STATE INDUSTRIES PROMOTION CORPORATION OF TAMILNADU LIMITED

19-A, RUKMANI LAKSHMIPATHY ROAD, EGMORE, CHENNAI-8

T.No. 40/2024-2025

TENDER DOCUMENT

FOR

CONSTRUCTION OF OUTDOOR VOLLEY BALL PLAYGROUND AND BADMINTON PLAYGROUND AT SIPCOT INDUSTRIAL PARK, SRIPERUMBUDUR AT MAMBAKKAM (PHASE- IV)

E.M.D. Rs.72,500/-

TENDER DUE ON: 13.03.2025

TENDER SUBMITTED TO:

The Superintending Engineer
SIPCOT Ltd.,
19-A,Rukmani Lakshmipathy Road,
Egmore, Chennai-600 008.

STATE INDUSTRIES PROMOTION CORPORATION OF TAMIL NADU LIMITED

TENDER NOTICE

1. For and on behalf of State Industries Promotion Corporation of Tamilnadu Limited tenders are invited under "Single Cover System" through online for the work of **" Construction of outdoor volley ball Playground and Badminton playground at SIPCOT Industrial Park, Sriperumbudur at Mambakkam (Phase- IV)**". The tender should be in the prescribed form obtainable from web portal tntenders.gov.in. Tender Documents are available in online from **25.02.2025**. Deadline for Bid submission in online is **13.03.2025** before **15.30 Hrs** (as per server system clock). The tender will be opened through online at **15.30 Hrs** (as per server system clock) on **14.03.2025** by the Superintending Engineer SIPCOT or any other officer authorized by him at Head Office, Chennai-8 on the date above mentioned.

1. Tenders must be submitted in online and should be addressed to the Superintending Engineer, State Industries Promotion Corporation of TamilnaduLimited, Chennai-8.

If the tender is made by an individual, it shall be digitally signed. If it is made by a firm, it shall be digitally signed with the co-partnership name by a member of the firm. If it is made by a Corporation, it shall be digitally signed by a duly authorized officer who shall produce with the tender, satisfactory evidence of his authorization. Such tendering, Corporation may be required before the contract is executed to furnish evidence of it's corporate existence.

2. a) Each tenderer must upload the relevant documents viz., registration certificate, the live registration order of the class concerned with upto date renewal for the year 2024-25 with valid Digital Signature Certificate, return for filing Latest **I.T.Certificate and GST registered number** and on production of proof of having similar experience, including date of completion of work, actual value of work done etc.,

b) The tenderer should have executed any **similar work and its allied civil works** in Single agreement in any one year during the last Five years.

3. Each tenderer must pay as Earnest Money Deposit a sum of **Rs.72,500/- (Rupees Seventy two Thousand and five hundred Only)** through online in the portal (tntenders.gov.in) itself. Bidder should not make any payment to SIPCOT through DD/NEFT/RTGS.

This Earnest Money will be refunded to the unsuccessful tenderer on application after intimation is sent of rejection of the tender or at the expiration of One month from the date of tender, whichever is earlier. This refund will be authorized by the State Industries Promotion Corporation of Tamilnadu Limited, by suitable endorsement. The Earnest Money Deposit

will be retained in the case of successful tenderer and will not carry any interest. It will be dealt with as provided in the tender.

4. When a tender is to be accepted, the tenderer whose tender is under consideration shall forthwith upon intimation being given to him by the SIPCOT, of acceptance of his tender, shall produce the balance amount of Security Deposit equivalent to 2% of value of accepted tender less EMD paid and Non-Judicial Stamp Paper for the value of Rs.100/- for preparing Agreement. He shall then sign the original agreement first, which will be accepted and signed by the competent authority of SIPCOT. The Security Deposit together with the Earnest Money Deposit and the amount withheld shall be retained as security for the due fulfillment of his contract. Failure to enter into the required agreement or to make the security deposit as defined in this paragraph within 15 days from the intimation shall entail forfeiture of the earnest money. The written agreement to be entered into between the contractor and the SIPCOT shall be the foundation of the rights of both the parties and the contract shall not be deemed to be complete until the agreement has first been signed by the contractor and then by the proper officer authorized to enter into contract on behalf of SIPCOT.

5. The tenderer shall examine closely the Tamilnadu Building practice specifications and sign the copy of the detailed standard specifications and its amendments volume in token of such study before signing the contract documents unit rates shall be for finished work in the site. He shall also carefully study the drawings and additional specifications and all the documents, which form part of the agreement to be entered into by the accepted tenderer. The Tamilnadu Building Practice Specifications and other documents connected with the contract such as specifications, plans, descriptive specifications sheets regarding materials etc. can be seen during office hours from 10.00 am to 5.45 pm on any working day in the office of the SIPCOT, Chennai-8.

6. The tenderer's attention is directed to the requirement for materials under the clause "Materials and workmanship" in the 'Preliminary specifications". Materials conforming to the Indian Standard specifications shall be used on the work and the tenderer shall quote his rates accordingly.

7. Every tenderer is expected before quoting his/their rates to inspect the site of the proposed work, and the quarries where the materials, conforming to the standards and specifications is available sufficiently and he /they also shall have to examine and ascertain the lead involved from the quarries selected by them to the work site before quoting his rates and satisfy himself/themselves about the quality and availability of materials. Once the tenderer has quoted his/their rates, it is to be concluded that he/they have taken into account all the leads involved, availability of

sufficient quantity of materials etc. Any litigation, later on in this regard will not be entertained. The best class of materials to be obtained from the quarries or other source defined shall be used on the work. In every case the materials must comply with relevant standard specifications or as specified in this tender notice or as required by the SIPCOT Officer in charge of the work. In any case, samples shall be submitted for the approval of the Engineer-in-charge of the work before the supply to site of work.

The SIPCOT will not however after acceptance or contract rates, pay any extra charges for lead or for any other reason in case the contractor has found later on to have misjudged the materials available. Attention of the contractor is directed to the standard "GENERAL CONDITIONS TO CONTRACT" in TNBP Vol.II regarding payment of seigniorage tolls etc.

8. The tenderer's particular attention is drawn to the sections and clauses in the standard 'GENERAL CONDTIONS TO CONTRACT' dealing with:
   1. Test, inspection and rejection of defective materials and work
   2. Carriage
   3. Water and lighting
   4. Cleaning up during progress and for delivery
   5. Construction plant
   6. Accidents
   7. Delays
   8. Particulars of payment

   The contractor should closely peruse all the specification clauses which govern the rates for items for which he is tendering.
9. A Bill Of Quantities(BOQ) accompanies this tender notice. It shall be definitely understood that the SIPCOT does not accept any responsibility for the correctness or completeness of this BOQ and that this BOQ is liable to alteration by omissions, deductions or additions at the discretion of the SIPCOT Officer in charge of the work, or as set forth in the conditions of contract. The tenderer will however, base his lump sum tender on this bill of quantities. He should quote specific rates for each item in the BOQ and the rates should be in rupees and paise. The tenderer should also undertake to do the whole work subject to the conditions of contract, such lump sum agreeing with the total amount of BOQ. This BOQ accompanying the lump sum tender shall be clear.
10. Tenders offering a percentage deduction from or increase on the estimate amount and those not submitted online in proper form/or in due time will be rejected. Rates of lump sum amounts for items not called for shall not be included in the tender. No alteration which is made by the tenderer in the contract form, the conditions of contract,

the drawings, specifications or quantities accompanying the same will be recognized and if any such alterations are made, the tender will be deemed to be void.

11. The tenderer should workout his own rates, without reference being made to the Public Works Department current schedule of rates or the SIPCOT estimaterates which are not open for inspection by tenderers.

12. No material will be supplied by SIPCOT. All materials conforming to the standards and specifications should be procured. Rates should be quoted taking into account the quality and lead involved from quarry to work site. Notwithstanding any subsequent change in the market value for these materials, no extra payment will be given.

13. The attention of the tenderers is directed to the contract requirements as to thetime of beginning work, the rate of progress and the dates for the completion of the whole work and its several parts. The following rate of progress and proportionate value of work done from time to time as will be indicated by theSIPCOT Officer's certificates of the value of work done will be required. Date of commencement of this Pogramme will be the date on which the site (or premises) is handed over to the contractor.

Period after date of commencement Percentage of work completed
(Based on contract lump sum amount)

Period after date of commencement	SCHEDULE-A
First Month	35% (Thirty Five percentage)
Upto Second Month	70% (Seventy percentage)
Upto Third Month	100% (One Hundred percentage)

14. No part of the contract shall be sublet without written permission of the SIPCOT nor shall transfer be made by power of attorney, authorizing others to receive payment on the contractor's behalf.

15. If further necessary information is required, the SIPCOT will furnish such, but itmust be clearly understood that tenders must be received in order and according to instructions.

16. The SIPCOT reserves the absolute right to reject any tender or all the tenders.

17. (a) Preference in the selection from among the tenderers will be given, other things being equal to those who are themselves professionally qualified or who undertake to employ, qualified men at their cost to look after the work. The tenderers should therefore state in clear terms whether they are professionally qualified or whether they undertake to employ technical staff and if so to give their professional qualification or

of the staff to be employed. In case, the selected tenderer is one who has undertaken to employ technical staff under him, he should see that one of the staff is always at the site of the work during working hours, personally, checking all items of work and paying extra attention to such works as may demand special attention e.g. reinforced concrete works. etc.

(B) The tenderers who are themselves not professionally qualified shall undertake to employ the qualified Technical Staff at their cost to look after the work. The tenderers should state in clear terms, whether they are professionally qualified or whether they undertake to employ technical men for the work.

Sl. No	**Value of contract**	**Qualification and number of Technical Assistant to be employed.**
1.	Upto Rs.1.00 lakh	No Technical Assistant need be employed. If situation and nature of work warrant a Diploma holder in Civil Engineering / a retired Junior Engineer may be employed.
2.	Rs.1.00 lakh to Rs.5.00 lakhs	One Diploma holder in Civil Engineering or not less than one retired Junior Engineer.
3.	Rs.5.00 lakhs to Rs.10.00 lakhs	One B.E. (Civil) or equivalent Degree holder or not less than one retired Sub-Divisional Officer (A.E.E.) or (A.D.E.) or one diploma holder with three years experience.
4.	Rs.10.00 lakhs to Rs.25.00 lakhs	One B.E. (Civil) or equivalent degree holder with three years experience in Civil Engineering works or not less than one retired Sub-Divisional Officer plus one diploma holder in Civil Engineering with five years experience.
5.	Rs.25.00 lakhs to Rs.50.00 lakhs	One B.E. (Civil) or equivalent degree holder with three years experience or not less than one retired Sub-Divisional Officer (Retired A.E.E. or A.D.E.) plus two diploma holders in civil Engineering or two retired Junior Engineers OR One B.E. (Civil) or equivalent degree holder with 3 years experience or not less than one retired Sub-Divisional Officer and one more B.E. (Civil) or equivalent degree holder.
6.	**Above Rs.50.00 lakhs**	**Two B.E. (Civil) or equivalent degree holder with three years experience or not less than two retired Sub- Divisional Officer (Retired A.E.E or A.D.E) plus one diploma holders in Civil Engineering and diploma holders in Electrical Engineering with three years experience** **OR** **Two B.E. (Civil) or equivalent degree holders with 3 years experience or not less than two retired Sub- Divisional Officer and one more B.E. (Civil) or equivalent degree holder.**

(C) In case the contractor who is professionally qualified is not in a position to remain always at the site of the work during the working hours, Personally checking all items of work and paying extra attention to such works, which may demand special attention.

