whom by virtue of the provisions of the Contract the Contractor is required to sub-let any work shall, in the execution of such work or the supply of such goods, materials or services, be deemed to be sub-Contractors employed by the Contractor and are referred to in this Contract as "nominated Sub-Contractors".

59.2 The Contractor shall not be required by the SHREE SOMNATH TRUST or the Engineer or be deemed to be under any obligation to employ any nominated Sub-Contractor against whom the Contractor may raise reasonable objection, or who shall decline to enter into a sub-contract with the Contractor containing provisions :-

- a) that in respect of the work, goods, materials or services the subject of the sub-contract, the nominated Sub-Contractor will undertake towards the Contractor the like obligations and liabilities as are imposed on the Contractor towards the SHREE SOMNATH TRUST by the terms of the Contract and will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities, and
- b) that the nominated Sub-Contractor will save harmless and indemnify the Contractor from and against any negligence by the nominated Sub-Contractor, his agents, workmen and servants and from and against any misuse by him or them of any Constructional Plant or Temporary Works provided by the Contractor for the purposes of the Contractor and from all claims as aforesaid.

59.3 If in any connection with any Provisional Sum the services to be provided include any matter of design or specification of any part of the permanent works or of any equipment or plant to be incorporated therein, such requirement shall be expressly stated in the Contract and shall be included in any nominated Sub-Contract. The nominated Sub-Contract shall specify that the nominated Sub-Contractor providing such services will save harmless and indemnify the Contractor from and against the same and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising out of or in connection with any failure to perform such obligations or to fulfill such liabilities.

59.4 For all work executed or goods, materials, or services supplied by any nominated Sub-Contractor, there shall be included in the Contract Price :-

- a) the actual price paid or due to be paid by the Contractor, on the direction of the Engineer, and in accordance with the Sub-Contract;
- b) the sum, if any, entered in the Schedule of Quantities for labor supplied by the Contractor in connection therewith, or if ordered by the Engineer as may be determined in accordance with Clause 53 hereof;
- c) in respect of all other charges and profit, a sum being a percentage rate of the actual price paid or due to be paid calculated, where provision for such is made in a special item provided in the Schedule of Quantities for such purpose.

59.5 Before issuing, under Clause 60 hereof, any certificate, which includes any payment in respect of work done or goods, materials or services supplied by any nominated Sub-Contractor, the Engineer shall be entitled to demand from the Contractor reasonable proof that all payments, less retentions, included in previous certificates in respect of the work or goods, materials or services of such nominated Sub-Contractor have been paid or discharged by the Contractor, in default whereof unless the Contractor shall

- a) inform the Engineer in writing that he has reasonable cause for withholding or refusing to make such payments and
- b) produce to the Engineer reasonable proof that he has so informed such nominated sub-contractor in writing, the SHREE SOMNATH TRUST shall be entitled to pay to such nominated sub-contractor direct, upon the certificate of the Engineer, all payments, less retentions, provided for in the sub-contract, which the Contractor has failed to make to such nominated sub-contractor and to deduct by way of set-off the amount so paid by the SHREE SOMNATH TRUST from any sums due or which may become due from the SHREE SOMNATH TRUST to

the Contractor. Provided always that, where the Engineer has certified and the SHREE SOMNATH TRUST has paid direct as foresaid, the Engineer shall in issuing any further certificate in favor of the Contractor deduct from the amount thereof the amount so paid, direct as aforesaid, but shall not withhold or delay the issue of the certificate itself when due to be issued under the terms of the Contract.

59.6 In the event of a nominated sub-contractor, as hereinbefore defined, having undertaken towards the Contractor in respect of the work executed, or the goods, materials or services supplied by such nominated sub-contractor, any continuing obligation extending for a period exceeding that of the Period of Maintenance under the Contract, the Contractor shall at any time, after the expiry of the Period of Maintenance, assign to the SHREE SOMNATH TRUST, at its Request and cost, the benefit of such obligation for the unexpired duration thereof.

CERTIFICATE AND PAYMENT

60.0 Interim Payment Certificate

60.1 (a) The Contractor shall submit a bill in 1 copies of soft and hard copy to the Engineer in a form approved by the Engineer. The bill for interim payment shall include the following items, as applicable, which shall be taken in to account in the sequence listed:-

- i) the estimated Contract value of the Works executed since the submission of the last bill, obtained by applying the base unit rates and prices in the Schedule of Quantities measured by the Engineer pursuant to clause 57;
- ii) the estimated Contract value of the Works as obtained above executed upto the previous bill;
- iii) the cumulative estimated Contract value at base unit rates and prices of the Works upto the bill in question obtained by adding (i) and (ii) ;
- iv) the cumulative amounts approved in respect of extra items executed up to the bill in question, obtained by applying the rates approved.
- v) any amount to be withheld under the retention provisions of clause 60.3 ;
- vi) any credit or debit for the period in question in respect of materials on site intended for, but not yet incorporated in , the Works in the amount and under the conditions set forth in clause 60.2 ;
- vii) any amount to be deducted on account of the Material advance.
- viii) any other sum to which the Contractor may be entitled under the Contract.
- ix) deductions of Income tax shall be made on the gross amount of each bill as per the provision of the Income tax Act.
- x) any amount to be deducted on account of water charges and power supply, if any, pursuant to clause 5.4 & 6.2 of Section III, Special Conditions of Contract.
- xi) any amount to be deducted on account of materials issued to the Contractor pursuant to clause 7.1 of section III, Special Conditions of Contract.

- (b) Within 15 days of the receipt of the said bill for interim payment, it shall be approved or amended such that, in the Engineer's opinion, the certificate reflects the amount due to the Contractor in accordance with the Contract. In cases where there is difference of opinion as to the value of any item, the Engineer's view shall prevail.

60.2 The Contractor shall be entitled to such sum as the Engineer may consider proper in respect of materials intended for but not yet incorporated in the Works provided that:

- a) the materials are in accordance with the specification for the Works ;
- b) such materials have been delivered to the site, and are properly stored and protected against loss or damage or deterioration to the satisfaction of the Engineer;
- c) the Contractor's records of the requirements, orders, receipts and the use of materials are kept in a form approved by the Engineer and such records shall be available for inspection by the Engineer;
- d) the Contractor shall submit with his monthly statement the estimated value of the materials on site together with such documents as may be required by the Engineer for the purpose of the valuation of materials and providing evidence of ownership and payment therefore;
- e) the ownership of such materials shall be deemed to vest in the SHREE SOMNATH TRUST; and
- f) the sum payable for such materials on site shall not exceed 75% of the related exfactory/exwarehouse/exquarry price of the building materials which shall in any case not be more than the material component of the base unit rates in the Schedule of Quantities.(Not applicable.)

60.3 Retention Money

- a) A retention amount of 5% will be deduct from the each running bill pursuant to clause 60.1 and it will be release after one year of completion date.
- b) NOT APPLICABLE
If the contactor so requests, the SHREE SOMNATH TRUST may pay the cumulative amount of retention money to the contactor upon lodgment with the SHREE SOMNATH TRUST of a Bank guarantee issued by at Nationalized Indian Bank, or a foreign bank operating in India. The guarantees given by other banks should be confirmed by a Nationalized Indian Bank or a foreign bank operating in India. The acceptable form of Bank guarantee shall be strictly as given in section IX of the bidding document:-Not applicable.
- c) NOT APPLICABLE
one half of the retention money shall be paid to the Contractor within 120 days of issuing of the certificate of completion by the Engineer and the balance of the retention money shall be certified with settlement of the final bill. Provided always that, if at such time there shall remain to be executed by the Contractor any works ordered during such period pursuant to clause 50 and 51 hereof, the SHREE SOMNATH TRUST shall be entitled to withhold payment until the completion of such works of so much of the balance of the retention money as shall, in the opinion of the Engineer, represent the cost of the works so remaining to be executed; and
- d) no interest shall be paid by the SHREE SOMNATH TRUST to the Contractor for the amount withheld as Retention Money with the SHREE SOMNATH TRUST.

60.4 The Engineer may by any Interim Payment Certificate make any corrections or modifications in any previous bills (other than one purporting to be a Final payment certificate) which shall have been issued by him and shall have power to modify or withhold any Interim Payment Certificate if the works or any part thereof are not being carried out to his satisfaction.

60.5 Mobilization Advance Loan :- NOT APPLICABLE

60.6 All interim payments shall be treated as advance payments. On completion of the entire work, the Contractor shall submit his final bill. After verifying the final bill, the

SHREE SOMNATH TRUST will issue to the Contractor a statement (hereinafter called as the Final Account statement). The Contractor shall return the Final Account Statement duly signed as an acknowledgement of full and final value of work performed under the Contract and full & final settlement of the payment. On receipt of this statement back from the Contractor, the final payment shall be released.

61.0 Approval only by Maintenance Certificate

61.1 No certificate other than the Maintenance Certificate referred to in Clause 62 hereof shall be deemed to constitute approval of the Works.

62.0 Maintenance Certificate

62.1 The Contract shall not be considered as completed until a Maintenance Certificate shall have been signed by the Engineer and delivered to the SHREE SOMNATH TRUST stating that the Works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer after the expiry of the Period of Maintenance, or, if different periods of maintenance shall become applicable to different sections or parts of the Works, the expiry of the latest such period, or as soon thereafter as any works ordered during such period, pursuant to Clause 50 and 51 hereof, shall have been completed to the satisfaction of the Engineer and full effect shall be given to this Clause, notwithstanding any previous entry on the Works or the taking possession, working or using thereof or any part thereof by the SHREE SOMNATH TRUST.

62.2 The SHREE SOMNATH TRUST shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the works, unless the Contractor shall have made a claim in writing in respect thereof before the issuance of the Maintenance Certificate under this Clause.

62.3 Notwithstanding the issue of the Maintenance Certificate the Contractor and, subject to clause 62.2, The SHREE SOMNATH TRUST shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the Maintenance Certificate which remains unperformed at the time such Certificate is issued and, for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties hereto.

REMEDIES AND POWERS

63.0 Default of Contractor

63.1 If the Contractor shall become bankrupt, or have a receiving order made against him, or shall present his petition in execution levied on his goods, or if the Engineer shall certify in writing to the SHREE SOMNATH TRUST that in his opinion the Contractor:-

- a) has abandoned the Contract, or
- b) without reasonable excuse has failed to commence the works or has suspended the progress of the works for 15 days after receiving from the Engineer written notice to proceed, or
- c) has failed to remove materials from the site or pull down and replace work for 15 days after receiving from the Engineer written notice that the said materials or work had been condemned and rejected by the Engineer under these conditions, or
- d) despite previous warnings by the Engineer, in writing, is not executing the works in accordance with the Contract, or is persistently neglecting to carry out his obligations under the Contract, or
- e) has, to the detriment of good workmanship, or in defiance of the Engineer's instructions to the contrary, sub-let any part of the Contract.

then the SHREE SOMNATH TRUST may, after giving 15 day's notice in writing to the Contractor, enter upon the site and the works and expel the Contractor there from and without thereby voiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the SHREE SOMNATH TRUST or the Engineer by the Contract, and may himself complete the works or may employ any other Contractor to complete the works. The SHREE SOMNATH TRUST or Such other Contractor may use for such completion so much Of the constructional plant, temporary works and materials, which have deemed to be reserved exclusively for the execution of the works, under the provisions of the Contract, as he or they may think proper, and the SHREE SOMNATH TRUST may at any time, sell any of the said Constructional Plant, temporary works and unused materials including invocation of bank guarantees and apply the proceeds of sale in or towards the satisfaction of any sum(s) due or which may become due to him from the Contractor under the Contract .

63.2 The Engineer shall, as soon as may be practicable after

any such entry and expulsion by the SHREE SOMNATH TRUST, fix determine ex-partie, or by or after reference to the parties, or after such investigation or enquiries as he may think fit to make or institute, and shall certify what amount, if any, had at the time of such entry and expulsion been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract and the value of any of the said unused or partially used materials, any Constructional Plant and any temporary works.

63.3 If the SHREE SOMNATH TRUST shall enter and expel the Contractor under this clause, it shall not be liable to pay to the Contractor any money on account of the Contract until the expiry of Period of Maintenance and thereafter until the costs of execution and maintenance, damages for delay in completion, if any, and all other expenses incurred by the SHREE SOMNATH TRUST have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum(s), if any, as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the SHREE SOMNATH TRUST the amount of such excess and it shall be deemed a debt due by the Contractor to the SHREE SOMNATH TRUST and shall be recoverable accordingly.

63.4 In such event, the SHREE SOMNATH TRUST shall charge 15% overhead to cover the departmental charges and the same shall be recovered from the Contractor.

63.5 No credit shall be allowed to the Contractor in case the amount spent by the SHREE SOMNATH TRUST for a particular item which shall be less than the amount payable as per the tender amount.

64.0 Urgent repairs

64.1 If, by reason of any accident, or failure, or other event occurring to in or in connection with the works, or any part thereof, either during the execution of the works, or during the Period of Maintenance, any remedial or other work or repair shall, in the opinion of the Engineer, be urgently necessary for the safety of the works and the Contractor is unable or unwilling at once to do such work or repair, the SHREE SOMNATH TRUST may employ and pay other persons to carry out such work or repair as the Engineer may consider necessary. If the work or repair so done by the SHREE SOMNATH TRUST is work which, in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract, all expenses properly incurred by the SHREE SOMNATH TRUST in so doing shall be recoverable from the Contractor by the SHREE SOMNATH TRUST, or may become due from the Contractor. Provided always that the Engineer, as the case may be, shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.

SPECIAL RISKS

65.0 No Liability for War etc.

65.1 Notwithstanding anything in the Contract contained:-

The Contractor shall be under no liability whatsoever whether by way of indemnity or otherwise for or in respect of destruction of or damage to the works, save to work condemned under the provisions of Clause 39 hereof prior to the occurrence of any special risk hereinafter mentioned, or to property whether of the SHREE SOMNATH TRUST or of third parties, or for or in respect of injury or loss of life which is the consequence of any special risk as hereinafter defined. The SHREE SOMNATH TRUST shall indemnify and save harmless the Contractor against and from the same and against and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising there out or in connection therewith.

65.2 If the works or any material on the site, or any other property of the Contractor used or intended to be used for the purposes of the works, shall sustain destruction or damage by reason of any of the said special risks the Contractor shall be entitled to payment for:-

- a) any permanent work and for any materials so destroyed or damaged, and, as so far as may be required by the Engineer, or as may be necessary for the completion of the works, on the basis of costs plus such profit as the Engineer may certify to be reasonable
- b) replacing or making good any such destruction or damage

of the works:

- c) replacing or making good such materials or other property of the Contractor used or intended to be used for the purposes of works.
- 65.3 Destruction, damage, injury or loss of life caused by the explosion or impact whenever and wherever occurring of any mine, bomb, shell, grenade or other projectile, missile, munitions or explosive of war, shall be deemed to be a consequence of the said special risks.
- 65.4 The SHREE SOMNATH TRUST shall repay to the Contractor any increased cost of or incidental to the execution of the work, other than such as may be attributable to the cost of reconstruction work condemned under the provisions of Clause 39 hereof, prior to the occurrence of any special risk, which is however, attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this clause hereinafter contained in regard to outbreak of war, but Contractor shall as soon as any such increase of cost shall come to his knowledge forthwith notify the Engineer thereof in writing.
- 65.5 The Special Risks are unprecedented flood, earthquake or other convulsion of nature, war, hostilities (whether war be declared or not) invasion, act of foreign enemies, the nuclear and the pressure wave risk described in clause 20 hereof, or in so far as it relates to the country in which the works are being or are to be executed or maintained, rebellion, revolution, insurrection, military or usurped power, civil work, or unless solely restricted to the employees of the Contractor or of his Sub-Contractors and arising from the conduct of the works, riot, commotion or disorder.
- 65.6 If, during the currency of the Contract, there shall be an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the works, the Contractor shall, until and unless the Contract is terminated under the provision of this Clause, continue to use his best endeavors to complete the execution of the works. Provided always that the SHREE SOMNATH TRUST shall be entitled at any time after such outbreak of war to terminate the Contract by giving written notice to the Contractor and, upon such notice being given, this Contract shall, except as to the rights of the parties under this clause and to the operation of clause 65.8 hereof, terminate, but without prejudice to the right of either party in respect of any antecedent breach thereof.
- 65.7 If the Contract shall be terminated under the provisions of

the last preceding sub-clause the Contractor shall, with all reasonable dispatch, remove from the site all constructional plant and shall give similar facilities to his sub-Contractors to do so.

65.8 If the Contract shall be terminated as aforesaid, the Contractor shall be paid by the SHREE SOMNATH TRUST, as in so far as much amount or items shall not have already been covered by payments on account made to the Contractor,

for all works executed prior to the date of termination at the rates and prices provided in the Contract and in addition:-

- a) the amounts payable in respect of any preliminary terms, so far as the works or service comprised therein has been carried out or performed, and a proper proportion as certified by the Engineer of any such items, the work or service comprise in which has been partially carried out or performed.
- b) the cost of materials or goods reasonably ordered for the works which shall have been delivered to the Contractor, or of which the Contractor is legally liable to accept delivery, such materials or goods becoming the property of the SHREE SOMNATH TRUST upon such payments being made by him.
- c) a sum to be certified by the Engineer, being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the works insofar as such expenditure shall not have been covered by the payments in this sub-clause before mentioned.
- d) any additional sum payable under the provision of the clauses 65.1, 65.2, and 65.4.
- e) the reasonable cost of removal of construction plant under clause 65.7 and, if required by the Contractor, return thereof to the Contractor's main plant yard in his country of registration or to any other destination, at no greater cost.
- f) the reasonable cost of repatriation of all the Contractor's staff and workmen employed in or in connection with the works at the time of such termination.

Provided always that against any payments due from the

SHREE SOMNATH TRUST under this sub-clause, the SHREE SOMNATH TRUST shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of constructional plant and materials and any other sums which at the date of termination were recoverable by the SHREE SOMNATH TRUST from the Contractor under the terms of the Contract.

66.0 Payment in the Event of Frustration

66.1 If a war or other circumstances outside the control of both parties, arises after the Contract is made so that either party is prevented from fulfilling his Contractual obligation, or under the law governing the Contract, the parties are released from further performance, then the sum payable by the SHREE SOMNATH TRUST to the Contractor in respect of the work executed shall be the same as that which would have been payable under clause 65 hereof if the Contract had been terminated under the provisions of clause 65 hereof.

67.0 Settlement of Disputes

67.1 If the Contractor considers any work demanded of him to be outside the requirements of the Contract, or considers any drawings, record or ruling of the Engineer on any matter in connection with or arising out of the Contract or the carrying out of the work to be unacceptable, he shall promptly ask the Engineer in writing, for written instructions or decision. There upon the Engineer shall give his written instructions or decision within a period of thirty days of such request.

67.2 Upon the receipt of the written instructions or decisions the Contractor shall promptly proceed without delay to comply with such instructions or decisions.

67.3 If the Engineer fails to give his instructions or decisions in writing within a period of thirty days after being requested, or if the Contractor is dissatisfied with the instructions and decisions appeal to the SHREE SOMNATH TRUST which shall afford an opportunity to the Contractor to be heard and to offer an evidence in support of his appeal. The SHREE SOMNATH TRUST shall give a decision within a period of thirty days after the Contractor has given the said evidence in support of his appeal.

67.4 If the Contractor is dissatisfied with this decision, the Contractor within a period of thirty days from the receipt of the decision shall indicate his intention to refer the dispute to Arbitration, failing which the said decision shall be final and conclusive.

68.0 Arbitration

68.1 All disputes or differences whatsoever which shall at any time arise between the parties hereto on the construction of this agreement or any clause herein contained or any matter in any way connected therewith or the rights, duties, obligations of the parties hereto shall within 3 months of the written notice of such difference(s) being given by one party to the other be finally referred to the adjudication of the Sole Arbitrator to be appointed by the SHREE SOMNATH TRUST. The SHREE SOMNATH TRUST shall then finalize a panel of three arbitrators and the intimation shall be sent

to the Contractor to enable the Contractor to choose and confirm his acceptance to the appointment of one arbitrator from the panel. If the Contractor fails to communicate his selection of the name, within the stipulated period, the SHREE SOMNATH TRUST shall select one arbitrator from the list and appoint him as the sole arbitrator. If the SHREE SOMNATH TRUST fails to send such a list within thirty days, as stipulated, the Contractor shall send a similar list to the SHREE SOMNATH TRUST within fifteen days. The SHREE SOMNATH TRUST shall then select one arbitrator from the list and appoint him as the sole arbitrator within fifteen days. If the SHREE SOMNATH TRUST fails to do so the Contractor shall communicate to the SHREE SOMNATH TRUST the name of one officer from the panel who shall then be the Sole Arbitrator. The appointment of the Sole Arbitrator so made shall be final and conclusive.

68.2 If the Arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another Sole Arbitrator shall be appointed as aforesaid.

68.3 The Arbitrator shall be deemed to have entered in the reference on the date he issues notices to both the parties fixing the date of the first hearing.

68.4 The Arbitrator from time to time, with the consent of the parties enlarge the time for making and publishing the award.

68.5 The venue of the Arbitration shall be Somnath only and jurisdiction for any matter/dispute arising out of or concerning or connected with such Arbitration shall be of Somnath District court only as the case may be.

68.6 The fees, if any, of the Arbitration shall, if required to

be paid before the award is made and published, be paid at half by each of the parties. The costs of the reference and the award including the fees, if any, of the Arbitrator shall be in the discretion of the Arbitrator who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix and settle the amount of costs to be so paid.

68.7 The award of the Arbitrator shall be final and binding on both the parties.

68.8 The Arbitration proceedings shall be governed by the Arbitration Act, 1940 and the rules hereunder or any statutory modification thereof for the time being in force. Performance under the Contract, shall, if reasonably possible, continue during the Arbitration proceedings and the payments due to the Contractor by the SHREE SOMNATH TRUST shall not be withheld, unless they are the subject of the Arbitration proceedings.

69.0 Notices

69.1 All certificates, notices or written orders to be given by the SHREE SOMNATH TRUST or by the Engineer to the Contractor under the terms of the Contract shall be served by sending by post to or delivering the same to the Contractor's principal place of business, or such other address as the Contractor shall nominate for this purpose.

69.2 All notices to be given to the SHREE SOMNATH TRUST or to the Engineer under the terms of the Contract shall be served by sending by post or delivering the same to the respective addresses nominated for that purpose.

69.3 Either party may change a nominated address to another address in the country where the works are being executed by prior written notice to the other party and the Engineer may do so by prior written notice to both parties.

70.0 Taxation

70.1 The prices bid by the Contractor shall include all taxes, duties including Sales Tax or or Service tax or works Contract tax or turn over tax, vat & service tax, labour welfare cess and if any new tax by government etc, that may be levied according to the laws and regulations on the constructional plant, material and supplies acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the contract shall relieve the Contractor from his responsibility to pay any tax that may be levied on profits made by him in respect of the Contract.

70.2 The Contractor's staff, personnel and labor will be liable to pay personnel income taxes in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor thereof as may be imposed on him by such laws and regulations.

71.0 Bribery and Collusion

71.1 The SHREE SOMNATH TRUST shall be entitled to terminate the contract and recover from the contractor the amount of any loss resulting from such termination if the contractor shall have offered or given to any person any gift or consideration of any kind as an inducement or reward for doing, or for bearing to do any action in relation to obtaining, or in the execution of contract or any other contract with the SHREE SOMNATH TRUST, or if any of the like acts shall have been done by any person employed by the contractor or acting on his behalf (whether with or without the knowledge of the contractor), or if the contractor shall have come in to any agreement with another contractor (s) whereby an agreed quotation or estimate shall be offered as a bid to the SHREE SOMNATH TRUST by one or more contractors.

71.2 In the event of such termination, the contractor shall :

- a) Proceed as provided in sub clause 65.7 hereof, and
- b) be paid by the SHREE SOMNATH TRUST as provided in sub clause 65.8 hereof, provided that any loss referred herein shall first be deducted.

72.0 Termination of Contract for SHREE SOMNATH TRUST's convenience

72.1 The SHREE SOMNATH TRUST shall be entitled to terminate this Contract at any time for its own convenience after giving 30 days prior notice to the Contractor, with a copy to the Engineer.

72.2 In the event of such termination the Contractor :

- a) shall proceed as provided in sub clause 65.7 hereof, and
- b) shall be paid by the SHREE SOMNATH TRUST as provided in sub clause 65.8 hereof.

SECTION III

SPECIAL CONDITIONS OF CONTRACT

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Section III

SPECIAL CONDITIONS OF CONTRACT

- 1.0 The following Special conditions of Contract shall supplement the General conditions of Contract, given in Section II, . Wherever there is a conflict the provision herein shall prevail over those in the General conditions of Contract.
- 2.0 Taxes
 - 2.1 The rates shall include all taxes. The bidder shall include in his rates all types of taxes including sales tax, works contract tax, service tax and other applicable taxes and VAT as per the law of the Central & the Government of the state, where the Contract is to be performed. No claim on account of any type of tax shall be admissible.
- 3.0 Time of Completion
 - 3.1 The Contractor shall execute the Contract up to 10% increase in the value of the works within the specified completion period of the Contract and no extension of time shall be granted. In case the increase in the value exceeds 10% of the Contract amount, proportionate extension of time shall be granted, for the entire amount of increase over the original Contract value.
- 4.0 Engineer's Office Accommodation
 - 4.1 The Contractor shall at his own cost provide a temporary office accommodation of size 3M X 4M for the Engineer along with toilet facility and shall provide electrical connection to the same. The structure shall be removed after the completion of work, by the Contractor, at his own cost.
- 5.0 Water For Construction and Other Use
 - 5.1 Unless otherwise specified the Contractor shall make his own arrangement for water for the work and nothing extra shall be paid for the same.
 - 5.2 The water used by the Contractor shall be fit for drinking as well as construction purposes to the satisfaction of the Engineer / SHREE SOMNATH TRUST.
 - 5.3 The Contractor may be allowed to construct temporary tube wells/ wells / sump in the Project site for getting water after he has got written consent of the Owner / SHREE SOMNATH TRUST / Engineer. The Contractor shall be required to provide necessary arrangements to avoid any accident or damage to the buildings, roads, and service lines adjacent to the tube wells / well / sump. The Contractor shall dismantle the tube well / well / sump on completion of work and restore the ground to its original condition at his own cost.

- 5.4 In case the Owner / SHREE SOMNATH TRUST supplies water, it shall be on the following conditions:
- a. Water charges @0.5% shall be recovered from the gross amount of work done from each Interim bill.
 - b. The water shall be provided at one point in the site at the discretion of the Engineer. The Contractor shall make his own arrangement for water connection, storage and distribution pipe lines in the construction area.
 - c. The Owner / SHREE SOMNATH TRUST shall not guarantee the maintenance of uninterrupted water supply. It will be the responsibility of the Contractor to make alternative arrangements for water supply at his own cost in the event of any break down so that the progress of work is not affected for want of water. No claim or damage or refund of water charges shall be entertained on account of such break down.

6.0 Power (Electricity) Supply

6.1 Unless otherwise specified the Contractor shall have to make his own arrangements for the power supply at his cost. All the works shall be done as per IEA Rules. The temporary lines shall be removed by the Contractor at his cost after the completion of the work or if there is any hindrance, to the other works due to the alignment of these lines, during the Contract period.

6.2 In case the power supply is provided by the Owner / SHREE SOMNATH TRUST, it shall be on the following conditions:-

1. The supply shall be made at one point in the site at the direction of the Engineer. The Contractor shall make his own arrangement to carry and distribute the power wherever it is required within the site as per IEA rules.
2. Electric charges @ 0.5% shall be recovered from the gross amount of work done from each interim bill.

7.0 IMPORTANT NOTES

7.1 All works shall conform to specifications.

7.2 Quantities furnished are approximate and can increase or decrease up to 50% during actual execution of work. Tenderer shall quote firm unit rates. No claim in the respect of actual quantities varying up to 50% or deleted from furnished here in shall be entertained.

7.3 Rates and prices shall be written in blue/black ink and shall be entered both in figures and in words.

- 7.4 Rate quoted shall be firm for entire duration of the works.
- 7.5 Progressive page total and the final total amount shall be furnished.
- 7.6 Tenderers shall as far as possible quote for the entire work.
- 7.7 On award of work-building-wise break up of quantities shall be worked out and R.A. bills will be prepared building-wise.
- 7.8 Wherever quantities of items are not given in the schedule of quantities, an appropriate rate should be quoted by the tenderer. SHREE SOMNATH TRUST reserves the right to ask the successful bidder to execute any of such items during implementation of project.
- 7.9 If rates of similar items in different building/work varies, the lowest rates of all quoted rates will be paid for all such items.
- 7.10 Any discount/rebate offered by the tenderer will be applicable on entire value of the work.
- 7.11 All the payments to party on account of running accounts bill shall be treated as advance payment only subject to settlement in the final bill of the project.
- 7.12 INSURANCE

The contractor shall take all risk insurance policy covering third party liability for entire civil and structural work against any danger, against any natural calamity, fire flood, riot, etc. during construction phase till handing over the entire work to the SHREE SOMNATH TRUST irrespective of what is stated elsewhere in the tender document.

8.00 LIST OF APPROVED MAKES

Sr.No.	Item	Approved Makes
1.	Anti-termite Treatment	Chlorpyriphos 20 EC of Pest Control (I) Ltd.
2.	Water proofing compound	Fosroc, CICO, ACC, Impermo
3.	Bitumen Impregnated Fiber Board/ SIL FLEX Sheet	Shalimar Tar Products Ltd. Supreme Ind. Ltd.
4.	Grouting cement	A.C.C., FOSROC, CICO
5.	Prelaminated Particle Board	Nova pan or equivalent
6.	Synthetic Enamel paint	Asian, British, J & N, ICI
7.	Floor Hardner	Fosroc, Sico, Pidilite
8.	Plasticizers	Fosroc, Sico, Pidilite, STP LTD
9.	Glaze Tiles	Johnson & Johnson, Somany, Navin, Asian
10.	Ceramic Tiles	Somany, Navin, Asian, Kajaria, Johnson & Johnson,
10(a)	Vitrified tiles	Asian, Somany
11.	Door closer	Everite, Hyper, Warnish or equivalent
12.	G. I. Pipes	Tata, GST, Jindal
13.	Sluice valves/C.I. valves	Indian Valve Co, Mumbai Leader, Kirloskar
14.	C. P. Fittings	Jaquar, Ark, Gem, Essco special
15.	G. I. Fittings	'R' Brand or equivalent
16.	Manhole cover	Neco, Navin or equivalent
17.	Rolling shutters	Swastic, Sarvottam, Star Standard
18.	Glass	Modifloat, Triveni, PPG
19.	Metalic compound for floors	Ironite Fastonate, Bestonate siroxide

20.	Nahni Trap	Atta, Neco, HCI, Prince
21.	Stoneware pipes	Perfert, Kashimira
22.	Hardware fittings	E.G., Blush, Earl Bihari
23.	S. S. Sink	Nirali, Krishna
24.	P.V.C. pipes & fittings	Finolex, Supreme, Prince, Astral etc
25.	Alluminium sections	Jindal, Indal Ltd.
26.	Chemical Resistant Epoxy materials	STP LTD ,Perma Const. Aids (P) Ltd.
27.	Stenless steel Railing of SS Grade-316	Kich India, HI-Tech Enterprise, Royal Febrication.

Notes :

Architect reserve the right to select any of the manufacturers from above list and to add/delete names of the other parties as and when required.

SECTION IV
TECHNICAL SPECIFICATIONS

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SECTION 1.00 EARTHWORK

Scope

This section covers the works specification of earthwork in excavation in all kinds of soils including murrum, hard murrum, soft rock (without blasting), hard rock (without blasting), rock (with blasting), filling excavated earth in plinths, sand filling in plinth, rubble soling, and brick on edge soling .

Applicable Codes

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

- a) IS - 4081 Safety code for blasting and related drilling operations
- b) IS - 1200 Method of measurement of building works.
- c) IS - 3764 Safety code for excavation work.
- d) IS - 3385 Code of practice for measurement of Civil Engineering works.
- e) IS - 2720 Part II Determination of moisture content.

Part VIII Determination of moisture content dry density relation using light compaction.

Part XXVIII Determination of dry density of soils, in-place by the sand replacement method.

Part XXIX Determination of dry density of soils, in-place, by the core cutter method.

Drawings

Engineer will furnish all necessary drawings showing the areas to be excavated, filled, sequence of priorities etc. Contractor shall follow strictly such drawings.

General

Contractor shall provide all tools, plants, instruments, qualified supervisory personnel, labor, materials, and temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein, for completion of the Work.

Contractor shall carry out the survey of the site before excavation and set properly all lines and establish levels for various works such as earthwork in excavation for leveling, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 5 m intervals or nearer as determined by Engineer based on ground profile. These shall be checked by Engineer and thereafter properly recorded.

The area to be excavated/filled shall be cleared of fences, trees, plants, logs, slumps, bush, vegetations, rubbish slush etc. and other objectionable matter. If any roots or stumps of trees are found during excavation, they shall also be removed. The material so removed shall be burnt or disposed off as directed by Engineer. Where earth fill is intended, the area shall be stripped of all loose/soft patches, top soil containing deleterious matter/materials before fill commences.

Relics, Objects of Antiquity, Etc.

All gold, silver, oil minerals archaeological and other findings of importance, all precious stones, coins, treasures, relics, antiquities and other similar things which may be found in or upon the site shall be the property of owner and Contractor shall dully preserve the same to the satisfaction of SHREE SOMNATH TRUST and from time to time deliver the same to such person or persons as SHREE SOMNATH TRUST may from time to time authorize or appoint to receive the same.