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(D) The contractor, whether he is professionally qualified or not, should see that technical personnel is always at the site of work, during working hours, personally checking all items of works and paying extra attention to such works as may demand special attention.

(E) It will not be incumbent on the part of the contractor to employ technical assistant/assistants when the work is kept in abeyance due to valid reasons, and if during such period in the opinion of the SIPCOT the employment of technical assistant/assistants is not required for the due fulfillment of the contract.

NOTE:

1. For non employment of such technical personnel, penalty of Rs.2000/- per month for Diploma Holder and Rs.5,000/- per month for Degree Holder will be levied.
2. An attendance register for the technical personnel is to be maintained. Every technical personnel should sign their initials in the register whenever they leave and arrive. The Register should be produced for inspection by the officials of SIPCOT as and when required.
3. If any replacement of the Technical personnel is proposed, the new personnel should have equal or better qualification of the original candidate.

b. Tenderers who have already registered themselves in PWD or in any other Government Department as contractors, shall furnish evidence of their good record and capacity to do works.

c. A tenderer submitting a quotation which the tender accepting authority considers excessive and / or indicative of the insufficient knowledge of current prices or definite attempt of profiteering will render himself liable to be debarred permanently from tendering or for such period as the tender accepting authority may decide. The tender rates should be based on the controlled price for materials, if any fixed by Government or the reasonable price permissible for the tenderer to charges private purchaser under the provision of clause 8 of the Hoarding and profiteering prevention ordinance, 1943 as amended from time to time and on similar principles to labour and supervision of the construction.

d. The fact of submitting the tender implies that the tenderers have actually inspected the site of work and have examined before tendering, the nature and extent of various kinds of soil at various depths and have based their tender on such examination by them and no future representation in this regard will be considered.

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e. Statement giving brief particulars of equipment and resources that will be put at the disposal of the work under the following classification should accompany thetender:

a. Equipment (Transport for materials viz. lorries and carts, concrete mixers)

b. Organisations (i) Technical (ii) skilled (iii) Unskilled

c. Resources in materials such as lime, teakwood etc. and extent upto which departmental help is required for procurement of materials and transport of same.

d. Methods that will be adopted to speed up the work to ensure completion within or less than the time fixed for completion.

f. The tender of the contractor who agrees to employ the maximum number of ex- servicemen (number to be specified in the tender) will receive preferential consideration. The tenderers are requested to report on this in their covering letter.

g. The contractors should invariably attach Registration as Contractor/Dealer under GST valid for the current period with their tender.

h. The SIPCOT reserves to itself the right of allotting the different sub works to thedifferent contractor or to one and the same contractor as it may decide after thereceipt of tenders.

i. Tenders should be submitted through online within the prescribed time and date. The EMD shall be paid through online in the portal (tntenders.gov.in) itself. Bidder should not make any payment to SIPCOT through DD/NEFT/RTGS, failing which, the bid shall be summarily rejected. The tender document can be read and signed. The same can be scanned as a pdf file which can be uploaded in the web portal.

j. <u>PERFORMANCE SECURITY AND ADDITIONAL PERFORMANCE SECURITY</u>

1.1. a) Within 15 days from the date of the Letter of Acceptance, the successful tenderer shall deliver to the Employer a **Performance Security Strictly in the form of Demand Draft/irrevocable BG** in favour of SIPCOT, Chennai for the difference in amount equivalent to 2% of the total value of the contract less EMD amount paid as laid down in clause No.5 above. b) On evaluation of tender, if it is found that if the overall quoted amount of the tender is less than 5% to 15% of the value put to tender, the contractor shall pay **Additional Performance Security** at 2% of the estimated value **Strictly in the shape of Demand Draft.** If the tender savings exceeds 15%, the contractor shall pay an **Additional Performance Security** of 50% of thedifference between quoted amount and estimated amount **Strictly in the shape of Demand Draft or irrevocable BG.** Failure to

produce Security Deposit additional performance security within 15 days from the receipt of acceptance order and execute the agreement shall entail cancellation of awardof tender and forfeiture of E.M.D.

The Security Deposit & additional performance deposit amount will not carry any interest and shall be refunded only after one year defect liability period after completion of the work.

k. The work should be executed in conformity with the Technical specification, specified for various items of work in the Tamilnadu Building practice.

I. MINIMUM CRITERIA

CRITERIA-I

1 (a) The Tenderer should have been in the Civil Engineering Construction field atleast for the past "FIVE" years.

EVIDENCE TO BE PRODUCED:-

(i) Audited Balance sheet with Chartered Accountant's Certificate for the past "FIVE"years in the case of individual Contractors, Partnership firms, Public / Private Limited Companies.

(or)

(ii) Registered Partnership Deed in the case of Partnership Firms.

(or)

(iii) Articles of Agreement and Memorandum of Association registered with Registrar of Companies as per 'Company Act' in the case of Public / Private Limited Companies.

1 (b) The Tenderer should be Registered as **Class-IV and above** Civil Contractor of PWD/Highways /Any Department of Government of Tamil Nadu/Central Government Department/ Tamil Nādu State Government undertaking with monetary limit for taking up of works above **Rs.50.00 Lakhs and upto Rs.2.00 crores**.

EVIDENCE TO BE PRODUCED:-

1. Copy of the communication issued by the Registering Authority, Registering the name of the Tenderer as **Class-IV & Above** Civil Contractor.

2. Copy of "LIVE CERTIFICATE" issued by the Registering Authority shall beenclosed.

1 (c) The Tenderer should produce Income Tax Assessment Order / Returns Filed for the Income Tax Assessment Year **2024-25**, GST Registration Certificate.

TENDERER

EVIDENCE TO BE PRODUCED:-

i. Copy of the Income Tax Assessment Order issued by the Income Tax Department or the Income Tax Returns filed with the Income Tax Department for the Tax Year **2024-25** or Financial Year **2024-25**.

ii. Copy of the Registration Certificate showing the GST Number assigned by the Commercial Tax Department issued by the Competent State / Central Commercial Tax Department Officials, valid for the current period.(i.e.**2024-25**)

1 (d) The Tenderer should furnish the details of **similar work and its allied civil works** executed inany one of the preceding FIVE years.

CRITERIA–II

The Tenderers should have satisfactorily completed one similar work such as **similar work and its allied civil works** under a single agreement with a value not less than 50% of value of this work **(i.e.) Rs. 62.50 Lakhs (Rupees Sixty Two Lakhs and fifty thousand Only)** in any one year during the last Five years from the date of tender including the year upto submission of tender documents by the tenderer.

EVIDENCE TO BE PRODUCED:-

(i) Certificate issued by the Engineer–in–Charge – (Not below than rank of Executive Engineer / Project Engineer) of the project clearly showing the following details.

a. Name of the Project
b. Location of the Project (Village / Town / Taluk / District / State)
c. Name / Designation of the Employer
d. Value of work (As per Agreement)
e. Agreement Number
f. Period of contract as stipulated in the Agreement
g. Date of commencement of the Project
h. Date of actual completion of the Project
i. Reasons for the delay in completion of the project, if any
j. Actual value of work done as per Final Bill
k. Quality of work executed.

CRITERIA–III

This experience in similar nature of work should also include the following minimum quantities of works in multiple agreement completed in any one year during the last five years.

S.No.	Description of work	Quantity	Unit
1	PCC & RCC	**77**	**Cum**
2	Steel	**3**	**MT**
3	GSB	**52**	**Cum**
4	Paver block	**350**	**Sqm**

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EVIDENCE TO BE PRODUCED: -

i. Certificate issued by the Engineer-in-Charge (not below rank of Executive Engineer or Project Engineer) clearly showing the quantities of various items of work as detailed below:

a. Name of the Project
b. Value of the Project
c. Agreement Number
d. Period of execution from…… to ……..
e. Quantities of work executed year wise if the work is executed in more than one financial year. Turned out.

If the physical out turn were made by the Tenderer, under multiple agreement in various items of work, separate certificates issued by the Engineer-in-Charge of each of such projects should be appended.

CRITERIA–IV

The Tenderer shall have the following minimum Construction Equipment's, Tools and Plants exclusively available with him own to be deployed for this work.

S. No	Name of the Equipment	Requirement of this work
1	Backhoe Loader / front end loader	1 No
2	Vibrator	1 No
3	Tipper	1 No
4	Concrete mixer machine	1 No

DOCUMENTS TO BE PRODUCED:-

(i) Attested Xerox copy of the RC Books invoices etc. for all the above constructionequipment's) and plants.
(ii) Certificate issued by the **Project Officer, SIPCOT Industrial Park, Sriperumbudur** (email id: posp@sipcot.in) clearly stating the details of Machineries, Tools and Plants owned by the Tenderer with year of purchase, capacity, present working condition, etc
(iii) This certificate shall be obtained after the date of publication of this tender.

CRITERIA–V

The Tenderer shall have a Project Engineer together with Site Engineers with Degree [(B.E. (Civil)] with minimum Field Experience noted

against each, available as detailed below exclusively for this work.

A. Project Engineer : 1 No - B.E. (Civil) with at least Five years' experience

DOCUMENTS TO BE PRODUCED:-

i. List of Technically Qualified Personnel under Permanent / Regular Employmentwith the tenderer with details such as,

(a) Name
(b) Qualification
(c) Total Experience
(d) Under Regular Employment with the Tenderer since ……

ii. List of Technical Personnel proposed to be employed for this project along with their willingness letters, Attested Xerox copy of the Testimonials in support of the Technical Qualification of the Personnel proposed to be deployed.

iii. If required numbers of Technical Personnel are not under permanent / regular employment of the Tenderer, the details such as Name, Qualification, Span of Experience, etc., of the Personnel proposed to be employed exclusively for this work along with their willingness letters, attested xerox copy of the testimonials in support of their Technical Qualifications should be uploaded.

Even though the applicants meet the above criteria, they are subject tobe disqualified if they have :-

- Made misleading or false representation in the form, statements and attachment submitted. and/or
- Records of poor performance such as abandoning the work, rescinding of contract for which the reasons are attributed to the non performanceof the contractor, consistent history of litigation awarded against the applicant or financial failure due to bankruptcy.

Note:-

1. Copies of the documentary evidence in support of the pre-qualification requirements should be uploaded with due attestation by the competent authority.
2. The tenderers should furnish the original documents if called for at the time of tender evaluation to verify the copies of documentary evidence furnished along with the pre-qualification documents.
3. The audited balance sheet/profit and loss account etc., to be furnished by the tenderers should be properly endorsed by the auditors.