1.01 Earth work in excavation up to 1.50 M from existing GL

Note: Sequence does not necessarily refer the sr. no. of Items in schedule of quantities. Contractor shall follow the item description for their specifications.

1.01 (a) Earth work in excavation up to 1.50 M from exiting GL

A) Classification

Any earthwork will be classified under any of the following categories:-

i) All kinds of soils

These shall include all kinds containing kankar, sand, silt, moorum and/or shingle, gravel, clay, loam peat, ash, shale etc. which can generally be excavated by spade, pick-axe and shovel and which is not classified under soft and decomposed rock, and hard rock defined below. This shall also include embedded rock boulders not bigger than 1 meter in any dimension and not more than 200 mm in any one of the other two dimensions.

ii) Soft Rock

This shall include rock, boulders, slag, chalk, slate, hard mica schist, laterite etc. which are to be excavated with or without blasting or could be excavated with picks, hammer, crow bars, wedges. This shall also include excavation in macadam and tarred roads and pavements. This shall also include rock boulders not bigger than 1 meter in any dimension and not more than 500 mm in any one of the other two dimensions Rubble masonry to be dismantled will also be measured under this item.

iii) Hard Rock

This shall include rock which cannot be easily excavated with pick-axes, hammer, crow bars and wedges but has to be either heated where blasting is prohibited or has to be blasted. They shall be stacked separately for measurement.

(B) The earth work in excavation shall be done as per the Architect and structural consultant's drawings up to required depths and levels and alignments in all sorts of soils. The depth of the foundation will be as per the Engineer's instructions. The lining work should be done by the Contractor. Roots or trees met with during the excavation shall be cut and smeared with coal tar. Excavated earth shall be stacked at least 3 m away from the trenches or as per the Engineer's instructions, so that it may not damage the sides of the excavated trenches. The sides of the excavated trenches shall be vertical and in straight line and bottom uniformly leveled watered, consolidated and ready for termite treatment. The maximum lead for stacking the earth shall be 100 m, unless otherwise categorically specified in the item description.

(C) In firm soil if the excavation is deeper than 2 m the sides of the trenches shall be made bigger by allowing steps of 50 cm on either side so as to keep the slope 0.25 to 1. In loose soft or slushy soil the width of the step shall be

suitably increased or the sides sloped or shoring and strutting may be done as per the Engineer's instructions.

- (D) For excavation for drain work, the sides and the bottoms should be to the required slope, shape and gradient. The cutting shall be done from top to bottom. Under no circumstances shall undermining or under cutting be allowed. The final surface shall be neatly leveled and well compacted. The earth from the cutting shall be directly used for filling either in plinth or on grounds.
- (E) For excavation in trenches for pipes nothing extra shall be payable for the lift irrespective of the depth unless specifically mentioned otherwise in the Schedule of Quantities.
- (F) If the trenches are made deeper than specified level due to oversight or negligence of the Contractor the extra depth shall be filled up by lean concrete of mix 1:5:10 (1 cement; 5 coarse sand and 10 coarse aggregate of nominal size 40mm) and if the trench is made wider than shown in the drawings the Contractor has to make good at his own cost. The foundation trenches shall be free from water and muck, while the foundation work is in progress.
- (G) The trenches which are ready for concreting shall be got approved by the Engineer.
- (H) The excavated stacked earth shall be refilled in the trenches and sides of foundation in 150 mm layers and the balance surplus shall be first filled in layers in plinth and the remaining surplus shall be disposed off by uniform spreading within the site/ outside the site as directed by the Engineer.
- (I) Adequate protective measures shall be taken by the Contractor to see that the excavation for the building foundation does not affect the adjoining structure's stability and safety. Contractor will be responsible if he has not taken precaution for the safety of the people, property or neighbor's property caused by his negligence during the constructional operations.
- (J) To the extent available, selected surplus spoils from excavated materials shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic & other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill up the voids and the mixture used for filling.

- (K) As soon as the work in foundations has been accepted and measured, the spaces around the foundations, structures, pits, trenches etc. shall be cleared of all debris and filled with earth in layers 15 cm to 20 cm , each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of Engineer.
- (L) Mode of measurement for Earth work in excavation including back filling
- i) Lead
- Lead for deposition/disposal of excavated material, shall be as specified in the respective item of work. If the lead is not specified in the respective item , a basic lead of 500 m shall be considered for quoting rates. Only leads beyond 500m shall be considered as extra lead and the Contractor shall be compensated for the same. For the purpose of measurement of lead the area to be excavated or filled or area on which excavated material is to be deposited/disposed off shall be divided into suitable blocks and for each of the blocks, the distance between centerlines shall be taken as the lead which shall be measured, as far as practically possible, by the shortest straight line route on the plan and not the actual route taken by Contractor. No extra compensation is admissible on the grounds that the lead including that for borrowed materials had to be transported over marshy or katcha land/route.
- ii) All excavation shall be measured net. Dimensions for purpose of payment shall be reckoned on the horizontal area of the excavation at the base for foundations of the walls, columns, footings, tanks, rafts or other foundations structure to be built, multiplied by the mean depth from the surface of the ground in accordance with the drawings. Excavation inside slopes shall not be paid for. Contractor may make such allowances in his rates to provide for excavation in side slopes keeping in mind the nature of the soil and safety of excavation. In soft/slushy soil or in firm soil if the excavation is deeper than 2m the sides of the trenches shall be made bigger by allowing steps of 50cm on either side so as to keep slope 0.25 : 1. This shall be paid as per original tender rate. However, if concreting is proposed against the additional/extra excavation made by the Contractor shall be made good by the Contractor with concrete of the same class as in the foundations at his own cost.

iii) Backfilling as per specification the side of foundations of columns, footings, structures, walls, tanks rafts, trenches etc. with excavated materials will not be paid for separately. It shall be clearly understood that the rate quoted for excavation including backfilling shall include stacking of excavated material as directed,

excavation/stacking of selected stacked material, conveying it to the place of final backfill, compaction etc. as specified. As a rule material to be back filled shall be stacked temporarily within the basic lead of 500 meters unless otherwise specified in the item.

iv) The rates quoted shall also include for dumping of excavated materials in regular heaps, bunds, riprap with regular slopes as directed by Engineer within the lead specified and leveling the same so as to provide natural drainage. Rock/soil excavated shall be stacked properly as directed by Engineer. As a rule, all softer material shall be laid along the center of the heaps, harder and more weather resisting materials forming the casing on the sides and the top. Excavated soft rock or hard rock shall be stacked separately.

(v) The bailing out of water shall also be executed by the Contractor at his own cost.

1.02 Earth work in excavation for depth exceeding 1.50 M but not exceeding 3.0 M

The general specification shall be same as for the item 1.01 given above.

1.03 Earth work in excavation for depth exceeding 3.0 M but not exceeding 4.5 M

The general specification shall be same as for the item 1.01 given above.

1.04 Earth work in excavation for depth from 4.50 to 6.0 M from EGL

(A) Unless otherwise stated herein, IS 4081, safety code from blasting and related drilling operations shall be followed. After removal of over burden, if any, excavation shall be continued in rock to such widths, lengths, and profiles as are shown on the drawings or such other lines and grades as may be specified by Engineer. As far as possible all blasting shall be completed prior to commencement of

construction. At all stages of excavation, precautions, shall be taken to preserve the rock below and beyond the lines specified for the excavating, in the soundest possible condition. The quantity and strength of explosive used,

shall be such as will neither damage nor crack the reacted by Engineer shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structure as a result of blasting operations. In case of damage to permanent or temporary structures, at

his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

- (B) Specific permission of Engineer will have to be taken by Contract for blasting rock and he shall also obtain a valid blasting license from the authorities concerned. If permission fro blasting is refused by Engineer, the rock shall be removed by wedging, pick barring, heating and quenching or other approved means. Al loose/loosened rock in the sides shall be removed y barring wedging, etc. The unit rates for excavation in hard rock shall include the cost of all these operations.
- (C) Contractor shall obtain necessary license for storage of explosives fuses and detonators issued to him from SHREE SOMNATH TRUST 's stores or from a supplier arranged by the Contractor, from the authorities dealing with explosives. The fees, if any, required for obtaining such license, shall be borne by Contractor. Contractor shall have to make necessary storage facilities, for the explosives etc. as per rules and regulations of local, state and Central Govt. authorities and Statutory bodies. Explosives shall be kept dry and shall not be exposed to direct rays of sun or be stored in the vicinity of fire, stoves, steam pipes or heated metal, etc. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done and surplus left after filing the holes shall be removed to the magazine. The magazine shall be built as far as possible from the area to be blasted. Engineer's prior approval shall be taken for the location proposed for the magazine.
- (D) In no case shall blasting be allowed closer than 30 m to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old.
- (E) For blasting operations, the following points shall be observed:-
 - i) Contractor shall employ competent and experienced supervisor and licensed blaster in charge for each set of

- operation. Who shall be held personally responsible to ensure that all safety regulations are carried out.
- ii) Before any blasting is carried out, Contractor shall intimate Engineer and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
 - iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200M radius from the firing point, at least 15 minutes before firing time by sounding warning siren. The areas shall be encircled by red flags. Clearance signal shall also be given sounding a distinguishing siren.
 - iv) The blasting of rock near any existing buildings, equipment or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Engineer, a trench shall have to be cut by chiseling prior to the blasting operation separating the area under blasting from the existing structures.
 - v) The firing shall be supervised by a Supervisor and not more than six (6) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along with misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
 - vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filed to the required depth the balance of the hole shall be filed with stemming which may consist of sand or stone dust or similar inert material.
 - vii) Contractor shall preferably shall preferably detonate the explosives electrically.
 - viii) The explosive shall be exploded by means of a primer which shall be fired by detonating a fuse instantaneous detonator

(FID) or other approved cables. The detonators with FID shall be connected by special nippers.

- ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Under water or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- x) Holes for charging explosive shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level. Any rock excavation beyond an over break limit of 75mm shall be filled up as instructed by Engineer, with concrete of strength not less than M10. The cost of filling such excess depth shall be borne by Contractor and the excavation carried out beyond the limit specified above will not be paid for. Stepping in rock excavation shall be done by hand trimming.
- xii) Contractor shall be responsible for any accident to workmen, public or owner's property due to blasting operations. Contractor by Inspector of explosives, or any other Authority duly constituted under the state and/or Union Govt.

xiii) Mode of Measurement

Volume of rock excavated shall be on the basis of length, breadth and depth of excavation indicated on the drawings. No payment will be made for excavations/over break beyond payment line specified, wherever such measurement is not possible, as in case of strata's intermixed with soil, excavated rock shall be properly stacked as directed by Engineer and the volume of rock shall be calculated on the basis of stack measurements after making 40% allowance for voids. The measurement of the earth work shall be paid as per the drawing or the requirements of the site as approved by the Engineer.

- xiv) The rate quoted for excavation shall include the following jobs:
 - a) Refilling of the trenches and consolidation and spreading as per the Engineer's directions.
 - b) Shoring and strutting as demanded by the site conditions and as instructed by the Engineer.

1.05 Filling in plinth with selected excavated earth

- (A) Plinth above in layers 15 - 30 cm, watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, if directed by the Engineer, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlements at a later stage. The finished level of the filling shall be trimmed to the level/slope specified.
- (B) Where specified in the item description given in the Schedule of Quantities that the compaction of the plinth fill shall be carried out by means of 10/12 tones rollers smooth wheeled, sheep-foot or wobble wheeled rollers. As rolling proceeds water sprinkling shall be done to assist consolidation. Water shall not be sprinkled in case of sandy fill.
- (C) Mode of Measurement
Payment for filling in plinth with selected excavated material will be made as specified/directed. Payment for this work will be made based on measurement of plinth/dimensions filled. The plinth/ground levels shall be surveyed beforehand for this purpose. The lead shall be 500 M. It shall be measured in cum.

1.06 Filling excavated earth in ground for land development.

- (A) No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with as directed by Engineers.
- (B) Filling shall be carried out as indicated in the drawings and as directed by Engineer. If no compaction is called for, the fill may be deposited to the full height in one operation and leveled. If the fill has to be compacted, it shall be placed in layers not exceeding 600 mm and leveled uniformly and compacted before the next layer is deposited.
- (C) Field compaction is called for, test shall be carried out at different stages of filling and also after the fill to the entire height has been completed. This shall hold good for embankments as well.
- (D) Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, Contractor shall remove the affected material and make good the slip at his own cost.

(E) The fill shall be carried out to such dimension and levels as indicated on the drawings after the stipulated compaction. The fill shall be considered as incomplete if the desired compaction has not been obtained.

(F) Mode of Measurement

It shall be measured in cum. The rate shall include all operations such as lead and transport, filling and consolidating as directed.

1.07 Filling in plinth and ground with earth brought from outside

(A) Filling shall be carried out with approved material as described in 1.01 (J). The material and source shall be subject to prior approval of Engineer. The approved area, from where the fill material is to be dug, shall be brought from within 10 kms. radial distance from site and shall be cleared of all bushes, roots plants, rubbish etc. top soil containing salts, sulphate and other foreign material shall be removed. The materials so removed shall be burnt or disposed off as directed by Engineer. The Contractor shall make necessary access roads to those areas and maintain the same, if such access road does not exist, at his cost.

(B) If any material is rejected by Engineer, Contractor shall remove the same forthwith from the site at no extra cost to the owner. Surplus fill material shall be disposed off by uniform spreading within the site as instructed by the Engineer.

(C) The compaction shall be carried out as specified in the item no. 1.05 for filling in plinth.

(D) Mode of Measurement

Backfilling, plinth filling etc. with borrowed earth will be paid for under specified items. The quoted rate shall include all operations such as clearing, excavation, lead and transport, fill, compaction etc. as specified. Actual quantity of consolidated filling or actual quantity of excavation in the borrow pits (less such top soil which has been excavated and not used for filling) whichever is less shall be measured and paid for in cubic meters. The lead, lift etc. shall be as indicated in the schedule of quantities.

1.08 Providing and filling local sand in trenches, plinth and surrounding areas

(A) At places backfilling shall be carried out with local sand if directed by Engineer. The sand used shall be kept flooded with water for 24 hours to ensure maximum consolidation. Any temporary work required to contain sand under flooded condition shall be to Contractor's account.

The surface of the consolidated sand shall be dressed to require level or slope. Construction of floors or other structures on sand fill shall not be started until Engineer has inspected and approved the fill.

(B) Mode of measurement

Actual quantity of consolidated sand filling shall be measured and paid in cubic meters.

1.09 Filling in plinth with selected earth for lead exceeding 500 mt.

The general specifications is same item no. 1.05.

1.10 Anti-termite Treatment.

Pre-construction Anti-termite Treatment

P.C.I. Specifications

These specifications have been formulated for all types of structures with R.C.C. foundation or with load bearing walled foundations. It also covers treatment of building under construction which has already come up to or above plinth level.

1. CHEMICALS

The following chemical shall be used for the soil treatment with the concentration shown against it in aqueous emulsion.

Chlorpyriphos 20 EC 1.0% a.i

2. TREATMENT

The principle of the treatment is to create a chemical barrier below and around the building so as to deny entry to the termites into the building. Treatment is designed depending on the type of building and is described below.

A) TREATMENT FOR BUILDINGS WITHOUT BASEMENT :

The treatment will commence after the foundation and the plinth wall construction is completed. The treatment is carried out in the following stages.

B) Treatment to top surface of plinth filling.

After the soil filling is completed in the plinth area and before the dry rubble packing of sub grade is laid, the entire surface of the filled soil and the top surface of plinth wall/beam shall be treated with the chemical emulsion at 5 ltrs. per sq.m light rodding may be carried out in the soil surface to facilitate absorption of the emulsion.

C) Treatment at junction of wall and floor.

Rodding if necessary to facilitate Soaking, shall be carried out along the junction of wall and soil filling at 15 cm intervals & up to a depth of 30 cm. Emulsion shall be sprayed along the wall junction at 1 ltr. per linear meter so that it mixes thoroughly with the broken-up soil. The disturbed earth is then tamped back in place.

D) Treatment of soil along external perimeter.

The soil around the external perimeter of the building up to a depth of 30 cm shall be treated with the chemical emulsion at 2.25 ltrs. per linear meter of the plinth wall. To facilitate this treatment, a crowbar should be driven into the soil as close as possible to the plinth wall at intervals of 15 cm and up to a depth of 30 cm and moved backwards and forwards parallel to the wall to break up the soil so that the chemical emulsion mixes with the soil.

E) Treatment of soil surrounding pipes, wastes and conduit.

When pipes, wastes and conduits enter the soil inside the plinth the soil surrounding the point of entry must be loosened around each such pipe, Waste or conduit for a distance of 15 cm and up to a depth of 7.5 cm and loosened soil shall be treated with chemical emulsion.