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DOCUMENT ANNEXURE **CRITERIA -II**

List of similar works such as **similar work and its allied civil work** completed under single agreement in any one of the proceeding FIVE Years.

Name of the tenderer:-

Sl. No.	Name of the project with location (Village / Town / District / State / to be furnished)	Value of the project (InRs.)	Name and full address of the	Agreement Number	Period of completion stipulated	Date of commencement of the project date of actualcompletion	Actual time taken to complete the project	Reasons for delay in completion (If any)	Salient features of theproject	Quantities of individual items of work actually executed

1. Details of major projects costing more than **Rs. 62.50 Lakhs** alone should be furnished.
2. Attested true copy of the certificates issued by the Engineer-in-Charge for each of thework should be furnished.

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DOCUMENT ANNEXURE- **CRITERIA–IV**

Details of machineries, construction equipment, tools and plants that could be deployed by own exclusively for this project (proof of ownership must be enclosed)

Name of Applicant:-

S. No	Name of machineries / equipment / Vehicles / Tools and plants	Total requirement for this project	Owned by the tenderer		
			No	Year of purchase, make and capacity	Present working condition
1	Backhoe Loader / front end loader	1 No			
2	Vibrator	1 No			
3	Tipper	1 No			
4	Concrete mixer machine	1 No			

SIGNATURE OF TENDERER

Note :

1. Current working condition along with the Registration No. of the Vehicle certificate should be obtained from the **Project Officer, SIPCOT Industrial Park, Sriperumbudur** (email id: posp@sipcot.in) for which the certificate should be after the date of tender publication and enclosed the original certificate along with the P.Q. document for the above plants and equipment's. if the above certificates not uploaded in the PQ document the tender will be summarily rejected by the tender inviting authority.

2. Contractor should compulsorily mention the contractor code assigned to him/her

TENDERER

Date. .02.2025

CERTIFICATE FOR PLANT AND EQUIPMENTS

TO

, _____

_____

_____

SIR

Sub: "Construction of outdoor volley ball Playground and Badminton playground at SIPCOT Industrial Park, Sriperumbudur at Mambakkam (Phase-IV)".

Ref: 1.H.O.TenderNoticeNo.NIT.No.40/CD/T.No.40/2024-25,dt. 20.02.2025

2. Your request letter No. Nil dated._____

****

With the reference to the above, I hereby certify that, the following plantand Equipment are available with the contractor ____

The following plant and equipments are verified at the plant site location and foundto be in working condition.

S. No	**Name of the Equipment**	**Requirement of this work**	**Vehicle Registration Number**
1	Backhoe Loader / front end loader	1 No	
2	Vibrator	1 No	
3	Tipper	1 No	
4	Concrete mixer machine	1 No	

This verification certificate is issued only for participating in the tender called for bythe Superintending Engineer, SIPCOT, Chennai vide. Tender Notice No.NIT.T.No.40/CD/T.No.40/2024-25, dt.20.02.2025.

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SPECIAL CONDITIONS FOR PLANT & MACHINERIES

1. The tenderer should upload the documents for possession of their own Backhoe Loader/front end loader, Vibrator, Tipper & Concrete mixer machine for the works. The tendersreceived without such proof for the possession and good working condition of their own Backhoe Loader/front end loader, Vibrator, Tipper & Concrete mixer machine end loader certificate obtained from the Project officer concerned shall be rejected.
2. During evaluation of the tender by the Tender Inviting Authority any short coming noticed regarding the ownership documents of the Plant & Machineriesthe Tender is liable for rejection.
3. The Working Condition Certificate for the above Machineries obtained after the date of Tender Notice from the concerned Project officer should be uploaded in Original. The tender received without the above certificate shall be rejected.
4. No extra cost shall be made for the tests and sample materials for test.
5. If any dispute regarding the working condition of the Machineries arises the decision of the **Superintending Engineer, SIPCOT** shall be the final and binding all the parties.
6. It shall be the primary responsibility of the Contractor to ensure quality of the mix produced conforming to the standards and specifications and maintain allthe records and registers as to the tests conducted to ensure quality and the registers, records and other relevant infrastructure shall be produced during inspection of the Engineer and or the officers duly authorized by SIPCOT in respect of quality assurance. The decision of the Engineer as to the quality and conformance to specifications shall be final and binding on the contractoras per P.S to S.S.R.B.
7. The works should be executed by using Backhoe Loader/front end loader wherever applicable.

TENDERER

FORM OF TENDER

To
The SUPERINTENDING ENGINEER,
State Industries Promotion Corporation of Tamilnadu Limited,Chennai – 8.

Sir,

I/we do hereby tender and, if this tender be accepted, undertake to execute

the following works. Viz., Construction of outdoor volley ball Playground and Badminton playground at SIPCOT Industrial Park, Sriperumbudur at Mambakkam (Phase- IV)" as shown in the drawings and described in the specifications of the State Industries Promotion Corporation of Tamil Nadu Limited with such variations by way ofalterations or additions to and omission from the said works and method of paymentas are provided for in the "Conditions of contract" for the sum of Rs. /-(Rupees …….…….…..…… only) or such other sum as may be arrived at under the clauses of the standard preliminary specification relating to payment on lump sum basis or by final measurement at unit prices".

I/WE have also completed the priced list of items in BOQ (in words and figures) for which I/WE agree to execute the work when the lump sum payment under the terms and conditions of the agreement is varied by payment for measured quantities. I/WE hereby distinctly and expressly declare and acknowledge that, before the submission of my/our tender I/WE have carefully followed the instructions in the tender notice and the preliminary specification therein and that I/WE have made such examination of the contract documents and of the plans, specifications and quantities and of the location where the said work is to be done and such investigation of the work required to be done, and in regard to the material requiredto be furnished as to enable me/us to thoroughly understand the intention of same and the requirement, covenants, stipulations and restrictions contained in the contract and in the said plans and specifications and distinctly agree that I/WE will not hereafter make any claim or demand upon the State Industries Promotion Corporation of Tamilnadu Limited based upon or arising out of any alleged misunderstanding or misconception or mistake on my/our part of the said requirement covenants, stipulations, restrictions and conditions. I/WE being a registered PWD/Highways and Rural Works Contractor enclose TAX verification certificate in respect of (the particulars of the previous occasion on which the certificate was produced should be given).

TENDERER

I/We enclose the Earnest Money Deposit for the sum of **Rs.72,500/- (Rupees Seventy Two Thousand and five hundred Only)** through online in the portal (tntenders.gov.in) itself. If my/our tender is not accepted, this sum shall be returned to me/us on my/our application when intimation is sent to me/us or rejection or at the expiration of four months from the date of this tender whichever is earlier. If my/our tender is accepted, the earnest money shall be retained by the State Industries Promotion Corporation of Tamil Nadu Limited as security for the due fulfillment of the contract. If upon written intimation to me/us by the SIPCOT officers, I/we fail to attend the said office before the end of the period specified on such intimation, the tender will not be considered and if, upon intimation being given to me/us by the SIPCOT of acceptance of my/our tender, I/We fail to enter into the required agreement as defined in clause of the tender notice, then I/We agree to the forfeiture of the earnest money. Any notice required to be served on me/us hereunder shall be sufficiently served on me/us if delivered to me/us personally or forwarded to me/us by post to me/us (Registered or ordinary) of left at my/our address given herein. Such notices shall if sent by post be deemed to have been served on me/us at the time when in due course of post it would be delivered at theaddress to which it is sent.

I/We agree that the time shall be considered as the essence of this contract and to commence the work, as soon as this contract is accepted by the competent authority and the site is handed over to me/us and agree to complete the work within **Three months** from the date of such handing over of the site and to show good progress as defined in the tabular statement "Rate of Progress", subject, nevertheless to the provision for extension of time contained in the General Conditions of Contract.

I/We fully understand that the written agreement to be entered into between me/us and the State Industries Promotion Corporation of Tamilnadu Limited, shall be the foundation of rights of both the parties and the contract shall not be deemed to be completed until the agreement has first been signed by me/us and then by the proper officer authorized to enter into contracts on behalf of State Industries Promotion Corporation of Tamilnadu Limited.

I/We will employ the following technical staff for supervising the work and will see that one of them is always at site during working hours personally checking all items of works and paying extra attention to such works as may require special attention.

Name of Technical Staff proposed to be employed	**QUALIFICATION**

TENDERER

NOTE:

(i) For non employment of such technical personnel, penalty of Rs.2000/- per month for Diploma Holder and Rs.5,000/- per month for Degree Holder will be levied.

(ii) An attendance register for the technical personnel is to be maintained. Every technical personnel should sign their initials in the register whenever they leave and arrive. The Register should be produced for inspection by the officials of SIPCOT as and when required.

(iii) If any replacement of the Technical personnel is proposed, the new personnel should have equal or better qualification of the original candidate.

TENDERER

SPECIAL CONDITIONS

1. Location of the work site:-

The site of construction is located at **SIPCOT Industrial Park, Sriperumbudur** Attached here to are the tender drawing giving the general layout, details and sanctions of the proposed works. Further details and working drawings necessary for execution of the construction of work will be prepared and issued by SIPCOT from time to time. All the works shall be carried out in accordance with the instructions and directions given by the SIPCOT Officer in-charge of the work from time to time.

1. Submission of the tender shall means that the contractor has seen the site and studied the plans, specifications, conditions and instructions and agree to abideby the same and execute an agreement with the employer. For the work engaged he must satisfy himself to the nature of the soil, facilities for access and storing of materials and other site condition.

2. A schedule of probable quantities is attached here with but it must be clearly understood that these quantities are liable to alterations, omissions, deductions or additions at the discretion of the SIPCOT and the unit rates quoted by the tenderer shall be valid irrespective of fluctuations in quantities.

3. Withdrawal of the tender when it is once accepted or failure on the part of the successful tenderer to execute the contract agreement within seven days after intimation being sent of acceptance of the tender would entail forfeiture of the Earnest Money.

4. In complying with these conditions and the specifications, schedule of quantities and contract agreement, the following works shall have the meaning herein assigned to them except where the subject or context otherwise requires.

a. "Employer" shall mean "**SUPERINTENDING ENGINEER**", SIPCOT LIMITED, CHENNAI-8 and shall include their representative / and assigns / or successors.

b. "Contractor" shall mean shall include his (tenderer's) legal representatives / and assign(s) or successors.

c. "SIPCOT" shall mean State Industries Promotion Corporation of Tamilnadu Limited and shall include their legal representative/s/ and assign/s/ successors.

d. "Site" shall mean the site of the contract works including any building and erections thereon and any other land (inclusively) as aforesaid allotted by theemployer for the contractor's use.

e. "This Contract" shall mean the Articles of Agreement, the conditions, the appendix, the schedule of quantities or specifications attached hereto duly signed.

f. "Notice in writing" or written notice shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise provided to have been received) by registered post to the last known private or business address or 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.

g. "Act of Insolvency" shall mean an act of insolvency as defined by the Provincial Towns Insolvency Act or any other Act amending such original.

h. "Net Prices": If in arriving at the contract amount, the contractor shall have added to or deducted from the total of the items in the tender any sum, either as a percentage or otherwise, then the net price of any item in the tender shall be the sum arrived at by adding to or deducting from the actual figure appearing in tender as the price of that item. A similar percentage or proportionate sum provided of the sum so added or deducted by the contractor, the total amount of any price cost items and provisional sums of money shall be deducted from the total amount of the tender. The expression "net rates" or net prices when used with reference to the contract or amounts shall be held it mean or process so arrived at". Words importing persons including firms and corporations. Words importing the singular also include the plural and vice versa where the context so requires.