F) Treatment for expansion Joints.

The soil beneath these joints should receive special attention. The treatment should be supplemented by treating through the expansion joints after the sub grade has been laid at the rate of 2 liters per linear meter.

3 TREATMENT FOR BUILDINGS WITH BASEMENT

The treatment starts when the excavation is complete and before laying soling and pcc. The treatment is carried out in following stages.

A) Treatment to soil below raft

Before laying the rubble soling and pcc the compacted and leveled soil shall be treated with the chemical Emulsion at 5 lit. per sq.m.

B) Treatment to soil along the retaining wall.

The soil coming in contact with the retaining wall shall be treated with the Chemical Emulsion at 5 lit. per sq.m. The treatment shall follow the backfilling as backfilling is done in stages of 30 cms but not to exceed a depth of 1 meter. Rodding may be carried out to facilitate the treatment.

C) Treatment to soil along the external perimeter of the building.

The soil around the external perimeter of the building up to a depth of 30 cm shall be treated with the Chemical Emulsion at 2.25 ltr. per linear meter. Rodding may be carried out as explained in item 2 (D) to facilitate this treatment.

(D) Treatment of soil surrounding pipes, wastes and conduits.

When pipes, wastes and conduits enter, the soil inside the area of the foundation, the soil surrounding the point of entry must be loosened around each such pipe, waste or conduit for a distance of 15 cm and upto a depth of 7.5 cm and loosened soil shall be treated with chemical emulsion.

4. SPRAYING EQUIPMENT

A pressure pump shall be used to carry out spraying operations to facilitate proper distribution of chemical in the soil.

Mode of measurement and payment

The length and breadth shall be measured correct to a cm as per the dimension of sanctioned plans. No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq.mt. The rate shall include the cost of all labor and materials required for the operation involved for satisfactory completion of this item. The sides of the trenches 30 cms. each side and bottom shall be measured under this item.

The rate shall be for a unit of one Sq.meter.

1.12 Providing and filling dry brickbats at all levels

The brickbats shall be of 40-65mm (average) thickness in size. The brickbats shall be clean and mortar free. They should be washed off dust before it is filled. They shall be filled in places as directed by the engineer.

Mode of Measurement

The bulk volume of the filling shall be measured in Cu.M. No deduction shall be made for voids.

SECTION 2.00 CONCRETE WORK

I Applicable Codes

The following codes and standards are made a part of the Specifications. All standards, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

In case of discrepancy between this specification and those referred to herein , this specification shall prevail.

(a) Materials

- 1) IS 269 : Specification for ordinary, rapid hardening and low heat portland cement.
- 2) IS 455 : Specification for Portland blast furnace slag.
- 3) IS 1489 : Specification for portland-pozollana cement.
- 4) IS 4031 : Methods of physical tests for hydraulic cement.
- 5) IS 650 : Specification for standard sand for testing of cement.
- 6) IS 383 : Specification for coarse and fine aggregates from natural sources for concrete.
- 7) IS 2386(Parts I to VIII): Methods of test for aggregates for concrete.
- 8) IS 516 : Methods of test for strength of concrete.
- 9) IS 1199 : Methods of sampling and analysis of concrete.
- 10) IS 2396(I)
IS 5640 Flakiness Index of aggregates
- 11) IS 3025 : Methods of sampling and test (physical and chemical water used in industry)

- 12) IS 432(Part I & II) : Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
- 13) IS 1139 : Specification for hot rolled mild steel and medium tensile steel deformed bars for concrete reinforcement.
- 14) IS 1566 : Specification for plain hard drawn steel wire fabric for concrete reinforcement.
- 15) IS 1785 : Specification for plain hard drawn (Part I) steel wire for prestressed concrete.
- 16) IS 1786 : Specification for cold twisted steel bars for concrete reinforcement.
- 17) IS 2090 : Specification for high tensile steel bars used in prestressed concrete
- 18) IS 4990 : Specification for plywood for concrete shuttering work.
- 19) IS 2645 : Specification for integral cement water-proofing compounds.

(b) Equipment

- 1) IS 1791 : Specification for batch type concrete mixers
- 2) IS 2438 : Specification for roller pan mixer
- 3) IS 2505 : Specification for concrete vibrators immersion type
- 4) IS 2506 : Specification for screed board concrete vibrators
- 5) IS 2514 : Specification for concrete vibrating tables.
- 6) IS 3366 : Specification for pan vibrators
- 7) IS 4656 : Specification for form vibrators for concrete.

- 8) IS 2722 : Specification for portable swing weigh-batchers for concrete (single and double bucket type)
- 9) IS 2750 : Specification for steel scaffoldings

(c) Codes of Practice

- 1) IS 456 : Code of practice for plain and reinforced concrete.
- 2) IS 1343 : Code of practice for prestressed concrete
- 3) IS 457 : Code of practice for general construction of plain and reinforced concrete for dams and other massive structures
- 4) IS 3370 : Code of practice for concrete structures for storage of liquids
(Part I to IV)
- 5) IS 3935 : Code of practice for composite construction
- 6) IS 3201 : Criteria for design and construction of precast concrete trusses.
- 7) IS 2204 : Code of practice for construction of reinforced concrete shell roof
- 8) IS 2210 : Criteria for the design of RC shell structures and folded plates.
- 9) IS 2751 : Code of practice for welding of mild steel bars used.
: for reinforced concrete construction.
- 10) IS 2502 : Code of practice for bending and fixing of bars for concrete reinforcement.
- 11) IS 3558 : Code of practice for use of immersion vibrators for consolidating concrete.
- 12) IS 3414 : Code of practice for design and installation of joints in buildings

- 13) IS 4014 : Code of practice for steel tubular,
(Part I&II) scaffolding.
- 14) IS 2571 : Code of practice for laying in situ-
cement concrete flooring.

(d) Construction Safety

- 1) IS 3696 : Safety code for scaffolds and
ladders

(e) Measurement

- 1) IS 1200 : Method of measurement of building
works.
- IS 3385 : Code of practice for measurement
of civil engineering works.

The above mode of measurements shall be applicable only if it is not given specifically in the tender document.

II General

The quality of materials, method and control of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise shall conform to the applicable portions of this specification.

Engineer shall have the right to inspect the source/s of material/s, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipment, and the quality control system. Such an inspection shall be arranged and engineer's approval obtained, prior to starting of concrete work.

III Materials

The ingredients to be used in the manufacture of standard concrete shall consist solely of standard type portland cement, clean sand, natural coarse aggregate, clean water and admixtures.

(A) Cement

- a) If the Contractor is instructed to supply cement , then the following points shall be applicable:

- i) Unless otherwise specified the cement shall be of grade 53 ordinary portland cement in 50 kg bags. The use of bulk cement will be permitted only with the approval of Engineer.
- ii) A certified report attesting to the conformance of the cement to IS specifications by the cement manufacturer's chemist shall be furnished to engineer.
- iii) Cement held in storage for a period of ninety (90) days or longer shall be tested. Should at any time Engineer have reasons to consider that any cement is defective, then irrespective of its origin, and/or manufacturers test certificate, such cement shall be tested immediately at contractor's cost at a National Test Laboratory/approved laboratory and until the results of such tests are found satisfactory, it shall not be used in any work. Contractor shall not be entitled to any claim of any nature on this account.

(B) Aggregates

- a) Aggregate in general designates both fine and coarse inert materials used in the manufacture of concrete. Fine aggregate is aggregate all of which passes through 4.75 mm IS sieve. Coarse aggregate is aggregate most of which is retained on 4.75 mm sieve
- b) All fine and coarse aggregates proposed for use in the work shall be subject to Engineer's approval and after specific materials have been accepted the source of supply of such materials should not be changed without prior approval of Engineer.
- c) Aggregates shall, except as noted above, consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion of the reinforcement or may impair the strength and/or durability of concrete. The grading of aggregates shall be such as to produce a dense concrete of specified strength and consistency that will work readily into position without segregation and shall be based on the mix design and preliminary tests on concrete specified later.

d) Sampling and testing

Samples of the aggregates for mix design and determination of suitability shall be taken under the supervision of Engineer and delivered to the laboratory, well in advance of the scheduled placing of concrete. Records of tests which have been made on proposed aggregates and on concrete made from this source of aggregates shall be furnished to Engineer in advance of the work for use in determining aggregate suitability. The costs of all such tests, sampling etc. shall be borne by contractor.

e) Storage of Aggregates

All coarse and fine aggregates shall be stacked in stock separately in stock piles in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign materials and with earth during storage and while heaping the materials shall be avoided. The aggregate must be of specified quality not only at the time of receiving at site but more so at the time of loading into mixer. Rackers shall be used for lifting the coarse aggregates from bins or stock piles. Coarse aggregate shall be piled in layers not exceeding 1.20 meters in height to prevent coning or segregation. Each layer shall cover the entire area of the stock pile before succeeding layers are started. Aggregates that have become segregated shall be rejected.

f) Specific Gravity

Aggregate except as noted above, and for other than light weight concrete shall consist of natural or crushed sand shall conform to IS 383. The sand shall be clean sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, alkali, organic matter, mica, salt or other deleterious substances,

which can be injurious to the setting qualities/strength/durability of concrete.

(C) Machine made Sand

Machine made sand will be acceptable, provided the constituent rock/gravel composition shall be sound, hard dense, non-organic uncoated and durable against weathering.

i) Screening and Washing

Sand shall be prepared for use for such screening or washing, or both, as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fractions.

ii) Foreign Material Limitations

The percentages of deteriorous substances in sand delivered to the mixer shall not exceed the following:

i) Material finer than 75 micron IS sieve	3.00	15.00
ii) Shale	1.00	-
iii) Coal and lignite	1.00	1.00
iv) Clay lumps	1.00	1.00
v) Total of all above substances including items (i) to (iv) for uncrushed sand and items iii) and (iv) for crushed sand	5.00	2.00

iii) Gradation

Unless otherwise directed or approved, the grading of sand shall be within the limits indicated hereunder:

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

Where the grading falls outside the limits of any particular grading zone of sieves other than 600 micron IS sieve, by total amount not exceeding 5 percent, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron IS sieve or to percentage passing any other sieve on the coarser limit of grading zone I or the finer limit of grading zone IV.

iv) Fineness Modulus

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

(D) Coarse Aggregate

a) Coarse aggregate for concrete, except as noted above and for other than light weight concrete shall conform to IS 383. This shall consist of natural or crushed stone and gravel and shall be clean and free from elongated, flaky or laminated pieces adhering coatings, clay lumps, coal residue, clinkers slag, alkali, mica, organic matter or other deleterious matter.

b) Screening and Washing

Natural gravel and crushed rock shall be screened and/or washed for the removal of dirt or dust coating, if so demanded by Engineer.

c) Grading

Coarse aggregate shall be graded in both cases the grading shall be within the following limits.

IS Sieve Designation	% passing for single sized aggregate of nominal size mm					% passing for graded aggregate of nominal size mm				
	40	20	16	12.5	10	40	20	16	12.5	
63mm	100	-	-	-	-	100	-	-	-	
40mm	85 100	100	-	-	-	95 100	100	-	-	
20mm	0-20	85- 100	100	-	-	30- 70	95- 100	100	-	
16mm	-	-	85- 100	100	-	-	-	90 100	-	
12.5mm	-	-	-	85- 100	100	-	-	-	90 100	
10mm	0.5	0- 20	0- 30	0- 45	85- 100	10- 35	25- 55	30- 70	40- 85	
4.75mm	-	0- 5	0- 5	0- 10	0- 20	0- 5	0- 10	0- 10	0- 10	
2.36mm	-	-	-	-	0- 5	-	-	-	-	

The pieces shall be angular in shape and shall have granular or crystalline surfaces, Friable, flaky and laminated pieces, mica and shale, if present, shall be only in such quantities that will not, in the opinion of Engineer affect adversely the strength and/or durability of concrete. The maximum size of coarse aggregate shall be 75 mm for class A concrete 40 mm for class B concrete and 20mm for class C concrete. The maximum size of coarse aggregate shall be the maximum size specified above, but in no case greater than 1/4 of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. Plums above 150 mm and upto any reasonable size can be used in plain mass concrete work of large dimensions upto a maximum limit of 20% of volume of concrete when specifically approved by

Engineer. For heavily reinforced concrete members the nominal maximum size of the aggregate shall be 5 mm less than the minimum clear distance between the reinforcing main bars or 5mm less than the minimum cover to the reinforcement whichever is smaller. The amount of fine particles occurring in the free state or as loose adherent shall not exceed 1% when determined by laboratory sedimentation tests as per IS 2386. After 24 hours immersion in water, a previously dried sample shall not have gained more than 10% of its oven dry weight in air, as determined by IS 2386.

d) Foreign Materials Limitations

The percentages of deleterious substance in the coarse aggregate delivered to the mixer shall not exceed the following:

	Percent by weight	
	Uncrushed	Crushed
i) Material finer than 75 micron IS sieve	3.00	3.00
ii) Coal and lignite	1.00	1.00
iii) Clay lumps	1.00	1.00
iv) Soft fragments	3.00	-
v) Total of all the above substances	5.00	5.00

(E) Water

- a) Water used for both mixing and curing shall be free from injurious amounts of deleterious materials. Potable waters are generally satisfactory for mixing and curing concrete.
- b) In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS-456. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The sample shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water.

- c) Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water.
- d) The initial setting time of test block made with the appropriate set cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by more than plus minus 30 seconds from the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test blocks shall be prepared and tested in accordance with the requirements of IS 4031.
- e) Where water can be shown to contain an excess of acid, alkali sugar or salt, engineer may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values:
 - i) To neutralize 200 ml sample of water, using phenolphthalein as indicator, it should not require more than 2 ml of 0.1 normal NaOH. The details of test shall be as given in IS 3025.
 - ii) To neutralize 900 ml sample of water using methyl orange as an indicator, it should not require more than 10 ml of 0.1 normal HCl. The details of test shall be given in IS 3025.
 - iii) Percentage of solids when tested in accordance with the method indicated below shall not exceed the following :

	Percent -----	Method of Test(Ref. to clause no. in IS 3025-1964 -----)
Organic	0.02	10 and 11 (organic solids = total solids minus ignited residue)
Inorganic		
Sulphate (as SO ₄)	0.30	11 (Ignited residue)
Alkali Chlorides (as Cl)	0.05	20
	0.10	24

(F) Brick aggregates

The brickbats shall be of new bricks well burnt, hard, durable and broken to sizes, well graded. It shall be free from dust, the size shall be of 37mm and down. It shall be free from earth and other impurities.

(G) Reinforcement Steel(CRS TMT) bars

If the contractor is instructed to supply reinforcement steel, the following points shall be applicable:-

- a) Unless otherwise specified the reinforcement bars shall be Thermo Mechanically Treated (TMT) bars confirming to the specifications of IS 1786.
- b) The certified report attesting conformance of the material to IS specifications by manufacturer's Testing laboratory shall be furnished to the engineer in charge.
- c) Reinforcement bars are arranged by contractor, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer.
- d) All reinforcement shall be clean, free from grease, oil, paint, loose mill scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used.

IV Form Work.

- a) The formwork shall consist of shores, bracings, sides of beams and columns, bottom of slabs etc, including ties anchors, hangers inserts etc, complete which shall be properly designed and planned for the work. False work shall be so constructed that necessary adjustment can be made to compensate for take up and settlements. Wedge may be used at the top or bottom of timber shores but not at both ends to facilitate vertical adjustment or dismantling of the formwork.

b) Design of formwork

The design of the formwork as well as its construction shall be the responsibility of Contractor. If so instructed, the drawings and/or calculation for the design for the formwork shall be submitted to Engineer for approval before proceeding with work, at no extra cost. Engineer's approval shall not however relieve Contractor of the full responsibility for the design and construction of the formwork. The design shall take into account all the load vertical and lateral that the forms will be carrying live and vibration loadings.

c) Type of formwork

Formwork may be of timber, plywood metal, plastic or concrete. For special finishes the formwork may be lined with plywood, steel sheets oil tempered hard board etc. Sliding forms and slip forms may be used with the approval of Engineer.

d) Form work requirements

- i) Forms shall conform to the shapes, lines, grades and dimensions including camber of the concrete as called for on the drawings. Ample studs, braces, ties, straps, etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete is set sufficiently to permit removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. In special cases form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with the concrete shall be free from adhering grout, plaster, paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water or any fine material from concrete.
- ii) Plywood shall be used for exposed concrete surfaces; where called for. Sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planed to remove irregularities or unevenness in the face. Formwork with linings shall be permitted.
- iii) All new and used form timber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form timber unsatisfactory in any respect shall not be used and if rejected by Engineer shall be removed from the site.
- iv) Shores supporting successive members shall be placed directly over those below or be so designed and placed that the load will be transmitted directly to them. Trussed supports shall be provided for shores that cannot be secured on adequate foundations.
- v) Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours indicated on the drawings, shall be repositioned and

strengthened. Poured concrete affected by the faulty formwork, shall be removed completely and the formwork be corrected prior to placing of new concrete.