5. <u>SCOPE OF CONTRACT:</u>

The contractor shall carry out and complete the said work in every respect in accordance with this contract and with the directions or and to the satisfaction of employer viz. the SIPCOT. The SIPCOT may from time to time issue further drawings and / or instructions, details, directions and explanation which are hereafter collectively referred to as instructions, in regard to:

a. The variation or modification of the design, quality or quantity or works or theaddition or omission or substitution of any work.

b. Any discrepancy in the drawings in between the schedule of quantities and /or drawings and / or specification.

c. The removal from the site of any materials brought thereon by the contractorand the substitution of any other materials thereof.

d. The removal and / or re-execution of any works executed by the contractor.

e. The dismissal from the works of any persons employed there upon.

f. The opening up for inspection of any work covered up.

g. The amending and making good of any defect under clause 24, the contractorshall forthwith comply with and duly execute any work comprised in each such SIPCOT instructions, directions and explanations given to the contractor or his representatives upon the works by the SIPCOT shall, if involving a variation, be confirmed in writing by the contractor within seven days.

6. DRAWING AND SCHEDULE OF QUANTITIES:

The contract shall remain in the custody of the employer and a duplicate copy of the contract shall remain in the custody of the Project Officer. The contractor on the signing thereof shall be furnished by the employer free of cost, a copy of the priced, schedule of quantities, one copy of each of the said drawings, the specifications and one copy of all further drawings issued during the progress of the works. Any further copies of such drawings required by the contractor shall be paid for by him. The contractor shall always keep one copy of all drawings in the works and the Employer/ SIPCOT site officer shall, at all reasonable times. have access to the same.

7. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY:

The contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the drawings, schedule of quantities and specification taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from and if the contractor finds any discrepancy in the drawings, in between the drawings, schedule of quantities and specification, he shall immediately and in writing refer the same to the project officer / SIPCOT Officers who shall decide in consultation with the Employer which is to be followed.

AUTHORITIES, NOTICES AND PATENTS:

The contractor shall conform to the provisions of any act of the legislature relating to the works and to the regulations and bye-laws of any authority and/or any water, lighting and other companies and/or authorities with those system, the structure is proposed to be connected and shall before making any variations from the drawings or specification that may be necessitated by so conforming give to the employer written notice, specifying the variations from the proposed to be made and the reason for making and apply for instructions thereon. In case, the contractor shall not within the ten days receive such instructions, he shall proceed with the work, conforming the provision, regulations or bye-law in question and any variationso necessitated shall be dealt with under clause No.18.

The contractor shall bring to the attention of the employer any notices required by the said Act/s, Regulations or bye-laws to be given any authority and pay to such authority, or to any public office, all fees that

may be properly chargeable in respect of the works and lodge the receipts with the Employer. The contractor shall indemnify the EMPLOYER against all actions arising from such claims and shall himself pay all royalties, license fees, damages, costs and charges of all and every sort/s that may be legally incurred in respect thereof.

8. SETTING OUT WORK:

The contractor shall set out the works and shall be responsible for the true and perfect setting out of the same and for the correctness of the position, levels, dimensions and alignment of all parts thereof. If at any time error in this respect shall appear during the progress of the works, the contractor shall at his own expense rectify such error if so required to the satisfaction of the EMPLOYER.

9. MATERIALS AND WORKMANSHIP TO CONFORM TO DESCRIPTION:

All materials and workmanship shall so far as procurable be of the respective kinds described in the schedule of quantities and/or specifications and in accordance with the employer's instructions and the contractor shall upon the request of employer furnish him with all invoices, accounts, receipts and other vouchers to prove that the materials comply therewith. The contractor shall at his own cost arrange for and/or carry out any test of any materials which the employer may require.

a. Clean M.Sand/P.Sand shall be used in all cases
b. Only clean & fresh water shall be used on the work. The contractor shall make his own arrangements for water and shall meet all charges therefore. The special attention of the contractor is drawn in clause 36 of General conditions of contract of TNDSS regarding water and lighting.
c. The broken stones for concrete and RCC work should be of hard blue granite and passed by the SIPCOT Officer.
d. The work will be carried out with least hindrance to the adjoining building and the contractor will be responsible for any damages, causes to the existing fixtures, electric fittings etc. in the course of execution and the contractor shall make good any damage, without any claim for extra.
e. Concrete works: All exposed concrete surfaces will be required to be finished by cement plaster as instructed.
f. Plastering: All external corners, edges of doors and window openings etc. shall be finished sharp using rich mortar and also finished truly vertical or horizontal as the case may be. The rate for plastering shall include the cost of finishing as above and no separate extra for the corners, edges, beams etc. shall be paid.
g. The SIPCOT reserves the right, to split up the work and entrust the

spilt up portions to different contractors without assigning any reason therefor.

h. Projections if any required in the masonry will be measured under the relevant items and no extra will be paid of for finishing the same.

i. The arrangement of M.S. rods for all RCC works shall be in accordancewith the working drawing supplied.

j. (i) The planks for forms and centering for RCC works shall be of well seasoned timber approved by the officer according to clause 10 of TNDSS No.30. They must be made smooth and perfectly level at the top so as to give smooth and even finish to the RCC ceilings. Alternatively, the contractor may use steel sheets over wooden forms, provided the required finish to the underside of the slab is obtained. Mango planks shall not be used under any circumstances.Centering and formwork shall be provided to the extent and area ordered by the Officer.

ii. Payment for centering works for all RCC items shall be made only after theconcrete is laid.

iii. All cement concrete for RCC works shall be machine mixed and vibrated.

iv. All lime mortar shall be ground in mortar mill as per TNDSS.

k. Wherever dewatering of sub soil water is necessary for the execution of worksthe cost of the same should be borne by the contractor only and no extra claim whatsoever on this account will be admitted.

10. CONTRACTOR'S SUPERINTENDANCE AND REPRESENTATIVE OF THEWORK:

The contractor shall give all necessary personal superintendence during the execution of the works and as long thereafter as the employer may consider necessary until the expiration of the "Defects Liability period", stated in the Appendix hereto. The contractor shall also during the whole time, when the works are in progress employ a competent representative who shall be constantly in attendance at the site. Any direction, explanations, instructions or notices given by employer to such representatives shall be held as given to the contractor.

11. DISMISAL OF WORKMAN:

The contractor shall on the request of the employer immediately dismiss from the work any person employed thereon by him who may in their opinion be incompetentor misconduct himself and such person shall not be again employed on the worksitewithout the permission of the employer.

12. ACCESS OF SIPCOT OFFICER TO WORKS:

The Employer/SIPCOT site officers shall, at all reasonable times, have free accessto the works and/or to the workshops, factories or other places where materials are lying or from which they are being obtained and the

contractor shall give every facility to the Employer/SIPCOT site officers necessary for inspection and examination/test of the material and workmanship. No person unauthorized by the employer except the representatives of public authorities shall be allowed on the works at any time.

PROJECT OFFICER:

The term Project Officer shall mean the person duly authorized to inspect the work in the absence of the Employer, the contractor shall offer the Project Officer/SIPCOT every facility and assistance for inspecting the works and materials and for checking and measuring items and materials. The Project Officer shall have power to give notice to the contractor or to his representatives of non approval of any work or materials and such work shall be suspended or the use of those of such materials shall be discontinued until the decision of the employer is obtained. The work will from time to time be examined by the Project Officer or any site officer notin any way to exonerate the contractor from the obligation to remedy any defects, which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this clause the contractor shall take instructions only from the SIPCOT officer.

13. ASSIGNMENT AND SUB-LETTING:

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly transfer, assign or underlet/sublet the contract or any share thereof or interest therein without the written consent of the Employer and no undertaking shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the works during their progress.

14. VARIATION NOT TO VITIATE CONTRACT:

No alteration, omission or variation shall vitiate this contract but in case the employer thinks proper at any time during the progress of the works to make any alterations and addition to or omissions from the works or any alterations in the kind and quality of the materials to be used therein and shall give in notice thereof in writing under his hand to the contractor, shall alter and add to or omit from as the case may be, required in accordance with such notice, but the contractor who shall not do any work extra to or any deviation from any of the provisions of the contract, stipulations, specification or contract drawing without the previous consent in writing of the Employer and the value of such extras, alterations, additions or omissions shall in all cases be determined by the employer in accordance with the provisions of Clause-22 thereof any of the same shall be added to or deducted from the contract amount accordingly.

TENDERER

15. SCHEDULE OF QUANTITIES:

The schedule of quantities unless otherwise stated shall be deemed to have been prepared in accordance with the standard method of measurement of such works asper the Tamilnadu Building Practice.

Any error in description or in quantity or in omission of items from the schedule of quantities shall not vitiate this contract but shall be rectified and the value thereof asascertained under clause-22 thereof shall be added to or deducted from the contract amount (as the case may be) provided there shall be no rectification of errors in thecontractor's schedule of rates.

16. SUFFICIENCY OF BILL OF QUANTITIES:

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 prices stated in the bill of quantities and/or the schedule of rates and prices which rates and prices shall cover all his obligations under the contract, and all matters and things necessary forthe proper completion of the works.

17. The Project Officer may from time to time intimate to the contractor that he requires the works to be measured and the contractor shall forthwith attend and send a qualified agent to assist the Project Officer or site officer in taking such measures, measurements and calculations and to furnish the particulars or to give all assistance required by either of them.

Should the contractor not attend or neglect or omit to send such Agent then the measurement taken by the Project Officer or site officer shall be taken to be correctmeasurements of the works. Such measurement shall be taken in accordance with the standard method of measurement for building works.

The contractor or his agent may at the time of measurement take such note andmeasurements as he may require.

All authorized extra works, omissions and all variations made without the Employer/Project Officer's knowledge, if subsequently sanctioned by the Employer inwriting shall be included in such measurements.

18. PRICES FOR EXTRAS ETC./ASCERTAINMENT OF:

Should it be found after the completion of the works from measurements taken in accordance with the previous paragraph that any of the quantities or amounts of works thus ascertained are less or greater than the quantities or amounts specified for the works in price-schedule of quantities and (or) tender or that any variation is made, the calculation of such quantities / amounts or variation unless previously or otherwise agreed upon, shall be made in accordance with the Employer's instructions. The measurement and valuation in respect of the contract shall be completed within the 'period of final measurements' stated in appendix. Materials, when taken into account will be the property of the Employer. Wherein any certificate of

which the contractor has received payment, the Employer has included the value of any unfixed materials intended for and/or advance payment to the works, such materials shall become the property of the Employer and they shall not be removed except for use upon the works, without the written authority of the Project Officer. The contractor shall be liable for any loss or damage to such materials.

19. REMOVAL OF IMPROPER WORK:

The Employer shall during the progress of works, have power to order in writing from time to time removal from the works, within such reasonable times as may be specified in the order, of any materials which in the opinion of the Employer are not in accordance with the specification or the instruction of the Employer, the substitution of proper materials and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specifications or instructions and the contractor shall forthwith carryout such order at his own cost. In case of default on the part of the contractor to carry out such order, the Employer have the power to employ and pay other person etc. to carry out the same and all expenses consequent on incidental thereto shall be borne by the contractor, or may be deducted by the employer for any money due or that may become due to the contractor.

20. DEFECTS AFTER COMPLETION:

Any defect, shrinkage, settlement or other faults which may appear within the defects Liability period stated in the appendix, arising in the opinion of the Employer and from materials or workmanship not in accordance with the contract shall upon the directions in writing of the Employer and within such reasonable time as shall be specified therein be amended and made good by the contractor at his own cost such defects, shrinkage, settlements or other faults and all damages loss and expenses consequently thereon or incidental thereto shall be made good and borne by contractor and such damage, loss and expenses shall be recoverable from him by employer or may be deducted from any money due or that may become due to the contract or the Employer may in lieu of such amending and making good by the contractor, deduct a sum to be determined by the Employer equivalent to the cost of amending such work and in the event of the amount retained under clause 36 being in sufficient recover the balance from the contractor, together with any expense the employer may have incurred in connection therewith. Should any defective work have been done or materials supplied by any sub-contractor employed on the works who has been nominated or suggested by the employer, as provided in Clause-26 of the contract shall be liable to make good in the same manner as if such work or materials had been done or supplied by the

contractor and been subject to the provision of this clause and clause-26 thereof.

The contractor shall remain liable under the provisions of this clause notwithstanding the signing of the Employer or any certificate of the passing of the accounts.

21. CERTIFICATE OF VIRTUAL COMPLETION:

The work shall not be considered as completed until the site officer has certified in writing that they have been virtually completed and the defects liability period shallcommence from the date of such certificate.

22. NOMINATED SUB-CONTRACTOR:

All specialists, Merchants, Tradesman and others executing any work or supplying and filling any goods for which time cost prices or provisional sums are included in the schedule of quantities and/or specifications may be nominated or selected by the Employer are hereby declared to be sub-contractor are employed by the contractor and are therein referred to as nominated sub-contractor. No nominated sub-contractor shall be employed on or in connection with the works against whom the contractor shall make reasonable objection or save where the employer and contractor shall otherwise agree, who will not enter into a contract provided,

a. That the nominated sub-contractor shall indemnify the contractor against the same conditions in respect of the sub contract as the contractor is under, in respectof his contract.

b. That the nominated sub contractor shall indemnify the contractor against claims in respect of any negligence by the sub-contractor/ his servants or agents or any issues by him or them of any Workmen- Compensation Act in force.

c. Payment shall be made to the nominated sub-contractor within fourteen days of his receipt of the site officer certificate provided that before any certificate is issued, the contractor shall upon request to furnish to the site officer's proof that all nominated sub-contractor accounts included in previous certificates have been duly discharged, in default whereof the Employer may pay the same upon a certificate ofthe site officer and deduct the amount thereof from any sums due to the contractor. The exercise of this power shall not create privity of contracts as between Employer and sub-contractor.

23. OTHER PERSONS ENGAGED BY EMPLOYER

The Employer with the concurrence of the SIPCOT site officer reserves the right to use the premises and any portion of the site for the execution of any work not included in this contract which he may desire to carry out by other persons andthe contractors to allow all reasonable facilities for the execution of such work but isnot required to provide any plant or materials

for the execution of such work except by special arrangements with the Employer. Such work shall be carried out in such a manner as not to impede the progress of works included in the contract and the contractor is not be responsible for any damage or delay, which may happen to or be occasioned by such work.

24. INSURANCE IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY

The contractor shall be responsible for all injury to persons animals or things and for all structural and destructive damage to property which may arise from the operation or neglect of himself or of any nominated sub-contractor's employees, whether such injury or damage arise from carelessness, accident or any other cause whatsoever, in any way connected with the carrying out of this contract. This clause shall be held to include inter-alia, any damage to buildings whether immediately adjacent or otherwise, any damage to roads, streets, footpaths, bridges or ways as well as damage caused to the buildings and works forming the subject of this contract by frost or other inclemency of weather. The contractor shall indemnify the Employer and hold him harmless in respect of all and expenses arising from any such injury or damages to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any such Acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claim. The contractor shall reinstate all damage of every source mentioned in this clause, so as to deliver up the share of the contract works completed and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties. The contractor shall indemnify the Employer against all claims which may be made against the Employer by any number of the public or other third party in respect of anything which may arise in respect of the contract, with an approved office, a policy of insurance in the joint names of the Employer and the contractor against such arise and deposit such policy or policies with the Employer from time to time during the currency of this contract. The contractor shall similarly indemnify the Employer against all claims which may be made upon whether under the workmen's Compensation Act or any other statutes in force during the currency of this contract or in common law in respect of any employees of the contractor or any sub-contractor and shall at his own expenses effect and maintain, until the virtual completion of the contract, with an approved office, a policy of insurance in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with SIPCOT from time to time during the currency of the contract.

The contractor shall be responsible for anything, which may exclude from the insurance policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or effective carrying out of this contract. He shall also indemnify the employer in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award ofor compensation of damage arising there from, arising from any such industry or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claim.

The employer with the concurrence of the Site Officer shall be at liberty and is hereby empowered to deduct the amount of any damage, compensation, costs, charges and expenses and or occurring from or in respect of any such claim or damage from any sum due or to become due to the contractor.

25. The contractor shall at the time of signing the contract insure the works and keep them insured until the virtual completion of the contract against loss or damages by fire in an office, to be approved by the SIPCOT in the joint names of the Employer and contractor (the name of the former being placed first in the policy) forthe full amount of the contract and for any further sum if called upon to do so by the Employer, the premium for such further sum being allowed to the contractor as an authorized extra such policy shall cover the property of the Employer only. The contractor shall deposit the policy and receipt for the premium with the Employer within **21 days** from the date of issue of work order. Unless otherwise instructed by the SIPCOT in default of the contractor, insuring as provided above, the Employer on his behalf may so insure and may deduct the premium paid from any amount due or which may become due to the contractor. The contractor shall as soon as the claim under the policy is settled, the work reinstated by Insurance Office should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire had not occurred and in all respects under the same conditions of contract. The contractor in case of rebuilding or SIPCOT in default of the contractor insuring as provided above, the Employer on his behalf may so insureand may deduct he premium paid from any money due or which may become due tocontractor. The contractor shall as soon as the claim under the policy is settled or the work reinstated by the Insurance Office, should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire had not occurred and in all respects under the same conditions of contract. The

contractor in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion as SIPCOT site officer deems fit.

The contractor has to take insurance for the contract value and the coverage should be for the contract period including the EOT period, if any, granted for this work.

26. DATE OF COMMENCEMENT AND COMPLETION:

Date of commencement will be reckoned as actual date of handing over of site to the Contractor or 15 days after the receipt of work order whichever is earlier. The contractor shall be allowed admittance to the site on the "Date of commencement" stated above and he shall there upon complete the same on or before the 'Day of completion' stated in the condition 25 subject nevertheless to the provision for extension of time hereinafter contained. If the contractor fails to commence the work as instructed by SIPCOT or fails to complete the work within **Three months** from the date of handing over of the site, he shall be liable for all the damages and consequences arising there from and further, the earnest money deposit andsecurity deposit shall be forfeited.

27. DAMAGE FOR NON-COMPLETION:

If the contractor fails to complete the works or part of the works by the due date stated in the appendix or within any extended time under Clause-32 thereof and the SIPCOT site officers certify in writing that in his opinion the same ought reasonable so, to have been completed, the contractor shall pay or allow to the employer the sums claimed in the appendix as 'Liquidated Damages for the period during which the said works shall so remain incomplete and the Employer and deduct such damages from any moneys due to the contractor.

28. DELAY AND EXTENSION OF TIME

a. If the work is not completed as per the time schedule, a fine not exceeding 5% of the balance value of the contract will be imposed on the contractor for slow progressof work.

a. If in the opinion of the employer the works be delayed (a) by force measure of

(b) by reason of any exceptionally inclement weather conditions (c) by reasons of proceedings taken or threatened by or dispute with adjoining or neighbouring owners by Public Authorities arising otherwise than through the contractor's own default or (d) by the works or delays of other contractors or tradesmen engaged or nominated by the Employer and not referred to in the schedule of quantities and/or specification of or (e) by reason of site officer(s) instructions as per clause-2 of (f) by reason of Civil Commotion, local combination of workmen or strike or lockout effecting any of the building trades or (g) in consequences of the contractor not having received confirmation in due time, necessary instructions from the

Employeron the recommendation of the Site Officer for which he shall have specially applied in writing, the Employer shall make a fair and reasonable extension of time for completion of the contract shall, as soon as may be given written notice thereof to the employer the contractor shall nevertheless continue his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of Employer to proceed with work.

29. FAILURE BY CONTRACTOR TO COMPLY WITH SIPCOT INSTRUCTIONS:

If the contractor after receipt of written notice from the Employer requiring compliance within ten days, fails to comply with such further drawings/and/or SIPCOT officer's instructions, the employer with the advice of the site officer, may employ and pay other persons to execute any such work whatsoever that may be necessary to the effect thereto and all costs incurred in connection therewith shall berecoverable from the contractor by the Employer on the certificate of the site officer as a debit or may be deducted by him from any money due or to become due to thecontractor.