- vi) Excessive construction camber to compensate for shrinkage, settlement may impair the structural strength of members and shall not be permitted.
- vii) Forms shall be so designed that their removal will not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conform to the architectural features of the structure as to location of joints and be as directed by engineer.
- viii) Where exposed smooth or rendered concrete finishes are required the forms shall be constructed with special care so that the resulting concrete surfaces require a minimum finish.

e) Formwork For Slope Surfaces

- i) Forms for sloped surfaces shall be built so that the formwork can be placed board-by-board immediately ahead of concrete placement so as to enable ready access for placement, vibration inspection and repair of the concrete.
- ii) The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than 4 horizontal: 1 vertical shall be formed as required herein.

f) Formwork For Curved Surfaces

- i) The contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form timber shall be built up of laminated splines cut to make tight, smooth form surfaces.
- ii) After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form material shall be dressed to the specified curvature.

g) Formwork For Exposed Concrete Surfaces

- i) Where it is desired, directed or shown on the drawings to have original fair face finish of concrete surface without any rendering or plastering, formwork shall be carried out

by using wood planks, plywood or steel plates of approved quality and as per direction of the Engineer.

- ii) The contractor shall use one type of material for all such exposed concrete faces and the forms shall be constructed so as to produce uniform and consistent texture and pattern on the face of the concrete. Patches or forms for these surfaces will not be permitted. The formwork shall be placed so that all horizontal formworks are continuous across the entire surface.
- iii) To achieve a finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features, cills, window heads or change in direction of the surface. All joints between shuttering plates or panels shall be vertical or horizontal unless otherwise directed. Suitable joints shall be provided between sheets. The joints shall be arranged and fitted so that no blemish or mark is imparted to the finished surfaces.
- iv) To achieve a finish which shall give the rough appearance of concrete cast against sawn boards, formwork boards unless otherwise stated shall be of 150 mm wide, securely jointed with tonge and grooved joints if required to prevent grout loss with tie rod positions and direction of boards carefully controlled. Sawn boards shall be set horizontally, vertically or at an inclination shown in the drawings. All bolt holes shall be accurately aligned horizontal and vertically and shall be filled with matching mortar recessed 5mm back from the surrounding concrete face.
- v) Forms for exposed concrete surfaces shall be constructed with grade strips (the underside of which indicated top of pour) at horizontal construction joints, unless the use of groove strips is specified on the drawings. Such forms shall be removed and reset from lift to lift, they shall not be continuous from lift to lift. Sheeting of reset forms shall be tightened against the concrete so that the forms will not be spread and permit abrupting irregularities or loss of mortar. Supplementary form ties shall be used as necessary to hold the reset forms tight against the concrete.
- vi) For fair faced concrete, the position of through bolts will be restricted and generally indicated on the drawings.

- vii) Chamfer strips shall be placed in the corners of forms for exposed exterior corners so as to produce 20 mm bevelled edges except where otherwise shown in the drawings. Interior corners and edges at formed joints shall not be bevelled unless shown on the drgs. Mouldings for grooves, drip courses and bands shall be made in the form itself.
- viii) The wood planks, plywood and steel plates used in formwork for obtaining exposed surfaces shall not be used for more than 3 times in case of wood planks, 6 times for plywood and 10 times for steel plates respectively. However, no forms will be allowed for reuse, if in the opinion of the Engineer it is doubtful to produce desired texture of exposed concrete.
- ix) In order to obtain exposed concrete work of uniform colour it shall be necessary to ensure that the sand used for all exposed concrete work shall be of approved uniform colour. Moreover the cement used in the concrete for any complete element shall be from single consignment.
- x) No exposed concrete surface shall be rendered or painted with cement or otherwise. Plastering of defective concrete as a means of achieving the required finish shall not be permitted, except in the case of minor porosity on the surface, the Engineer may allow a surface treatment by rubbing down with cement and sand mortar of the same richness and colour as for the concrete. This treatment shall be made immediately after removing the formwork.
- xi) The contractor shall also take all precautionary measures to prevent breaking and chipping of corners and edges of completed work until the building is handed over.
- h) Bracings struts and props
- i) Shuttering shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bearers.
- ii) The shuttering for beams and slabs shall be so erected that the shuttering on the sides of the beams and under the soffit of slabs can be removed without disturbing the beam bottoms. Repropping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges or other

measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering. If the shuttering for a column, is erected for the full height of the column, one side shall be left open and built up in sections as placing of concrete from the sides to limit the drop of concrete to 3M or as directed by engineer.

j) Mould Oil

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

k) Chamfers and fillets

All corners and angles exposed in the finished structure shall be formed with moulding to form chamfers or fillets on the finished concrete. The standard dimension of chamfers and fillers, unless otherwise specified shall be 20 mmx20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the mouldings shall be planned or surfaced to the same texture as the forms to which it is attached.

l) Wall ties

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

m) Reuse of forms

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retreated to prevent adhesion, to the satisfaction of Engineer. Warped lumber shall be resized. Contractor shall equip himself with enough shuttering material to complete the job in the stipulated time.

n) Removal of forms

i) Contractor shall record on the drawings and in a special register the date upon which the concrete is placed in each

part of the work and the date on which the shuttering is removed there from. The Contractor shall remove the shuttering after obtaining the approval of the Engineer.

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

iii) In normal circumstances (generally where temperatures are above 20 Deg. Cent.) forms may be removed after expiry of the following periods:-

	Ordinary portland cement concrete	Rapid hardening portland cement concrete
	-----	-----
a) Walls columns and vertical sides of beams	24 to 48 hrs as directed by the Engineer	24 hrs.
b) Slabs left under	3 days	2 days
c) Beam soffits props left under	7 days	4 days
d) Removal of props to slabs:		
i) Spanning upto 4.5 m	7 days	4 days
ii) Spanning over 4.5 m	14 days	8 days
e) Removal of props to beams & arches		
i) Spanning upto 6 m	14 days	8 days
ii) Spanning over 6m	21 days	12 days

iv) Striking shall be done slowly with utmost care to avoid damage to arises and projections and without shock or vibration, by gently easing the wedges. If after removing the form work, it is found that timber has been embedded in the concrete, it shall be removed and made good as specified earlier.

v) Reinforced temporary openings shall be provided as directed by Engineer to facilitate removal of formwork which otherwise may be inaccessible.

vi) Tie rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than 24 hours nor later than 40 hrs. after the concrete has been deposited. Ties, except those required

to hold forms in place, may be removed at the same time.

Ties, withdrawn from walls and grade beams shall be pulled towards the inside face cutting ties back from the faces of walls and grade beams will not be permitted.

- vii) For liquid retaining structures no sleeves for through bolts shall be used nor shall through bolts be removed as indicated above. The bolts, in this case, shall be cut at 25 mm depth from the surface and then the hole shall be made good by sand, cement mortar of the same proportions as the concrete just after striking the formwork.

- 2.01 Providing and laying Brickbats Cement concrete 1:4:8 (1 cement 4 coarse sand, 8 brickbats of size 37 mm and down). The brickbats, sand and cement shall be of quality as described in the materials section above. The materials shall be mixed in volumetric proportions in concrete mixer only. The concrete shall be laid in layers of 150mm thick and well consolidated with rammer of weight 4.5 to 5.5 kg steel rammers of base area 300 sqcm till slurry comes on top before the next layer is laid. Curing shall be done for 7 days. For joints the edge of the concrete shall be finished off with a slope not steeper than 2:1 and well roughened.

Mode of Measurement

This shall be measured in cum and part thereof. The bed concrete provided for flooring shall be paid for under this item. The rate shall include cost the shuttering to be provided.

- 2.02 Providing and laying plain cement concrete 1:4:8 (1 cement: 4 coarse sand, 8 graded black trap stone aggregate) of nominal size 37 mm and down

The coarse aggregate, cement and coarse sand shall be of quality as specified in the materials section. The other procedures are same as that specified in item no. 2.01.

- 2.03 Providing and laying Plain cement concrete 1:3:6 (1 cement, 3 coarse sand, 6 graded black trap stone aggregates) of nominal size 37 mm and down

The general specification is same as for item no. 2.02 but for the volumetric proportion of the coarse sand and stone aggregates which shall be 3:6 instead of 4:8.

2.04 Providing and laying RCC of mix M20 for structures up to plinth level

Mix Design

- a) All concrete in the works shall be of design mix as defined in IS 456, unless it is a nominal mix concrete such as 1:3:6, 1:4:8 or 1:5:10. Whether reinforced or otherwise, all design mix concrete works to be carried out under this specification shall be divided into the following classifications:

MINIMUM COMPRESSIVE STRENGTH OF 15 CM CUBES AT 7 AND 28 DAYS AFTER MIXING, CONDUCTED IN ACCORDANCE WITH IS 516

Class	Preliminary test N/SQ.MM		Work test N/SQ.MM		Max. size of aggregate mm.	Minimum Cement Content per cum
	at 7 days	at 18 days	at 7 days	at 28 days		
M 42	35.0	54.0	27.0	46.0	20	550 kg
M 35	31.0	45.0	23.5	39.0	20	470 kg
M 30	28.0	42.0	20.0	33.0	40 or 20	420 kg
M 25	23.5	35.0	17.0	28.0	40 or 20	370 kg
M 20	19.4	29.0	13.5	22.0	40 or 20	320 kg
M 15	14.0	17.0	10	16.0	40 or 20	300 kg

- b) It shall be very clearly understood that whenever the class of concrete such as M 20 is specified it shall be the Contractor's responsibility to ensure that minimum crushing strength stipulated for the respective class of concrete is obtained at works. The maximum total quantity of aggregate by weight per 50 kg of cement shall not exceed 450 kg except when otherwise specifically permitted by Engineer.
- c) To fix the grading of aggregates, water cement ratio, workability and the quantity of cement required to give preliminary and works cubes of the minimum strength specified, the proportions of the mix shall be determined by weight/volume. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made. Mix proportioning shall be carried out according to Indian

Standard Specifications.

- d) Whenever there is a change either in required strength of concrete or water cement ratio or workability or the source of aggregates and/or cement, preliminary tests shall be repeated to determine the revised proportions, of the mix to suit the altered conditions.
- e) While fixing the value for water cement ratio for preliminary mixes, assistance may be derived from the graph (appendix IS 456 showing the relationship between the 28 day compressive strengths of concrete mixes with different water cement ratios and the 7 days compressive strength of cement tested in accordance with IS 269.

Preliminary tests

- a) Test specimens shall be prepared with at least two different water/cement ratios for each class of concrete, consistent with workability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of these tests is to determine the proportions of cement, aggregates and water necessary to produce concrete of required consistency and to give the specified strength. It will be the Contractor's sole responsibility to carry out these tests and he shall therefore furnish to Engineer a statement of proportions proposed to be used for the various concrete mixes.
- b) Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregates for each mix shall be determined by weight/volume to an accuracy of 1 part in 1000 parts.
- c) Mixing shall be done by a mixer machine as per IS 516 in such a manner as to avoid loss of water. The cement and fine aggregate shall first be mixed dry until the mixture is uniform in colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than 3 minutes until the resulting concrete is uniform in appearance. Each mix of concrete shall be of such a quantity as to leave about 10% excess concrete after moulding the desired number of test specimens.
- d) The consistency of each mix of concrete shall be measured immediately after mixing, by the slump test in

accordance with IS 1199. If in the slump test, care is taken to ensure that no water or other materials is lost, the materials used for the slump test may be remixed with the remainder of the concrete for making the specimen test cubes. The period of re-mixing shall be as short as possible yet sufficient to produce a homogeneous mass.

- e) Compression tests of concrete cubes shall be made as per IS 516 on 15 cm cubes. Each mould shall be provided with a metal base having a plane surface so as to support the mould during filling without leakage. The base plate shall be preferably attached to the mould by springs or screws. The parts of the mould when assembled shall be positively and rigidly held together. Before placing concrete the mould and base plate shall be cleaned and oiled. The dimensions and internal faces of the mould shall be accurate within the following limits:

Height and distance between the opposite faces of the mould shall be of specified size plus minus 0.2mm. The angle between the adjacent internal faces and between internal faces and top and bottom planes of mould shall be 90 Deg. plus/minus 5 Deg. The interior faces of the mould shall be plane surfaces with a permissible variation 0.03mm.

- f) Concrete test cubes shall be moulded by placing fresh concrete in the mould and compacted as specified in IS 516.
- g) Curing shall be as specified in IS 516. The cubes shall be kept in moist air of at least 90% relative humidity at a temp. of 27 Deg. Cent. plus minus 2 Deg. Cent. for 24 hours plus minus half hour from the time of adding water to the dry ingredients. Thereafter they shall be removed from the moulds and kept immersed in clean, fresh water and kept at 27 Deg. Cent. plus minus 2 Deg. Cent. temp. until required for test. Curing water shall be renewed every seven days. A record of maximum and minimum temperatures at the place of storage of the cubes shall be maintained during the period they remain in storage.

- h) Testing of specimens

The strength shall be determined based on not less than five cubes test specimens for each age and each water cement ratio. All these laboratory test results shall be tabulated and furnished to Engineer. The test result shall be accepted by Engineer if the average compressive strengths of the specimens are tested subject to the

condition that only one out of the five consecutive test may give a value less than the specified strength for that age. The Engineer may direct the Contractor to repeat the tests if the results are not satisfactory and also to make such changes as he considers necessary to meet the requirements specified. All these preliminary tests shall be conducted by the Contractor at his own cost in an approved laboratory.

Proportioning consistency, batching and mixing of concrete
Proportioning

a) Aggregate (black trap)

The proportions which shall be decided by conducting preliminary test shall be by volume. These proportions of cement, fine and coarse aggregates shall be maintained during subsequent concrete mixing. The supply of properly graded aggregate of uniform quality shall be maintained over the period of work, the grading of aggregates shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions. The different sizes shall be stocked in separate stock piles. The grading of coarse and fine aggregate shall be checked as frequently as possible as determined by Engineer, to ensure maintaining of grading in accordance with the samples used in preliminary mix design. The material shall be stock piled well in advance of use.

b) Cement

The cement shall be measured by volume.

c) Water

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

The water cement (W/C) ratio is defined as the volume of water in the mix (including the surface moisture of the aggregates) divided by the volume of cement in the mix. The actual water cement ratio to be adopted shall be determined in each instance by the Contractor and approved by the Engineer.

d) Proportioning by water/Cement ratio

The W/C ratio specified for use by Engineer shall be maintained. The Contractor shall determine the water content of the aggregates as frequently as directed by Engineer as the work progress and as specified in IS 2386 (Part-III) and the amount of water added at the mixer shall be adjusted as directed by Engineer so as to maintain the specified W/C ratio. To allow for the variation in volume of aggregates due to variation in their moisture content suitable adjustments in the volume of aggregates shall also be made.

e) Consistency and slump

Concrete shall be of a consistency and workability suitable for the conditions of the job. After the amount of water required is determined, the consistency of the mix shall be maintained throughout the progress of the corresponding parts of the work and approved tests e.g. slump tests, compacting factor tests, in accordance with IS 1199 shall be conducted from time to time to ensure the maintenance of such consistency.

f) The following tabulation gives a range of slumps which shall generally be used for various types of construction unless otherwise instructed by the Engineer.

SLUMPS FOR VARIOUS TYPES OF CONSTRUCTION

Only sufficient quantity of water shall be added to concrete during mixing to produce a mix of sufficient workability to enable it to be well consolidated, to be worked in to the corners of the shuttering and around the reinforcement, to give the specified surface finish, and to have the specified surface strength. The following slumps shall be adopted for different kinds of works:-

Name of Work	When vibrator used	When vibrator not used
Mass concrete in foundations, footings retaining walls and pavements.	10mm to 25mm	50mm to 75mm
Thin sections of		

floors of less than 75mm thick	25mm to 40mm	75mm to 100mm
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For Reinforced cement concrete work:

Mass concreting in foundations, footings retaining walls and pavements	10mm to 25mm	80mm
Beams, slabs, columns	25mm to 40mm	100mm to 125mm
Thin shells, folded plates etc.	40mm to 50mm	125mm to 150m

Sampling and testing concrete in the field

- a) Facilities required for sampling materials and concrete in the field shall be provided by the Contractor at no extra cost. The following equipment with operator shall be made available at Engineer's request (all must be in serviceable condition):
- i) One concrete cube testing machine suitable for 15 cm machine suitable for 15 cm cubes of 100 tones capacity with proving calibration ring.
 - ii) Twelve cast iron cube moulds of 15 cm size
 - iii) One Lab. balance to weigh up to 5 kg with sensivity of 10gm
 - iv) One set of sieves for coarse and fine aggregates
 - v) One set of slump cone complete with tamping rod
 - vi) A set of measures from 5litre to 0.1litre
 - vii) One electric oven with thermostat upto 120 Deg. Cent.
 - viii) One flakiness gauge
 - ix) One elongation index gauge
 - x) One sedimentation pipette
 - xi) One Pyconometer
 - xii) Two calibrated glass jar of 1litre capacity

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

- b) At least 6 test cubes of each class of concrete shall be made for every 15.0 cu.m. of concrete or part thereof. Such samples shall be drawn on each day for each type of concrete. Of each set of 6 cubes, three shall be tested at 7 days age and three at 28 days age. The laboratory test results shall be tabulated and furnished to Engineer. Engineer will pass the concrete if average strength of the specimens tested is not less than the strength specified, subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength. The cubes shall be tested on 7th and 28th day from the day of casting of the cubes.