30. TERMINATION/DETERMINATION OF CONTRACT BY THE EMPLOYER:

a. If the contractor being an individual or firm commit any "act of insolvency" or shall be adjudge insolvent or being an Incorporated Company shall have an order for compulsory winding up made, against with or pass an effective resolution forwinding up voluntarily or subject to the liquidation, such acts of insolvency or winding up shall be liable within seven days after notice to him inquiring him to do so, to show the reasonable satisfaction of the Employer that he is able to carry out and fulfill the contract, and to give security, there for, if so required by the employer or if the contract (whether an individual, firm or incorporated company) shall suffer execution to be issued, or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor, or shall assign or sublet to this contract without the consent in writing of the Employer/Project Officer first obtained or shall charge or encumber this contract for any payments due or which may become due to the contractor thereunder, or if the Project Officer shall certify in writing to the Employer that the contractor,

ii) has abandoned the contract, or

iii) has failed to commence the works, or had without any lawful excuse underthese conditions, suspended the progress of the works for 14 days after receiving from the Employer/Project Officer, written notice to proceed or

iv) has failed to proceed with the works with such due diligence and

failed to make such due progress as would enable the works to be completed within the time agreed upon or

v) has failed to remove materials from the site or pull down and replace work for seven days after receiving from the Project Officer's written notice that the said materials or work were condemned and rejected by the Employer/Project Officer under these conditions or

vi) has neglected or failed persistently to observe and perform all or any of the facts, matters or things by this contract to be observed and performed by thecontractor for seven days after written notice shall have been given to the contractor requiring the contractor to observe or perform the same or

vii) has to the detriment of good workmanship or in defiance of the Employer/Project Officer's instructions to the contrary subject any part of the contract. Then and in any of the said cases the Employer with the written consent of the Project Officer, may not withstanding any previous waiver, after giving seven days notice in writing to the contractor determine the contract, but without hereby affecting the functions of the Project Officer or the obligations andliabilities of the contractor, the whole of which shall/continue in force as fully as if the contract had not been so determined and as if the work subsequently executed had been executed by or on behalf of the contractor, and further the employer on the recommendation of the Project Officer may enter upon and takepossession of the works and all plant, tools, scaffoldings, sheds, machinery, steam and other power utilities and materials lying upon the premises or theadjoining lands or roads, and use the same at his own property nor may employthe same by means of his own servants and workman-in-carrying "on" and completing the works or by employing any other contractor or other person orpersons to complete the works and the contractor shall not in any way interruptor do any act, matter or thing to prevent or hinder such other contractor or otherperson or persons employed for completing the finishing or using the materials and plant for the works. When the Employer/Project Officer shall give a notice inwriting to the contractor to remove his surplus materials, tools and plant, and should the contractor fails to do so within a period of 14 days after receipt thereto by him, the employer shall sell the same by public auction and shall givecredit to the contractor for the amount realized. The Project Officer shallthereafter ascertain and certify in writing under his hand what (if anything) shallbe due or payable to or by the Employer for the value of the said plant andmaterials so taken possession of by the Employer and the expense or loss which the Employer shall have

been put to, in procuring the works to be completed and the amount, if any, owing to the contractor and the amount which shall be so certified shall thereupon be paid by the Employer, as the case may be and the certificate of the Project Officer shall be final and conclusive between the parties. b)After, determining the contract, SIPCOT shall have the right to give any part or whole of the unexecuted balance work to any other contractor, in which case any expenses which may be incurred in excess of such amount which would have been paid to the original contractor if the whole work had been executed by him, will be recovered from him. For this purpose, the amount will be deducted from the money due to him from SIPCOT on any account whatsoever. But if the expenses incurred by SIPCOT are less than the amount works out as per original agreement rate, than the difference will not be paid to the Contractor, as he is a defaulter.

31. PRIME COST AND PROVISIONAL SUMS:

a. Where 'Prime cost' (PC) prices or Provisional Sums of money are provided for any goods or work in the specification or schedule of quantities the same are exclusive of any trade discounts of allowances, discount for cash, or profit which the contractor may require and of carriage and fixing.

b. All goods or works for which prime cost prices or provisional sums of money are provided may be selected or ordered from any manufacturers or firms at the discretion of the Project Officer or Employer and the Employer reserves to himself the right of paying direct to any such goods, or work and deducting the said prices or sums, from the amount of contract. Should any goods or work for which prime cost prices or provisional sums are provided or portions of same be not required, such prices or sums, together with the profits allowed for the same and such additional amounts as the contractor may have allowed for carriage and fixing will be deducted in full from amount of the contract whether the goods be ordered by the contractor or otherwise, the contractor shall, at his own cost fix the same if called upon to do so and the contractor shall also receive and sign for such goods and be responsible for their safe custody as and from the date of their delivery upon the works.

c. In cases in which provisional quantities of materials are contained in the contract, the contractor shall provide such materials to such amounts or to greater or less amounts as the Project Officer shall direct in writing as the net rates at which he shall have priced such items in his schedule of quantities. Should however any such item by entirely omitted which omission shall be at the Employer/Project Officer's discretion, no profit on

such items shall be allowed to the contractor.

d. If the contractor neither produces the receipt nor gives authority to the Employerto issue a certificate in favour of such sub-contractor direct, the SIPCOT officer may upon giving the contractor seven days notice in writing of his intention to do so, issue to the sub-contractor such certificate direct. The Employer may obtain the receipt from the sub-contractor which receipt shall be deemed as a dischargefor the amount of such certificate as though given by the contractor. In the event of such default on the part of the contractor, he shall not be allowed any profit he may have added in the schedule of quantities upon such sub-contract.

e. The exercise of the option before referred to by the contractor and the issue of certificates as before described to sub-contractor upon the contractors request of the issue to the sub-contractor director of certificate by the Employer shall not, however relieve the contractor from any of the liabilities in respect of insufficient/faulty or in-completed work of the sub-contractor for which he may be liable under the terms of contract.

f. If any provisional items provided for work of a nature usually carried out by the contractor in the ordinary course of his business, the Employer shall give the contractor an opportunity of tendering for the same without prejudice to the rightto accept the lowest or any tender.

32. <u>CERTIFICATE AND PAYMENTS:</u>

The contractor shall be paid by the Employer from time to time in installments under interim certificates to be issued by the Project Officer to the contractor on account of the works executed when in the opinion of the site officer, work to the approximate value of work for interim certificates or less at the reasonable discretion of the Employer has been executed in accordance with this contract,

subject, however, to retention of 5% of bill amount from each bill. The Project Officer shall with the concurrence of the Employer include in the interim certificate such amount as he may consider proper on account of materials delivered upon thesite by the contractor for use in the work. And when the works have been critically completed and the Project Officer should have certified in writing that they have been completed, the contractor shall be paid by the SIPCOT in accordance with the certificate to be issued by the Project Officers the sum of money named in the Appendix as 'Installment after virtual completion' being 50% of the said total retention money. The balance 50% of the retention amount, EMD and Security Deposit will be released, after one year from the completion of work, to the contractor on receipt of indemnity bond for a further period of four years, provided always that the issue by the Project Officer of any

certificate during the progress of the works or their completion shall not relieve the contractor from his liability underClause 2 and 25 nor relieve the contractor of his liability or case of all defects and insufficiencies in the works or materials which a reasonable examination would have disclosed. New certificate of the Project Officer shall be the conclusive evidence that any works or materials to which it relates are in accordance with the contract. The Employer shall have full power on the advice of the Project Officer withhold any certificate if the works or any parts thereof are not being carried out to his satisfaction. The Project Officer may by any certificate make any correction in any previous certificate, which shall have been issued by him.

Payments upon the Project Officer's certificates shall be made within 15 days named in the Appendix as period for honouring of Certificates' on such certificates have been delivered to the Employer.

33. FORFEITURE OF PERFORMANCE SECURITY:

The performance security is liable to the forfeited in case, where the contractor fails to carry out the work in accordance with the specifications, terms and conditions of the Contract, leading to termination of the contract.

34. Notwithstanding anything contained in the agreement, instructions of theemployer shall be final and binding on the contractor and in respect of all or any of the matter under clauses 2 to 32 above and the clauses stipulated shall not contradict the TNBP.

35. SETTLEMENT OF DISPUTES:

In case of any difference or dispute shall arise between the parties hereto in respect of any of the matter comprised in this contract, the jurisdiction of the court shall be at Chennai.

36. The contractor shall be responsible for the safe custody and storage of the materials under dry condition at the place of the work spot approved by the Officer.

37. No royalty shall be charged, where due for materials quarried from the Public Works Department or District Board or other Government quarries. No plot rent will be charged for materials stacked on the SIPCOT land during the course of construction provided all such materials are removed within a month after the workis completed.

38. Royalty charges due for the use of private quarries and private land shall be paidby the contractor.

39. The contractor shall form his own approach road in the works site for which no extra will be due to him. On completion of work, the contractor shall not be permitted to remove the materials laid for formation of road. If the contractor is allowed to use the existing roads, he shall maintain them in good condition at his own cost throughout the period of the contract.

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40. Any surplus materials remaining at the site, will not generally be taken over by SIPCOT, whether before or after the completion or determination of contract. Such materials which were originally procured by the contractors are the property of the contractors and can however be taken over by the SIPCOT if required, for use on other works which are in progress only by special arrangements and at the prevailing market rates viz. the rates at which the articles or articles of a similar description can be procured at a given time at the storage godown from public market suitable in the division for obtaining supply thereof.

41. The contractor's special attention is invited to clause 42 of the General conditions to the contract of TNBP and he is requested to provide shed, latrine and urinal for his workmen at his own expenses.

42. If night work is required to fulfill the agreed rate of progress, all arrangements shall made by the contractors inclusive of lighting without any claim for extra.

43. The contractor shall not employ the labour below the age 14 years and shall also note that he must offer employment to ex-servicemen, ex-toddy tapers and unemployed agricultural labourers as far as possible.

44. Any of the items in the schedule may be omitted or radically altered no variation in a rate shall become payable to contractors on account of such omissions or variation in quantities.

45. Reference to TNBP in the schedule of quantities at the reprint 1952 and Addendaand Corrigenda issued thereafter.

46. The formation of roads will be deemed to be completed only if all the items of works including finishing items contemplated herein are executed.

47. The contractor shall abide by the contractor's labour regulations of the PWD framed by the Tamilnadu Government.

48. The contractor shall at his own expenses provide arrangements for the provision of footwear for any labour doing cement mixing work and all other similar type of work involving the use of tar, mortar, etc. to the satisfaction of employer's / Officer and on his failure to do so the SIPCOT shall be entitled to provide the same and recover the cost from the contractor.

49. When there are complaints of non-payment or wages to the labour, bills of the contractor may be withheld pending a clearance certificate from the labour Department.

50. RULES FOR THE PROVISION OF HEALTHAND SANITARY FOR WORKERS EMPLOYED BY THE SIPCOT CONTRACTORS

The contractor's special attention is invited to clause 37,38,39 and 51 of the General Conditions to contract in Tamilnadu Building Practice and he is requested to provide at his own expenses, the following amenities to the satisfaction of the officer.

a. FIRST AID:

At the work site, there shall be maintained in a readily accessible place, first aid appliances and medicines including adequate supply of sterilized dressings and sterilized cotton wool. The appliances shall be kept in a good order. They shall be placed under the charge of a responsible person who shall be readily available duringworking hours.

b. DRINKING WATER:

i. Water of good quality fit for drinking purpose shall be provided for the work peopleon a scale of not less than a gallon per head per day.

ii. Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage tank where such drinking water shall bestored.

iii. Every water supply and storage shall be at a distance not less than 50 feet away from any latrine, drain or other existing well which is within such proximity of latrine, drain or any other source of pollution. The well shall be properly closed, if water is drawn from it for drinking. All such wells shall be entirely closed and be provided with a trap door and shall be dust and water proof.