Admixtures

- a) Admixtures may be used in concrete only with the approval of Engineer based upon evidence that, with the passage of time, neither the compressive strength nor its durability reduced. Calcium chloride shall not be used for accelerating setting of the cement for any concrete containing reinforcement, or embedded steel parts. When calcium chloride is permitted to be used, such as in mass concrete works, it shall be dissolved in water and added to the mixing water in an amount not to exceed 1.5% of the volume of the cement in concrete. When admixtures are used, the designed concrete mix shall be corrected accordingly. Admixtures shall be used as per manufacturer's instructions and in the manner and with the control specified by Engineer.
- b) Air entraining agents
Where specified and approved by Engineer, neutralized vinyl resin or any other approved air-entraining agent may be used to produce the specified amount of air in the concrete mix and these agents shall conform to the requirements of ASTM standard 6260, air entraining admixtures for concrete. The recommended total air content of the concrete is 4% plus minus 1%. The method of measuring air content shall be as per IS 1199.
- c) Water reducing admixtures
Where specified and approved by Engineer water reducing lignosulfonate mixture shall be added in quantities specified by Engineer. The admixtures shall be added in the form of a solution.

d) Retarding admixtures

Where specified and approved by Engineer, retarding agents shall be added to the concrete mix in quantities specified by Engineer.

e) Water proofing agent

Where specified and approved by Engineer, water proofing agent conforming to IS:2645 shall be added in quantities specified by Engineer.

Optional tests

- a) Engineer may order tests to be carried out on cement, sand, coarse aggregate and water in accordance with the relevant Indian Standards. Tests on cement shall include (i) fineness test (ii) test for normal consistency (iii) test for setting time (iv) test for soundness (v) test for tensile strength (vi) test for compressive strength (vii) test for heat of hydration by experiment and by calculations in accordance with IS:269. Tests on sand shall include (i) sieve test (ii) test for organic impurities (iii) decantation test for determining clay and silt content (iv) specific gravity test (v) test for unit weight and bulk age factor. Tests on coarsed aggregate shall include (i) test for sieve analysis (ii) specific gravity and unit weight of dry loose and rodded aggregate (iii) soundness and alkali aggregate reactivity (iv) pictographic examination (v) deleterious materials and organic impurities (vi) test for aggregate crushing value. Any or all these tests would normally be ordered to be carried out only if Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by contractor at site or at an approved test laboratory. If the tests are successful, SHREE SOMNATH TRUST shall pay for all such optional tests otherwise the Contractor shall have to pay for them.
- b) If the works cubes do not give the stipulated strengths Engineer reserves the right to ask contractor to dismantle such portions of the work, which in his opinion are unacceptable and re-do the work to the standard stipulated at contractor's cost.
- c) Load test on members or any other tests

- i) In the event of any work being suspected of faulty material or workmanship or both, Engineer requiring its removal and reconstruction may order the contractor that it should be load tested in accordance with the following provisions.
- ii) The test load shall be 125 % of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of the concrete. During the test, struts strong enough to take the load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.
- iii) If within 24 hours of the removal of the load, the structure does not show a recovery of at least 75 percent of the maximum deflection shown during the 24 hours under load the test loading shall be repeated after a lapse of at least 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75 percent of the maximum deflection shown during the second test. If the structure is certified as failed by Engineer, the cost of the load test shall be borne by the contractor.
- iv) Any other tests e.g. taking out in approved manner concrete cores, examination and tests on such cores removed from such parts of the structure as directed by Engineer, sonic testing etc. shall be carried out by contractor if so directed.
- v) Should the results of any test prove unsatisfactory, or the structure shows signs of weakness, undue deflection or faulty construction the contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by SHREE SOMNATH TRUST the Contractor shall bear the cost of so doing, unless the failure of the member or members to fulfill the test conditions is proved to be solely due to faulty design.

Concrete in alkali soils and alkaline water

Where concrete is liable to attack from alkali salts or alkaline water, special cements containing low amount of tricalcium aluminate shall be used, if so specified in the drawings. Such concrete shall have a minimum 28 days

compressive strength of 250 kg per sq.cm and shall contain not less than 370 kg of cement per cubic meter of concrete in place. If specified, additional protection shall be obtained by the use of a chemically resistant stone facing or a layer of plaster of paris covered with suitable fabric, such as jute thoroughly impregnated with tar.

Preparation prior to concrete placement

- a) Before the concrete is actually placed in position, the insides of the form work shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection, especially at bottom of columns and walls forms to permit removal of saw dust, wood shavings, binding wire, rubbish dirt etc. Openings shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitably plugged.
- b) The various agencies shall be permitted ample time to install drainage and plumbing lines in floor and trench drains, conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment to be cast in the concrete as indicated on the drawings or as is necessary for the proper execution of the work Contractor shall cooperate fully with all such agencies and shall permit the use of scaffolding form work etc. by other agencies at no extra cost.
- c) All embedded parts, inserts etc. supplied by SHREE SOMNATH TRUST or Contractor shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.
- d) Anchor bolts shall be positioned and kept in place with the help of proper manufactured templates. The use of all such templates, fixture etc.. shall be deemed to be included in the rates.
- e) Slots, openings, holes, pockets etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by Engineer.
- f) Prior to concrete placement all work shall be inspected and approved by Engineer and if found unsatisfactory, concrete shall not be poured until after all defects have been corrected at Contractor's cost. Cat ladders shall be provided on the reinforcement to facilitate labour movement.
- g) Approval by Engineer for all materials and work as required herein shall not relieve contractor from his obligation to produce finished concrete in accordance with the drawings and specifications.
- h) No concrete shall be placed in wet weather or on water covered surface. Any concrete that has been washed by heavy rains, the work shall be entirely removed, if there is any sign of cement and sand having been washed from the concrete mixture. To guard against damage which may

be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.

- i) Immediately before concrete placement begins, proposed surfaces except framework, which will come in contact with the concrete to be placed, shall be covered with a bonding mortar..

Transportation

- a) All buckets, containers or conveyors used for transporting concrete shall be mortar tight. Irrespective of the method of transportation adopted, concrete shall be delivered with the required consistency and plasticity without segregation or loss of slump. However, chutes shall not be used for transport of concrete without the written permission of Engineer and concrete shall not be rehandled before placing.
- b) Concrete must be placed in its final position before it becomes too stiff to work. On no account, water shall be added after the initial mixing concrete which has become stiff or has been contaminated with foreign materials shall be rejected and disposed off as directed by Engineer.
- c) All equipment used for mixing, transporting and placing of concrete shall be maintained in clean condition. All pans, buckets, hoppers, chutes, pipelines and other equipment shall be thoroughly cleaned after each period of placement.

Procedure for placing of concrete

- a) Before any concrete is placed, the entire placing programme, consisting of equipment, layout proposed procedures and methods shall be submitted to engineer for approval if so demanded by Engineer and no concrete shall be placed until Engineer's approval has been received. Conveyor for conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job and placement location.
- b) Concrete shall be placed in its final position before the cement shall normally be compacted in its final position

within thirty minutes of leaving the mixer and once compacted it shall not be disturbed.

- c) Concrete, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be rehandled or caused to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded inserts or impair its strength. For locations where direct placement is not possible, and in narrow forms, contractor shall provide suitable drop and elephant trunks to confine the movement of concrete. Special care shall be taken when concrete is dropped from a height especially if reinforcement is in the way, particularly in columns and thin walls.
- d) Except when otherwise approved by Engineer, concrete shall be placed in shovels or other approved implements and shall not be dropped from a height more than 1 M or handled in a manner which will cause segregation.
- e) The following specification shall apply when placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of work involved. The control of placing shall begin at the mixer discharger, concrete shall be discharged by a vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to throughout all stages of delivery until the concrete comes to rest in its final position.
- f) Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposition of concrete in all dumping position, shall be employed.
- g) In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall clear the concrete already in place and the height of drop shall not exceed 1 M. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing or in any manner which results in separation of ingredients or disturbance of previously placed concrete will not be permitted.
- h) Concrete placed in restricted forms by wheel barrows, buggies, cars, short chutes or hand shoveling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position.

- i) Where it is necessary to use transfer chutes, specific approval of Engineer must be obtained to the type, length, slopes, baffles, vertical terminals and timing of operations, the discharge and without segregation. To allow for the loss of mortar against the sides of the chutes, the first mix shall have less coarse aggregate. During cleaning of chutes the waste water shall be kept clear of the forms. Concrete shall not be permitted to fall from the end of the chutes by more than 1 M. Chutes when approved for use shall have slopes not flatter than 1 : 3 and steeper than 1 : 2 chutes shall be of metal or metal lined and of rounded cross section. The slopes of all chutes sections shall be approximately the same. The discharge end of the chutes shall be maintained above the surface of the concrete in the forms.
- j) Concrete may be conveyed and placed by mechanically operated equipment e.g. pumps or pneumatic placers only with the written permission of Engineer. The slump shall be held to the minimum, necessary for conveying concrete by this method.
- k) When pumping is adopted, before pumping of concrete is started, the pipeline shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.
- l) When pneumatic placer is used, the manufacturer's advice on layout of pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provide at the discharge box to cater for the reaction at this end. Manufacturer's advice shall be followed regarding concrete quality and all other related matters when pumping or pneumatic placing equipment are used.
- m) Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 to 90 mm as directed by Engineer. These shall be placed as rapidly practicable to prevent the formation of cold joints or planes of weakness between each succeeding layer within the pour. The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as well facilitate spreading the layer to uniform depth and texture with a minimum of

shoveling. Any tendency to segregation shall be corrected by shovelling stones into mortar rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by Engineer.

- n) The top surface of each pour and bedding planes shall be approximately horizontal unless otherwise instructed.
- p) Compaction
 - i) Concrete shall be compacted during placing the approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the forms faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and caution exercised not to over-vibrate the concrete to the point that segregation results.
 - ii) Vibrators shall conform to IS specifications. Type of vibrator to be used shall depend on the structure where concrete is to be placed. Shutter vibrators to be effective, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators shall have no load frequency, amplitude and acceleration as per IS 2505 depending on the size of vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.
 - iii) The exact manner of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall immersion vibrators be used to transport concrete inside the forms. Particular attention shall be paid to vibration at the top of a lift e.g. in a column or wall.
 - iv) When placing concrete in layers., which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending and mixing of the concrete between the succeeding layers.

- v) The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below with the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.
- vi) Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.
- vii) Form attached vibrators shall be used only with specific authorization of Engineer.
- viii) The surface vibrators will not be permitted under normal conditions. However for thin slabs vibration by specially designed vibrators may be permitted upon approval of Engineer.
- ix) The formation of stone pockets or mortar bondages in corner and against faces of forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for through bonding, as directed by Engineer.
- q) Placement interval
Except when placing with slip forms each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.
- r) Special provision in placing
When placing concrete in walls with openings and in floors of integral slab and beam construction and other similar
- s) Placing concrete through reinforcement steel
When placing concrete through reinforced steel, care shall be taken to prevent segregation of the coarse aggregate. When the congestion of steel makes placing difficult it may be necessary to temporarily move the top steel aside to get proper placement and restore reinforcing steel to design position.
- t) Bleeding
Bleeding of free water, on top of concrete being deposited, in to the forms shall be caused to stop the concrete

pour. The conditions causing this defect corrected before any further concreting is resumed.
Curing,Protecting,Repairing and finishing

A) Curing

- i) All concrete shall be cured by keeping it continuously damp for the period of time required for complete hydration and hardening to take place. Preference shall be given to the use of continuous sprays or ponded water continuously saturated covering of sacks, canvas, hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. Extra precautions shall be exercised in curing concrete during cold and hot water as outlined hereinafter. The quality of curing water shall be the same as that used for mixing concrete.
- ii) Certain types of finish or preparation for overlaying concrete must be done at certain stage of the curing process and special treatment may be required for specific concrete surface finish.
- iii) Curing of concrete made of high alumina cement and super sulphated cement shall be carried out as directed by Engineer. Unit rate are also inclusive & necessary centering & shuttering work which shall be as per following;
- iv) Fresh concrete shall be kept continuously wet for a minimum period of 10 days from the date of placing of concrete following a lapse of 12 to 14 hours after laying of concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin immediately the concrete has hardened. Water shall be applied uniformly to concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon removal of forms quantity of water applied shall be controlled so as to prevent erosion of freshly placed concrete.
- v) Curing shall be assured by use of an ample water supply under pressure in pipes with all necessary appliance of hose, sprinklers and spraying devices. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by Engineer.
- vi) Whenever, by the judgment of Engineer, it may be necessary to omit the continuous spray method, a covering of clean sand or other approved means such as wet gunny bags which

will prevent loss of moisture from the concrete, may be used. No type of covering will be approved which would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during the curing period.

- vii) For curing of concrete in pavements, side-walks floors, flat roofs or other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these area. The ponded area shall be kept continuously filled with water during the curing period.
- viii) Surface coating type compounds shall be used only by special permission of Engineer, curing compounds shall be liquid type white pigmented. Other curing compounds shall be used on surfaces where future blending with concrete, water or acid proof membrane or painting is specified.
- ix) All equipment and materials required for curing shall be on hand and ready for use before concrete is placed.

B) Protecting fresh concrete

Fresh concrete shall be protected from defacements and damage due to construction operation by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or contact with other materials etc, that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during it setting period. If it is necessary that workmen enter the area of freshly placed concrete, Engineer may require that bridges be placed over the area.

C) Repair and replacement of unsatisfactory concrete

- i) Immediately after the shuttering is removed, the surface of concrete shall be very carefully inspected and all defective areas called to the attention of Engineer who may permit patching of the defective areas or also reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by contractor at no additional expense to owner. Holes left by from bolts etc. shall be filled up and made good with

mortar composed of one part of cement to one and half parts of sand passing 2.36 mm IS sieve after removing any loose stones adhering to the concrete shall be finished as described under the particular items of work.

- ii) Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering in the presence of Engineer and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities and necessary care being taken to avoid damage to the surface. Surface irregularities shall be removed by grinding.
- iii) If reinforcement is exposed or the honeycombing occurs at vulnerable positions e.g. ends of beams or columns it may be necessary to cut out the member completely or in part and reconstruct. The decision of Engineer shall be final in this regard. If only patching is necessary, the defective concrete shall be cut out till solid concrete is reached (or to a minimum depth of 25mm) the edges being cut perpendicular to the affected surface or with small under cut if possible. Anchors, tees or dovetail slots shall be provided whenever necessary to attach the new concrete securely in place an area extending several centimeters beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.
- iv) The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer. Epoxy shall be applied in strict accordance with the instructions of the manufacturer.
- v) Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form bottom, grout insert holes and slots cut for repair of cracks shall be repaired as follows. The hole to be patched shall be roughened and thoroughly soaked with clean water until absorption stops.

A 5mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching concrete which shall be well consolidated with a wooden float. The concrete patch shall be built up in 10 mm thick layers. After an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden float and

smooth finish obtained by wiping with hessian, a steel trowel shall be used for this purpose. The mix for patching shall be of same material and in the same proportions as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible.

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

- vi) The patched area shall be covered immediately with an approved non-staining water saturated material such as gunny bag which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by fine spray of sprinkling for not less than 10 days.
- vii) All materials, procedures and operations used in the repairing of concrete and also the finished repair work shall be subject to the approval of Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and finished.

D) Finishing

- i) The type of finish for formed concrete surface shall be as follows, unless, other wise specified by the Engineer. For surfaces against which backfill or concrete is to be placed, no treatment is required except repairing of defective areas.

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

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

- ii) Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage.