A reliable pump shall be fitted to each covered well. The trap door, shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

c. WASHING AND BATHING PLACES:

Adequate washing and bathing places shall be provided separately for men and women. Such places shall be kept in clear and drained condition. Bathing or washing should not be allowed in or near the drinking water well.

d. LATRINE AND URINALS:

There shall be provided within the premises of every work place and accommodation for labourers latrines and urinals in an accessible place separatelyfor each of them. The number of seats to be provided shall not be less than the following in any particular case.

i.	Where the number of persons employed does not exceed 50	-	2 seats
ii.	Where the number of persons employed exceed 50 but does not exceed 100	-	3 seats
iii.	For every additional 100 persons	-	3 seats

If women are employed, separate latrine and urinals screened from those for men shall be provided on the same scale. Except in work places provided with water flushed latrine connected with a water borne sewerage system, all latrines shall be provided with receptacle dry earth system which will be cleared atleast four times daily and atleast twice during working hours and kept in a strictly sanitized conditions.

The latrine and urinals shall be tarred inside and outside atleast once a year. The excreta from the latrines shall be disposed off at the contractor's expenses in outside pits approved by the local Public Health Authority. The contractor shall also employ adequate number of scavengers, conservancy staff to keep the latrine and urinals in a clear condition.

e. SHELTER DURING REST:

At the work site there shall be provided, at free of cost, two suitable sheds one formeals and another for rest for the use of labour.

f. CRECHES:

At every work place at which 25 or more women are working there shall be provided two huts of suitable size for the use of children under the age of 6 years belonging to such women. One hut shall be used for infant's, games and play and the other as their bed room. The huts shall not be constructed on a lower standard than the following:

i. Thatched roofs
ii. Mud floors and walls
iii. Planks spread over the mud floor and covered with matting.

The size of the crèches should vary according to the number of women workers. The crèches should be properly maintained and necessary equipment like toys, etc. should be provided and huts shall be provided with suitable and sufficient sweepers to keep the place clean. There shall be two Ayas in attendance.

Sanitary facilities shall be provided to the satisfaction of the Health Officer of thearea concerned. The number of huts shall be constructed to children their attendants and attendants of the children.

g. CANTEEN:

A cooked food canteen on a moderate scale shall be provided for the benefit of the workers, if it is considered expedient.

h. SHEDS FOR WORKSMEN:

The contractor should provide at his own expense, shed for housing the workmen. The sheds be on a standard not less than the clean shelter type to livein which the workers pertaining to the locality are accustomed to. A floor area of about 6' x 5' for 2 persons shall be provided. The sheds are to be in a row with 5'clear space between sheds and 80' clear space between row if conditions permit. The work people's camp shall be laid

out in units of 400 persons each. Each unit to have clear space of 48' alround.

51. GENERAL RULES TO SAFETY EQUIPMENT AND FIRST AID:

ARTICLE – 10

1. All necessary personal safety equipments shall be kept available for the use of the persons employed on the site and be maintained in a condition suitablefor immediate use.

2. The workers shall be required to use the equipment thus provided and the employer shall take adequate steps to ensure proper use of the equipment by those concerned.

ARTICLE – 11

When work is carried on in proximity to any place where there is a risk of drowing, all necessary equipment shall be provided and kept ready for use and all necessary steps shall be taken for the prompt rescue of any person in danger.

ARTICLE – 12

Adequate provision shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

ARTICLE – 13

Where large work places are situated in cities, town or in their suburban and no beds are considered necessary owing to the proximity of city or town hospital, suitable transport shall be provided to facilitate removal of urgent cases to the hospitals. At the work places, some conveyance facilities such as car, shall be kept readily available to the injured person or persons suddenly taken seriously illto the nearest hospital.

52. SPECIAL CONDITION FOR GST:

The unit rates offered shall be inclusive of **All Taxes and levies by the Central or State Governments or Local Authority as applicable except GST** including any variation during contract period and any agreed extension of time. No claim in respect of Tax and levies by the Central or State Governments or Local Authority whether existing or future shall be entertained. **Rates shall also be inclusive of all incidental charges and charges for taking all Insurance Policies, such as CAR Policy, Workmen's Compensation, Third Party Liability, Transport Policy, etc.,**

The GST value as mentioned in BOQ is the applicable GST at the time of execution of the agreement. Any changes in the value of the GST in the future will be applicable and the contractor is bound to pay the same as and when demanded.

"All duties, taxes, and other levies except GST, payable by the contractor under the contract,or for any other clause shall be included in the rates,

prices and total BidPrice submitted by the bidder".

GST will be charged on the amount collected from the tenderer on account of rent, electricity, water charges etc., if availed by them.

53. RECOVERY/UNDER REVENUE RECOVERY ACT:

Whenever any amount has to be paid by the contractor in view of determination of the contract by virtue of clause 57.4 or any amount that may be due or may become due from the contractor under these presents and the contractor is not responding to the Government shall be entitled to recover the said amount under the provision of the Tamil Nadu Revenue Recovery Act 1864 (Tamil Nadu Act V of 1864)

56.CONTRIBUTION TO WORKERS WELFARE FUND:

Towards contribution of fund for the benefit of manual workers employed in the construction works an amount equivalent to 1.00% of estimate amount will be paid by the Employer direct to the Labour Welfare Board as per G.O. Ms. No. 283 / MA & WS Dept / Dated: 11.11.2010 & G.O. Ms. No. 295/ Labour and Employment(I2) Dept/ Dated:17.12.2013.

57. RECOVERY OF MONEY FROM CONTRACTOR IN CERTAIN CASES:

In every case in which provision is made for recovery of money from the contractor, Government shall be entitled to retain or deduct the amount thereof from any money, that may be due or may become due to the contractor under these presents and or under any other contract or contracts or any other accountwhat so ever.

58. RECOVERY/UNDER REVENUE RECOVERY ACT :

Whenever any amount has to be paid by the contractor in view ofdetermination of the contract by virtue of Clause 57.4 of General Conditions of Contract (TNBP Volume-II) or any amount that may be due or may become due from the contractor under these presents and the contractor is not responding, the SIPCOT shall be entitled to recover the said amount under the provision of the Tamil Nadu Revenue Recovery Act 1864 (Tamil Nadu Act V of 1864).

59. The Contractor should facilitate the Project Officer, SIPCOT Industrial Park, **Sriperumbudur** for compliance under EPF & MP Act, 1952 for this work. The contractor has to produce documentary proof for minimum wages Act, PF, ESI etc., without violation of labour law in connection with the labour employed for the execution of this work.

60. The Govt. of India has notified vide notification No:20/2017-Central Tax (Rate) dated:22nd August 2017 and Notification:21 No.24/20017-Central Tax (Rate) dated21st September 2017, 40 CONTRACTOR the concessional rate of the Goods and Services Tax(GST)at 12%

(CGST6%+SGST6%) is liveable for any Government Contract, whether Civil or Electrical, irrespective of the Goods and Service Tax(GST) rate applicable on purchase of goods used in the execution of Government contract.

And GST amount will be calculated at 18% from the sum of total tendered value quoted by the tenderer for construction cost (excluding GST) specified in the BOQ, subject to GST rate applicable from time to time as recommended by the GST Council.

"All duties, taxes, and other levies except GST, payable by the contractor under the contract, or for any other clause shall be included in the rates, prices and total Bid Price submitted by the bidder".

61. <u>Bonus to the contractors in advance</u>:

Bonus as incentive for advance completion of works to the contractors and any work completed in advance by not less than 10% of agreement period can be considered and Bonus of 1% on the value of actual quantum of works executed at tendered rate may be paid, by adopting G.O(MS.). No.60 Public works (G2) Department, dr.14.03.2008 and the procedure laid down in PWD/Buildings Organisation memorandum No. H.D.O(A)/24179/2002-1, dt.22.04.2002".

62. <u>Procurement of cement</u>:

Arasu Cement from TANCEM or its equivalent brand should be used in theconstruction works.

63. (i)Appropriate charges will be received for any materials supplied by SIPCOT to the contractor for the execution of work (ii) Necessary charges will be recovered from the contractor for the usage of water, electricity and rent, if availed by the contractor from SIPCOT. (iii) Necessary GST will be charged extraon the above.

TECHNICAL SPECIFICATIONS FOR (A). (CIVIL) WORKS

NOTE:

The General Technical Specifications shall be those confirming to the INDIAN STANDARD SPECIFICATIONS as published by BUREAU OF INDIAN STANDARDS (BIS) from time to time with all amendments published up to the date of submission of Tenders. In the absence of any definite provision in the afore said specifications, reference may be made to the specifications prescribed in the Tamil Nadu building practice and where even these are

Silent, the construction shall confirm to sound Engineering practice as approved by the Engineer. In case of any dispute arising out of the interpretation of the above, the decision of the Engineer shall be final and binding on the contractor.

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SECTION -1

GENERAL SPECIFICATIONS

The term Indian Standard Specifications herein after referred to as IS means the relevant Indian Standard Specifications with all Amendments published up to the date of submission of tenders.

A Statement of relevant IS applicable to this context, is enclosed.

LIST OF INDIAN STANDARDS

Sl. No.	Short Title	IS Number	TNBP Number
I.	**Cement**		
	(e) Specifications for ordinary and Low heat Portland Cement	269-1976	10
	(f) Specification for Portland Pozzolana Cement	1489-1976	10 A
II.	**AGGREGATES**		
	1. Specification for coarse and fine Aggregate from natural source for concrete	383-1970	5 & 7
	2. Specification for sand and Masonry Mortars	2116-1980	7
	3. Method of Tests for aggregates for concrete	2386-1963 (Part I to VII)	7
III.	**BUILDING STONES**		
	1. Method of test for Determination of strength properties of natural building stones.	1121-1974 (Part I to IV)	35
	Part - I Compressive Strength	1200-1976	
	Part - II Transverse Strength	(Part – IV)	
	Part - III Tensile Strength	3812-1981	
	Part - IV Shear Strength	(Part I)	
	2. Method of Measurement of buildings and civil engineering works	1200-1976 (Part – XII	
	3. Specification for fly-ash for use as Pozzolana and admixture		
	4. Method of Measurement of building and Civil Engineering Works Part – XII plastering and pointing		
IV.	**CONCRETE**		
	1. Method of Measurement of building and Civil engineer works Part-II concrete works	1200-1974 (Part II)	
	2. CONCRETE WORKS Code of practice for plain and reinforced concrete	456-2000 516-1959	

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	3. Method of test for strength of concrete 4. Code of practice for laying in situ cement concrete lining on canals 5. Method of sampling and analysis of concrete 6. General requirements for concrete Vibrators – immersion type. 7. Specification for Concrete Vibrating tables 8. Method of Test for permeability or cement mortar and concrete 9. Specifications for fly ash for use as Pozzolana as admixture for concrete 10. Specification for Portable swing weigh batch for concrete (Single and double bucket type)	3873-1978 1973 (Part I to IX) 1199-1976 1791-1968 2505-1980 2514-1963 3085-1965 3812-1966 (Part II)	28,30
V.	**EARTH WORK** 1.Method of Measurement of building and Civil Engineer Works Part-I Earth work, 2. Safety code for excavation works, 3. Method of test for soils Part II determination of water content, 4. Method of test for soils Determination of moisture content Dry density relation using light compaction 5.Method of test for soils Determination of Dry density of soils in place by sand replacement method 6.Method of test for soils Determination of dry density of soils in place by the core cutter method	1200-1974 (Part I) 3764-1966 2720-1973 (Part II) 2720-1980 (Part VII) 2720-1975 (Part XXVIII) 2720-1975 (Part XXIX)	20, A, B, C, 23, 24, 25 19, 26
VI.	**OTHER SUBJECTS** 1. Safety code for scaffolds and Ladders Part I Scaffolds 2. Safety code for scaffolds and ladders Part II Ladders 3. Recommendations on stacking and storage of construction materials at site	3696-1966 (Part I) 3696-1966 (Part II) 4082-1977	
VII.	**PILES:** 1.Code of practice for design and construction of pile foundation – driven cast-in-situ piles 2.Code of practice for design and construction of pile foundation – Load test	IS: 2911(Part I/Sec I) - 1979 IS: 2911(Part 4) - 1985	

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	on piles		

In addition to the Indian Standard Specifications, the specifications prescribed in Tamil Nadu Building Practice (TNBP) shall also be followed, where IS specification are not available.