Unless the drawing specifies such as stair treads, walls shall be sloped across the width approximately 1 in 30 broader surface such as walkways., roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete sub floors to be covered either concrete topping, terrazzo or quarry tile and similar surfaces shall be smooth screened and leveled to produce even surfaces. Surface irregularities shall not exceed 6mm. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside decks, floors of galleries and sumps, parapets, gutters, sidewalks floors and slabs shall be consolidated, screeded and floated. Excess water and laitance shall be removed before finishing. Floating may be done with hand or power tools and started as the screeded surface has attained a stiffness to permit finishing operation and these shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints edges panels and forms linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, projections etc, removed leaving the surfaces reasonably smooth and unmarred.

iv) Integral cement concrete finish

When specified on the drawings and integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded as specified on the drawingly as per IS 2571. The surface shall be compacted and than floated with a wood float or power floating machine . The surface shall be tested with a straight edge and any high and low spots eliminated. Floating or trowelling of finish shall be permitted only after all surfaces water has evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

v) Exposed Concrete finish/Rendering

A rubbed finish shall be provided only on exposed concrete surfaces as specified on the drawings . Upon removal of forms, all fins and other projections on the surfaces shall be carefully removed, off-sets leveled and voids and damaged sections be immediately saturated with water and repaired by filling with a concrete or mortar of the same composition as was used in the surface. Then surface shall be thoroughly wetted and rubbed with carborundrum or other abrasive. Cement mortar may be used in the rubbing, but the finished surface shall be brush coated with either

cement grout after rubbing. The finished surfaces shall present a uniform and smooth appearance.

Mode of Measurement

- i) The unit rate for concrete work under various categories shall be all inclusive and no claims for extra payment on account of such items as leaving holes, embedding inserts etc. shall be entertained unless separately provided for in the schedule of quantities. No extra claim shall also be entertained due to change in the number, position end/or dimensions of holes solts or openings sleeves, inserts or on account of any increased lift or scaffolding etc. All these factors should be taken into consideration while quoting the unit rates.
- ii) Payments of concrete will be made on the basis of unit quoted for the respective items in the Schedule of Quantities. No deduction in the concrete quantity will be made for reinforcements, inserts etc. and opening less than 0.05 cu.m. where concrete is measured in cum . Where no such deduction for concrete is made, payment for shuttering work provided for such holes, pockets etc. will not be made.
- iii) Payment for beams will be made for the quantity based on the depth being reckoned from the underside of the slabs and length measured as the clear distance between supports. Payment for columns shall be made for the quantity based on height reckoned up to the underside of slabs.

2.05 Providing and laying M20 concrete in superstructure.
General specification same as per item no. 2.04.

2.07 Providing and laying M 25 concrete up to plinth level.
a,b, The general specification is same as per item no 2.04
c but for the design mix M 25 instead of M20.

2.08 Providing and laying M 25 concrete in superstructure.
a to The general specification is same as per item no. 2.04
1 the design mix M25 instead of M20.

2.09 Providing & laying RCC for equipment/machine foundation
The general specification is same as item no 2.04 but for the mix of the concrete, which shall be as specified in the item. The rate is exclusive of reinforcement steel but inclusive of centering and shuttering, providing number of holes, pockets (size and as shown in the drawings/directed) and grouting the same after the machine/equipment is erected with concrete of specified mix and finishing the same as specified.

2.10 Supplying and mixing water proofing compound
The water proofing compound may be Fosroc, Sika , Cico, ACC,

Impermo or of any equivalent make. It shall be added to cement concrete or cement mortar as instructed by the Engineer. The proportion of the compound to be added shall be as per the Manufacturer's specifications.

Mode of Measurement

The quantity of compound added shall be measured and paid for. The unit shall be as specified in the item specification.

2.11 Providing, fabricating and placing in position Reinforcement steel (CRS TMT) Bars

The quality of the steel shall be as mentioned in the materials section. The bars shall be fabricated as per the drawings. Laps and splices for reinforcement shall be as shown on the drawings. Splices in adjacent bars shall be approved by Engineer. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site.

Bending

- a) Reinforcing bars supplied bent or in coils, shall be straightened before they are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is considered as a part of reinforcement bending fabricating work.
- b) All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and rebent in a manner that will injure the material, bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 32mm in diameter which may be bent hot if specifically approved by Engineer. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 845 deg. C.) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and rebinding shall not injure the material. No reinforcement shall be bent when in position in the work without approval whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

Fixing

- a) Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the

drawings by the use of block, spacers and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing points shall be strongly bound together at all such points with two no. 16 to 18 gauge annealed soft G.I. wire. The vertical distance required between successive layers of bar in beams or other members shall be maintained by providing of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

Cover

- a) Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish) shall be as follows:
 - i) At each end of reinforcing bar, not less than 25 mm nor less than twice the diameter of the bar whichever is less.
 - ii) For a longitudinal reinforcing bar in a column, not less than 40mm, nor less than the diameter of the bar. In case of columns of minimum dimensions of 20 cm or under, with reinforcing bars of 12 mm and less in diameter, a cover of 25 mm may be used.
 - iii) For longitudinal reinforcing bars in a beam 25 mm nor less than the diameter of the bar.
 - iv) For tensile, compressive, shear, or other reinforcement in a slab or wall not less than 12mm nor less than the diameter of such reinforcement.
 - v) For any other reinforcement not less than 12 mm nor less than the diameter of such reinforcement.
 - vi) For footings and other principal structural members in which the concrete is deposited directly against the ground, cover to the bottom reinforcement shall be 75 mm. If concrete is poured on a layer of lean concrete the bottom cover may be reduced to 50 mm.
 - vii) For concrete surfaces exposed to the weather or the ground after removal of forms, such as retaining walls, footing sides and top etc. not less than 50 mm for bars larger than 16 mm dia and not less than 40 mm for bars 16 mm dia or smaller.
 - viii) Increased cover thickness shall be provided, as indicated on the drawings, for surfaces exposed to the action of harmful chemicals (or exposed to earth contaminated by such chemical, acid, alkali, saline atmosphere, sulphurous smoke, etc.

- ix) For reinforced concrete members, totally or periodically immersed in sea water or subject to sea water spray, the cover of concrete shall be 50mm more than those specified in (i) to (v) above.
- x) For liquid retaining structures the minimum cover to all steel shall be 40mm or the diameter of the main bars, whichever is greater. In the presence of sea water and soils and waters of a corrosive character the cover shall be increased by 10 mm.
- xi) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing a dense impermeable concrete with approved protective coatings, as specified by the Engineer.
- xii) The correct cover shall be maintained by cement mortar cover blocks. Reinforcement for footings, beams and slabs on sub-grade shall be supported on precast concrete blocks as approved by engineer. The use of pebbles or stones shall not be permitted.

Inspection

Erected and secured reinforcement shall be inspected, jointly measured and recorded and approved by Engineer prior to placement of concrete.

Mode of Measurement

Lengths of reinforcement steel shall be measured to the nearest centimeter. Spacers and chairs shall be measured and converted to weight using IS coefficients. The actual quantity of steel embedded in concrete as calculated and approved by Engineer, irrespective of the level or the height at which the work is done shall be taken. The unit rate for reinforcement shall include all wastages, binding wire. etc. for which no separate payment shall be made. Laps as shown in drawings or as approved by Engineer and minimum number of chairs and spacer bars required to keep the reinforcement in position shall be paid for. The cost of this quantity of steel plus wastage as specified in clause 5.0 of Section VI shall be recovered at issue rate from the Contractor. Rolling margin shall be paid as per clause 6.0 of Section VI.

2.12 Providing & placing in position bitumen impregnated fibers

The bitumen impregnated fiber boards shall be placed in locations before concreting as instructed by the Engineer. The work shall be done at all levels without any extra cost.

The thickness of the board shall be as specified in the item specification.

Mode of Measurement

It shall be measured in sqm. The rate quoted shall be valid for all levels.

2.12 Providing and laying bituminous mastic

This shall be of approved make and quality. This shall be filled in the expansion joints as directed by the Engineer/shown in the drawings. The joints shall be of uniform width and care shall be taken for proper bonding of the joints.

Mode of Measurement

This shall be measured in RM for specified width and depth as per the item in the Schedule of Quantities.

Clean-up

- i) Upon the completion of concrete work, all forms, equipment, construction tools protective coverings and any debris resulting from the work shall be removed from the premises.
- ii) All debris, i.e. empty containers, wooden pieces etc. shall be removed.
- iii) The finished concrete surfaces shall be left in a clean condition satisfactory to Engineer.

2.14 Grouting the pockets with Ready mixed Grouting cement concrete mix of specified brand complete with making holes if necessary in concrete as directed. The work shall be measured based on the size of pockets actually grouted or size of pockets shown in the approved drawing, whichever is less. Similarly, in case of grouting below the base plate of machine / equipment, measurement shall be based on the area of grout and the thickness as per the drawing or as per actual whichever is less.

2.15 Providing & laying CC M20 in floor/road.

The genial specification as per item no. 2.04

2.17 Precast concrete

Precast concrete shall comply with IS 456 and with the following requirements:

- a) All precast units shall be cast on suitable bed or platform with firm foundation and free from wind.

Contractor shall be responsible for the accuracy of the level or shape of the bed or platform. A suitable serial number and the date of casting shall be impressed or painted on each unit.

- b) Side shutters shall not be struck in less than 24 hours after deposition of concrete and no precast unit shall be lifted until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected to at the time of lifting.
- c) The lifting and removal of precast units shall be undertaken without shock, vibration or undue bending stresses to or in the units. Before lifting and removal takes place Contractor shall satisfy Engineer or his representative that the methods he proposes to adopt for these operations shall not overstress or otherwise affect seriously the strength of the precast units. The reinforced side of the units shall be distinctly marked.
- d) All precast work shall be protected from the direct rays of the sun for at least 7 days after casting and during that period each unit shall be kept constantly watered or preferably be completely immersed in water if the size of the unit so permits, otherwise curing practice as given in clause 20 shall be followed.
- e) Slots, openings or holes, pockets etc. shall be provided in the concrete work as shown in the drawings or as directed by Engineer. Any deviation from the approved drawings shall be made good by Contractor at his own expense, without damaging any other work sleeves, bolts, inserts, etc. shall also be provided in concrete work where so specified.
- g) Mode of Measurement

It shall be measured as per the item schedule. The unit rate for precast concrete members shall include formwork, mouldings, finishing, hoisting and setting in position including mortar, provision of lifting arrangement, exposed concrete finish etc. complete. Only if reinforcement is used, it shall be measured and paid for separately under item rate.

SECTION 3.00 MASONRY WORKS

Applicable codes and specifications

- a) The following codes, standards and specifications are made a part of this specification. All standards, tentative specifications, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

IS:1077	- Common burnt clay building bricks
IS:3102	- Classification of burnt clay bricks
IS:2180	- Burnt clay building bricks, heavy duty.
IS:3495	- Method of sampling and testing clay building bricks
IS:2691	- Burnt clay facing bricks
IS:2221	- Code of practice for brick work
IS:2185	- Load bearing hollow concrete blocks
IS:5498	- Lime-cement-cinder hollow concrete blocks
IS:3115	- Lime-cement cinder soiled blocks
IS:1597	- Code of practice for construction of stone masonry (Part I).

3.01 Providing and constructing brick masonry in CM in foundation and upto plinth level

- a) Bricks used in works shall be bricks of specified crushing strength as described in the Schedule of Quantities. They shall have the following general properties:

They shall be sound, hard, homogenous in texture, well burnt in kiln without being vetrified, table moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square edges and paralleled faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing unground particles and which absorb water more than 1/5th of their weight when soked in water for twenty four hours shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. These bricks shall give a clear ringing sound when struck.

- b) Samples of bricks shall be submitted before starting the brickwork to the Engineer for approval. Bricks supplied shall conform to these approved samples. Brick sample shall be got tested as per IS:3495 by Contractor at no extra cost. Bricks rejected by Engineer shall be removed from the site of works within 24 hours.

(c) Mortar

- i) Mix for cement mortar shall be as specified in the respective items of work. Gauge boxes for sand shall be of such dimensions that one complete bag of cement containing 50 kgs. of cement forms one unit. The sand shall be free from clay shale, loam, alkali, and organic matter and of sound, hard, clean and durable particles. Sand shall be approved by the engineer. If so directed by the engineer sand shall be thoroughly washed till it is free of any contamination.
- ii) For preparing cement mortar the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Cement mortar shall preferably be machine mixed, through mixing in a thorough manner may be allowed. The mortar so mixed shall be used within 30 minutes of mixing. Mortar left unused in the specified period shall be rejected.
- iii) The Contractor shall arrange for test on mortar samples if so directed by the engineer retempering of mortar shall not be permitted.

(d) Workmanship

- i) All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work. Brick work 230 mm thick and over shall be laid in english bond unless otherwise specified. While laying bricks shall be pressed in to the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.
- ii) All brick work shall be plumb, square and true to dimensions. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be leveled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes. No broken bricks shall be used except as closers. Care shall be taken that the bricks forming the top corners and ends of the wall shall be properly radiated and keyed into position. Holes kept in masonry for scaffolding shall be closed before plastering. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work where this is not possible, the work shall be raked back accordingly to bond (and not saw toothed) at an angle not exceeding 45 deg.

- iii) Bricks shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6mm and not more than 10 mm. The face joint shall be raked to a minimum depth of 12mm by raking tools daily during the progress of work when the mortar is still green so as to provide a proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done the joints shall be uniform in thickness and be struck flush and finished at the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If the mortar in the lower course has begun to set the joints shall be raked out to a depth of 12 mm before another course is laid.
- iv) All brick work shall be built tightly against columns, floor slabs or other structural member.
- v) Where drgs. indicate that structural steel columns are to be fireproofed with brick work the brick shall be built closely against all flanges and webs with all spaces between the steel and bricks works filled solid with mortar. Steel members partly embedded in brickwork and not indicated to be fireproofed with concrete shall be covered with not less than 12mm thick mortar unless directed otherwise by engineer.
- vi) The work shall be cured for 15 days.
- (e) Miscellaneous inserts in masonry e.g. sleeves, wall ties, anchors, conduits, structural sheet, steel lintels etc. shall be installed by the Contractor . Furnishing fixing of any of these inserts by the Contractor will be paid for separately under steel work. Openings, arches, etc. shall be provided as shown on the drawings, chasses, pockets etc, shall be provided as shown on the drawings to receive rain water pipes etc. Wall ties and flashings shall be built into the brickwork in accordance with the drawings and specifications.
- (f) Mode of Measurement
- i) Brick work of thickness one brick i.e. 230 mm and above shall be paid in units of cum.

In all cases, the quantities measured shall be executed after making necessary deductions for openings etc. as given below:-

No deductions shall be done for openings up to 1000 sqcm , ends of dissimilar materials, drainage holes, window/door holdfasts, concrete lintel bearings, landing slab bearing, beam bearing, chimney flues, cutouts, iron fixtures, pipes up to 30cm dia.

- ii) It shall be clearly understood that the rates quoted by the Contractor include leaving openings, cutting chases in brickwork as per drawings/ instructions of the Engineer.
- iii) The rate includes necessary single or double scaffolding, centering, soaking of bricks, raking out joints and curing the work all complete.

3.02 Providing and brick work in CM in super structure at all a to levels
e

The general specification is same as per item no. 3.02.

3.03 Providing and constructing 115 mm brick masonry in partition a to for superstructure in CM
e

The bricks shall be laid with stretchers. The proportion of the mortar shall be as specified in the item description. The quality of the bricks shall be as specified in the item 3.01. the bricks shall be well soaked in water before using them. The brick work shall be plumb and square. Two nos. of 6mm dia MS bars or 25mm x 1.2 mm deep iron band kept at every third course of 115 mm thick brick work. This shall be provided by the Contractor.

Mode of Measurement

The brick work shall be measured in sq.m. The deductions shall be as specified in the item 3.01. The rate includes necessary single or double scaffolding, centering, soaking of bricks, providing and placing of 2 nos of 6 mm dia MS bars or 25mm x 1.2 mm deep iron band ,raking out joints and curing the work all complete.

3.04 Providing and constructing honey comb brick work

The specification for the material and the workmanship shall be as specified in the items 3.01 or 3.03 depending on the thickness of the brick work. The proportion of the CM shall as specified in the item description in the Schedule of Quantities.

Mode of Measurement

It shall be measured as a normal brick work. No deductions shall be made for the honeycombing. Also nothing extra shall be made for the honeycombing.

SECTION 4.00 WOODWORK

Applicable Codes

- IS:4021 - Timber door, window and ventilator frames
- IS:2202 - Wooden flush door shutters (solid core type) part I
- IS:1003 - Timber panelled and glazed shutters (part I & II)
- IS:4020 - Method of tests for wooden flush doors:
Type tests.
- IS:1761 - Transparent sheet glass for glazing and framing purposes
- IS:3097 - Specification for veneered particle boards
(Exterior Grade)

4.01 Providing & Fixing panelled or glazed or partly panelled & partly glazed door shutters of specified thickness with frame of specified size

- a) Wood used for all work shall be the best of the respective class specified, and properly seasoned, suitable for joiner work should be of natural growth, uniform in texture, straight grained, free from sapwood, dead knots, open shakes, rot, decay and any other defects and blemishes.
- b) For joints following principles to be observed:-
At the joints the weakness of pieces must be minimum as far as possible. To place each abutting surface in a joint as neatly as possible, perpendicular to pressure. To form and fit accurately every pair of surface that come in contact.
- c) All joining shall be wrought on all faces and finished off by hand with sand paper with slightly rounded arises.
- d) The joints shall be pinned with hard wood pins and put together with white lead. Jointing shall be by means of mortice and tenon or dovetailed joints as approved. For external work the joints shall be coated with white or red lead before the members are put together. For internal joints where there is no chance of moisture the joint shall be glued. Driving of screws with hammer is prohibited. The screws shall be soaked in oil before driving them home. The heads of the screws and nails shall be sunk and puttied.
- e) Any joinery work which shall split, fracture, shrink or show

flaws or other defects due to unsoundness, inadequate seasoning or bad workmanship, shall be removed and replaced with sound materials at the contractor's expense.

- f) Door frames shall be rebated. All dimensions shall be as per drawings. The verticals of door frames shall project about 50mm below finished floor. surface coming in contact with brick work shall be painted with bitumen or solignum as directed by the engineer. The door frame shall be provided with 3 nos MS 230x30x3 mm flat split hold fasts on each side, respectively. These hold fasts shall be embedded in masonry or concrete work with concrete block of mix 1:2:4 and size 230x300x250. The work shall conform to IS:4021.
- (g) The door shall be paneled or solid flush doors as described in the item of work. All doors shall be supplied with approved fittings such as hinges, mortice lock of approved make with handles on both sides, oxidized brass tower bolts and latch arrangements door stops etc, and as shown in drawings. External flush doors shall be made of weatherproof plywood as per item description in the Schedule of Quantities.
- (h) The workmanship of all doors and window shutters shall conform to the requirements of IS:1003 (Parts 1 & II) and IS:2202 (Part 1). Flush door panels shall be got tested as per IS:4020 in standard Laboratories..
- (i) Beading and architraves shall conform to the shapes shown on drawings or as approved and fixed by means of screws (counter sunk or otherwise) or bolts.
- (j) Glass

Sheet glass or plate glass shall be of Indian make as specified in the Schedule of Quantities/ as directed. It shall be free from waves and bubbles and all defects The thickness of the glass shall be as follows:-

2mm thick glass for panes upto 900 sqcm area

3mm thick glass for panes from 900 - 5500 sqcm area

4mm thick glass for panes 5500-8400 sqcm area

5.5mm thick glass or plate glass for panes above 8400 sqcm

It should be clearly understood that glass which does not have uniform refractive index or which is wavy, will be rejected. The glazing shall be fixed with teak wood beading and putty.

It shall conform to IS:1761. The putty shall be made up of one part of white lead, 3 parts of finely powdered chalk and adding boiled linseed oil to make a stiff elastic paste. No voids shall be left in the putty. Woodwork shall not be painted oiled or otherwise treated before it has been approved by the engineer.

(k) Mode of Measurement

The doors shall be measured in sq.m. or part thereof. The outer to outer of the door shutter shall be measured. The rate for the item shall include the following works :-

- i) Providing and fixing of the shutter as specified and instructed by the Engineer
- ii) Providing and fixing of architrave as per drawing.
- iii) Painting / polishing of the shutter and the architrave/beading
- vi) Fittings shall be provided as specified in the item / as per the drawings/as directed.
- v) Providing and fixing of glass of specified thickness with painted/polished teak wood beading/putty etc. all around.

4.02 -Do- same as per item 4.01 but for 19 mm NOVA TEAK paneled or equivalent make board as filler material.

The specification shall be same as for item 4.01 but for NOVA TEAK or the board of ISI approved make.

4.03 -Do- same item 4.02 but without frame

The specification shall be same as item 4.01 but the measurement of the actual size of the shutter shall be taken.

4.04 Providing and fixing Composite door and window partly openable, partly fixed with frame of specified size.

The specification for the door shutter shall be as per item 4.01. The specifications for the windows shall be as given below:-

The window frame shall be provided with 2 nos MS 230 x 30 x 3 mm flat split hold fasts on each side, respectively. These hold fasts shall be embedded in masonry or concrete work with concrete block of mix 1:2:4 and size 230x300x250 mm.

The type of windows shall be as specified. Each leaf of the shutter shall have one pair of hinges for a width of less than or equal to 2 feet, for width more than 2 feet extra nos. of hinges shall be provided as directed by the Engineer at no extra cost. The glazed windows shall be provided with glass of thickness as specified in the item description. Architraves shall be provided as per drawings.

Mode of Measurement

Same as item 4.01.

4.05 Providing and fixing windows and ventilators fixed type

The specification for windows shall be same as given in item 4.04 Ventilators shall have two MS holdfasts. Ventilators shall be provided with glass of thickness as specified in the item description. Architraves for the ventilator shall be provided as per the drawing. Mode of measurement shall be same as item 4.04.

4.06 -Do- same as item 4.05 but for fully openable type

The specification shall be same as item 4.05 but with necessary hinges as per item description / drawing. The work shall be carried out as per the drawing/ as instructed by the Engineer.

4.07 -Do- same as item 4.05 but for partly openable and partly fixed

The specification shall be same as item no. 4.05 but with necessary hinges as per item description / drawing.

4.08 Providing & Fixing mosquito/fly proof shutter

The specification for frames and the shutter shall be same as item description and for the fly wire mesh the following specification shall be applicable:-

Fly/Mosquito proof netting of 100G or 140G (22 to 23 SWG), rust proof, S.S.Net as specified in the item description shall be used. Mosquito proof of 100 G (23 SWG), 0.60mm wire dia and 1mm average distance between the wire or Fly proof of 140 G (22SWG), .71mm wire dia and 1.40mm average distance between the wire shall be used.

Mode of Measurement

The wire mesh shutter shall be measured in sqm. The wiremesh Bent up or turned back shall not be paid, only shutter out to out shall be paid. The rate shall include painting/

polishing of both sides of the shutter and the beading provided all around the wire net as specified in the item description.

4.09 Providing & Fixing fixed glass louvers in TW frame of specified size

The frame shall be fixed to the masonry or RCC elements with 2 nos hold fasts. The louver shall be provided with glass of thickness as specified in the item description. The glass shall be fixed at an angle in the frame as shown in the drawing. The frame shall be painted/polished as specified in the item description.

Mode of Measurement

It shall be measured in sqm. The outer to outer of the frame shall be measured. The rate shall include providing of frame, architrave, glass louvers, painting/polishing etc. all complete.

4.10 Providing & Fixing built in cupboard

The specification shall be same as per item 4.09. The thickness of the wired glass shall be as specified in the item description.

4.11 Providing & fixing built in cupboard

These shall be made of block board / particle board as specified in the item description. The shutter shall also be made of 19 mm or 25 mm thick block board or particle board or marine ply as specified in the item. 6mm thick and of suitable width teak wood lipping shall be provided on all edges. Horizontal partitions shall be provided as per the drawings/ instructions. The size of the frame shall be as specified in the item description. the inside shall be painted with paint of ISI approved make and exterior shall be painted / polished as specified / directed.

Mode of Measurement

It shall be measured in sq.m. The outer to outer of the frame shall be measured. The rate shall include provision of frame shutter, horizontal and vertical partitions, beading and painting / polishing all complete.

4.12 Providing and Fixing Meter box cupboard on wall

The frame shall be of specified size and class of wood. It shall be fixed with 2 no. of holdfasts and the same may be grouted with CC 1:2:4 blocks of size 230x230x300. The shutter shall be of 19 mm thick Nova teak. A slit shall be

provided in the shutter as directed by the Engineer. 3mm thick glass shall be fixed in the slit. Architraves shall be provided as directed by the Engineer. Fixtures as specified shall be provided. The shutter, frame and the architrave shall be painted with 3 coats of ISI approved enamel paint.

Mode of Measurement

It shall be measured in sq.m. The outer to outer of the frame shall be measured.

4.13 Providing and fixing TW baluster (molded hand rail)

The hand rail shall be of specified quality of teak wood. The size, shape and the design shall be as per the Architect's drawing. The rounding at the landing shall be made up of monolithic one piece. The hand rail shall be fixed on MS flats with screws/anchor bolts as specified. It shall be applied with three coats of paint/polish as specified.

Mode of Measurement

It shall be measured in cum or part thereof. Measurement shall be for the rectangle or square cross-section circumscribing the curve ends and the actual length.

4.14 Extra for making vision panel/Venetian in flush door.

These shall be provided as shown in the drawings. The inside of the opening shall be lipped. The glass shall be braced with beading and putty. The lipping and the architrave shall be painted with 2 coats of approved paint or polished as directed. Opening up to 0.259 sqm shall not be deducted from the shutter area for payment.

Mode of Measurement

It shall be measured in nos.

4.15 Providing and Fixing cupboard below platform

TW frame of specified size and class of wood shall be provided. The shutter shall be of 19mm thick block board/particle board/ marine ply shutter as specified. The frame and both the sides of shutter shall be duly painted as directed. Architrave shall be provided as specified and the same shall be painted as directed.

Mode of Measurement

It shall be measured in sqm. The measurement shall be out to out of the frame.

SECTION 5.00 FINISHING WORKS

Applicable Codes

- IS:2394 - Code of practice for application of lime plaster finish.
- IS:1477 - Code of practice for painting of ferrous metals in buildings and allied finishes (part I &II)
- IS: 427 - Distemper, dry colour as required
- IS:2395 - Code of practice for painting concrete, masonry and plaster surfaces
- IS:428 - Distemper, oil emulsion, colour as required.

5.01 Providing & Applying Cement plaster 12 mm thick

The surface to be plastered shall be washed with fresh clean water free from all dirt, loose material grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. Concrete surfaces to be plastered will however be kept dry. The wall should not be too wet but only damp at the time of plastering the dampening shall be uniform to get uniform bond between the plaster and the wall. The junction between the brick work and RCC should be fixed with chicken wire mesh/PVC strip as directed before plaster.

The proportion of the mortar shall be as specified under the respective items of work. Cement shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water, sand and cement shall be as mentioned in the Specifications for Concrete & allied works. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to stand for more than 30 minutes after mixing with water. The plaster shall be laid in a single coat. The mortar shall be splashed on the prepared surface with a trowel and finished smooth by trowelling. The plastered surface shall be rubbed with iron plate till the surface shows cement paste. The work shall be in line and level. Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.

The plaster shall be carried out on jambs, lintel and sill faces top and undersides, etc. as shown in the drawing or as directed by the engineer.

Mode of Measurement

- a) The quantity of work to be paid for under this item shall be calculated by taking the projected surface of the area plastered after making necessary deductions for openings, doors, windows etc. as given below :-
- i) No deductions shall be made for opening or end steel joints, beams, post girders etc. upto 0.5 sqm area. No addition shall be made for joints, soffits and sills of such openings. This is applicable to both the sides of the wall.
 - ii) Where opening exceeds 0.5 sqm. but does not exceed 3 sqm and also when only one side of the wall is treated and other side is not treated, deduction shall be made if the width of the reveal on the treated sides is less than that on the untreated side but if the width of the reveal is more then no deduction nor addition shall be made for reveals for jambs, soffits, sills etc.
 - iii) For openings more than 0.5sqm but not exceeding 3 sqm and also when both the sides of the wall is plastered with the similar plaster, deduction shall be made for one face only. But when both the sides treated with different plaster, then deduction shall be made from the side on which the reveal is less and no deduction on the other side.
 - iv) For openings whose respective areas exceed 3 sqm deduction shall be made for the full opening of the wall treatment on both faces while at the same time jambs, sills and soffits shall be measured in sqm for payment. In measuring the jambs deduction shall not be made for the area in contact with the frames of doors, windows etc.
 - v) If the average thickness of the plaster is more than the specified thickness due to any account nothing extra shall be paid for the same.
 - vi) Nothing extra shall be paid for double scaffolding and the rate is applicable for work at all levels.

5.02 Providing & Applying cement plaster 20 mm thick. double coat Mala Finish

The General specifications as same as for item no. 5.01 but for the thickness of the plaster. The plaster work shall be carried out in 2 layers, the first layer being 12-14mm thick and the second layer being 6-7mm thick. The proportions of the mortar for both the layers shall be as specified in the item specification. The first layer shall be splashed against the prepared surface with a trowel to obtain an even surface. The second layer shall then be applied and finished leaving an even and uniform surface, trowel finished unless otherwise directed by the engineer. The plastered surface

shall be rubbed with the iron plate till the cement plaster comes on the surface.

Mode of Measurement

It is same as specified in item 5.01.

5.03 Providing & Applying lime punning to the plastered surface.

The plastered surface shall be finished smooth by trowelling on the surface with lime Neeru (lime cream) Neeru shall be properly slaked flat time. The neeru shall be applied at the rate of 2.2 Kg per sqm.

Mode of Measurement

It shall be measured in sq.m. The rate shall include the cost of lime, double scaffolding, finishing and curing the work at all levels. The deduction as mentioned in item 5.01 shall be applicable here also.

5.04 Providing and Applying 19mm sand faced plaster

- a) This shall be applied in 2 coats. The first coat or the base coat should be approximately 12 mm and shall be continuously carried out without break to the full length of wall or natural breaking points such as doors, windows etc. The base coat shall be splashed on to the prepared surface with heavy pressure, brought to true and even surface and then lightly roughened by cross scratch lines, to provide bond for the finishing coat. The mortar proportion for this base coat shall be as specified in the respective item of work. The base coat shall be cured for at least seven days
- b) The second coat shall be 6mm thick. Before application of the second coat, the base coat shall be evenly damped. This coat shall be applied from top to bottom in one operation and without joints, finish shall be straight, true and even. The mortar proportions of this coat shall be as specified under the respective item work. Sand to be used for the second coat and for finishing work shall be as specified in the item description. The second coat shall be finished with sponge. Grooves shall be made as per the drawings.

Mode of Measurement

It shall be same as per item 5.01.

5.05 Providing & Applying water-proof cement plaster

The plaster shall be of specified thickness and of mortar proportions. The contractor shall use approved waterproofing admixture made by reputed manufacture in the

mortar for plaster work. The quantity to be used shall be accordance with the manufacturer's instructions, however subjected to the approval of the Engineer. The use of Calcium chloride shall be prohibited unless specifically allowed by engineer and shall conform to IS:2645. The plaster shall be cured at least for 7 days.

Mode of Measurement

It shall be measured in sqm. The rate shall include the double scaffolding, plastering and curing. The cement of water-proofing material added shall be measured and paid for separately.

5.06 Providing & Applying neat cement neeru.

The specification same as per item no. 5.03 except that neat cement is applied to the plaster surface in place of lime neeru.

5.07 Providing & Applying white washing on new work 3 or more coats

Walls to be thoroughly scrapped with sand paper before white wash is applied. White wash shall be prepared from a good quality fat line. Lime shall be slaked with water to the consistency of a cream and allowed to remain under water for 2 days. It shall then be strained through a cloth and 2 kg of clean gum of approved make, as specified in the item specification or by the engineer, shall be added for every cubic metre of lime and indigo upto three gm. per kg of lime dissolved in water shall then be added and stirred well.

Each coat to be applied with a brush . It shall be applied with a stroke of the brush from the top downwards, another from bottom upwards over the first stroke and similarly one stroke on the right and another from the left over the first brush, before it dries. Minimum 3 coats shall be applied on the plaster surface for desired finish. If the desired finish is not obtained extra coats shall be applied without any extra cost.

Mode of Measurement

It shall be measured in sqm. Deductions shall be carried out as per item no.5.01. The rate shall be applicable for carrying out the work at all heights, double scaffolding etc.all complete. Extra 20% shall be added to the area for AC corrugated sheets and 17% for semi-corrugated sheets, Cornices and others.

5.08 Providing and fixing Chicken wire mesh.

The wiremesh shall be 24 gauge and it shall be fixed with nails at the junction of brick masonry and RCC elements the chicken wiremesh shall not sag in between the nails. This shall be done before the application of plaster.

Mode of Measurement

It shall be measured in sqm. Measurement shall be taken before the application of the plaster. The rate includes for carrying out the work at all heights.

5.10 Providing & Applying Plastic Emulsion paint

Paint to be used for the various items of work should be of approved make viz. British, Asian, Jenson & Nicholson, ICI or Shalimar. The painting work shall be carried out as directed by the engineer. keeping however in view the recommendations of the manufacturer. Where painting with plastic emulsion is specified, all uneven surface shall be thoroughly cleaned of all dust, dirt and sand papered. One primer coat with cement putty and minimum 2 coats of emulsion paint shall be applied. It shall be applied with rollers. Workmanship shall conform to the requirements of IS:2395.

Mode of Measurement

The actual quantity of work carried out shall be measured in sq meter. Deduction for opening etc. shall be made as in the case of cement plaster.

5.11 Providing & Applying Cement paint

This may be "SNOWCEM" or of equivalent make. The surface shall be prepared as specified in the specification for white wash. This shall be applied with brush on the plastered wall. The strokes shall be even and it shall be

cured at least for 7 days. No patch or brush stroke shall be seen. Three coats shall be applied.

Mode of Measurement

It shall be measured in sqm. The deductions shall be as specified in the item 5.01.