SECTION –2

SITE OF WORK

2.1 Clearing and Grubbing

2.1.1 Clearing and leveling Site

The portion of the right-of-way where required for constructing the work under these specifications shall be cleared of all trees, bushes, rubbish and other objectionable matter. Trees designated by the Engineer-in-charge shall not be cut and shall be protected for injury. Such cleared material shall be disposed of, as provided in sub-paragraph 'c' below or removed from the site of work before the date of completion of the contract as approved by the Engineer in-charge. The clearing operation shall be in accordance with clauses 4.1, 4.1.1, 4.2 and 4.3 of I.S. 4701-1982 Indian code of practice for earth work in canals. Surface boulders either loose or partly embedded in the ground will have to be removed and stacked as directed.

b. Grubbing

The area described or shown on the relevant site plan shall be cleared of all obstructions, loose stones, non-required materials and rubbish of all kinds. All brushwood shall be cleared and the roots grubbed up. No trees shall be cut down and removed without the instructions of the Engineer-in-charge. Those which are cut down shall be grubbed up. The same remarks apply to jungle clearance. Trees to be preserved will be designated by the Engineer-in-charge. Those which are cut down shall be grubbed up. The same remarks apply to jungle clearance. Trees to be preserved will be designated by the Engineer-in-charge.

The products of the clearing shall be stacked in such place and manner as may be ordered by the Engineer in-charge and the ground shall be left in a perfectly clean condition; all products of the clearing shall be the property of Government and shall be disposed of as the Engineer-in-charge may direct. All holes or hollows, whether originally existing or produced by digging up roots shall be carefully filled up with earth, well rammed to the design density and levelled off, as may be directed.

C. Disposal of Cleared and Grubbed Material

The disposal of cleared and grubbed material shall be in accordance with clause 4.1.1 of I.S. 4701-1982 code of practice for earth work on canals. All waste materials to be burnt shall be piled neatly and when in suitable condition shall be burnt completely to ashes. Piling of waste material for burning shall be done at such a location and in such a manner as would not cause any fire risk. Necessary precautions shall be taken to prevent spreading of fire to areas beyond the limits of cleared site. Suitable materials and equipment for prevention and suppression of fire shall be kept available at all times.

The material to be disposed of may be buried for which Para 1.2 and 2 of specification 16 of TNBP shall apply.

2.1.2Payment

For the clearance of scrub jungle, light jungle, heavy jungle with or without uprooting etc., payment will be made as provided for in the tender documents. The contractor shall include the cost of clearing of site and grubbing in the prices bid in the bill of quantities of the contract for the relevant finished item of work for which clearing and grubbing as mentioned in the above para are required unless otherwise it is given as a separate item in the contract. No payment towards removal of small stones and boulders of size less than 0.01 cubic meter will be made, and the rate Quoted for excavation will be considered to include this item. However, payment will be made for the removal of surface boulders of sizes greater than 0.01 cubic meter but less than 3 cubic meters, either loose or partly embedded in the ground, at the rate quoted in bill of quantities for the actual quantity to removed, based on stack measurement applicable for the relevant strata classification after deducting 40% towards voids.

Benching will be paid as separate item, per 1 (one) running meter of bench at the rate provided for in the tender documents.

2.2.1 Setting out of the work

Monsoon Damages

Damages due to rain or flood shall have to be made good by the contractor till the work is handed over to the department.

The responsibility for desilting and making good the damages due to rain or flood rests with the contractor. No extra cost is payable for such operations and the contractor shall, therefore, have to take all necessary precautions to protect the work done during the construction period.

Removal of Silt and Water

Accumulated silt and water in the structures for the works partly done by the Contractor in this or previous seasons should be removed and no extra payment will be made, for such removal of silt and water. The unit rate of excavation is deemed to include cost for removal of such silt and water.

Section – 3

3 Filling

3.1 The portion of the area where filling is proposed, is to be cleared off all trees, bushes, rubbish and other objectionable matter if anything is deposited there without any extra cost by the contractor.

3.2 During the course of filling if any boulders or non – specified earth is brought to the site it should be removed from the site before leveling.

3.3 During the course of filling if any layer does not conform to test as specified in the bid document, shall be removed and re-laid to meet out the standard.

Payment will be made for only the difference in the final and initial levels based on the empirical formula furnished by the Project officer. Pre-levels as taken by the Project officer will be handed over to the contractors for verification and acceptance before commencement of work. If the contractor represents that the firm is not satisfied with the

computation of levels, levels will be taken by Project officer in presence of the contractor. The contractor has to bear the charges. The level furnished by Project officer is final. After filling, final level will be taken by Project officer. The contractor should sign the final levels also. Payment will be made based on the difference between the pre and final levels for the filled-up portions with filling earth at different stages. The payment will be made as per the quantity computed by Project officer.

If any intermediate payment is desired by the contractor, levels at that stage will be taken and quantity arrived. Deductions in the quantity will be made based on the consolidation achieved. The decision of the Executive Engineer is final and binding for proposing the quantity to be deducted for interim bills. Pre final payment shall however be restricted only to 90% of the total value of work satisfactorily completed and finally measured for. Pre-final payment will be assessed based on the consolidated final levels. Release of the remaining 10% shall be effected only after an immediate monsoon period of 3 months (October to December). Shortfall if any should be made good by the contractor. The contractor shall make his own arrangements for the machineries, power roller, clean fresh water etc., for use on the works and shall meet all charges there for.

The contractor shall employ at his cost necessary watch and ward to safeguard his machineries, plants etc., including barricading and danger lighting where ever the machineries are stationed as well as for the works turned out by him and paid for from time to time till completion including those hired if any. The tenderer is requested to specially note that if any incidental pumping is opted by the tenderer to facilitate for filling all incidental charges including pumping shall be borne by him.

Before commencing the work and also during the progress, the contractor shall give notice to the concerned authorities. Viz the Panchayats / Municipalities, the Railway department, Police and other departments or company as may be required to the effect that the work is being taken up in particular locality and necessary diversion of traffic may be arranged for. The contractor shall co-operate with the department concerned and provide for necessary barricading of roads, protection to existing cables, wires etc., during the operation. The contractor shall provide at his own expenses watching and lighting arrangements during the day and night times and put the required notice board such as “CAUTION-ROAD CLOSED” for traffic etc.,

He should also provide and maintain at his own cost, the necessary supports for underground cables etc., to afford best protection to them in consultation with the authorities in-charge of the properties and to their best protection.

No payment will be made for the excess earth brought by the contractor and such surplus earth brought to the site shall be disposed off by the contractor at his own cost in the places shown. The seignories and other charges payable to the District Collector are to be borne by the contractor. The contractor should handover all the receipt of full payment made to the District Collector towards seignories charges paid by him to the Project officer. If the seignories charges part or full payment is not made to the District Collector, the amount due to the District Collector will be recovered from the bills and paid to be concerned authorities. Only materials capable of giving on compaction in field, a dry density of more than 15.00 KN/m3 shall be used for the filling. For assessment of

suitability of the materials for use in the work, the contractor may get the materials duly tested, for compact ability in the laboratory indicated by the Project officer (at the cost of the contractor) in accordance with Proctor's Procedure.

Notionally given a dry density of 16.50 KN/m3 or more on compaction at optimum moisture content in the laboratory are suitable for the work. Although the laying of materials shall proceed in 15cm layers and further consolidated, dry density tests will be carried out only when a consolidated thickness of 15cm is achieved. One set of two core samples for every 3000 square meter area of each layer shall be taken and tested. The average dry density shall not be less than 15.00 KN/m3. The contractor shall bear the expenses of the above tests, which shall be carried out in Highways research laboratory or any other lab as directed by the Project officer.

It is hereby made clear that for any stagnation of water or inundation of water due to any reason whatsoever in the filling site or at the commencement of work at the time of handing over of site, for the execution of work or during execution of work, the contractor should make his own arrangement to bail-out the water at his own cost. The department will not accept or entertain any plea for bearing this cost or allowing extension of time on this score to complete the work.

SECTION – 4

4.1 Excavation

4.1.1 Classification of Excavation

Except as otherwise provided in these specifications' material excavated will be measured in excavation to the lines shown on the drawings or as provided in these specifications and all materials as required to be excavated will be paid for at the applicable price bid in the schedule for excavation. No additional allowance above the price bid in the schedule will be made on account of any of the material being wet. Bidders and the contractors must assume all responsibility for deducing and concluding as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavation. The Government does not represent that the excavation can be performed and maintained at the pay lines described in these specifications as shown on the drawings.

4.1.2 Excavation for Structures

a. General

Excavation for the foundation of structures shall be to the elevation shown on the drawer or as directed by the Engineer-in-Charge. In so far as practicable the material removed in excavation for structures shall be used for backfill and embankments.

b. Foundations for Structures

All trenches in soil other than rock or hard compact soil more than 1.5m deep, into which men enter shall be securely shored and strutted and timbered. All trenches in soil soft or fissured rock or hard soil exceeding 2 m in depth, into which men enter shall be securely shored and tinkered. Notwithstanding anything said above, it shall be understood that the need for shoring shall receive careful and frequent consideration even in trenches of less than 1.5 or 2m in depth (as the case may be). When there is doubt as to the safety of the

work without shoring, no further, excavation or other work shall be continued until adequate shoring is provided. Where the sides of trenches are sloped but not to within 1.5m of the bottom the vertical sides shall be shored and the shoring shall extend at least 30 cm above the vertical sides.

When open spaced sheathing is used, a toe board shall be provided to prevent material rolling down the slope and failing into the part of the trench with vertical walls. Shoring and timbering shall be carried along with the opening of the trench but when conditions permit protection work, such as sheet piling may be done before the excavation commences. All loose stones, projecting clumps of earth, pockets of unsuitable material which might come down on the workers in the trench or any condition which is a hazard, shall be either removed or the excavated sides adequately braced and the trench suitably guarded. On steps slopes workmen shall not be permitted to work one above the other.

The contractor shall prepare the foundations at structure sites by methods which will provide firm foundation for the structures. The bottom and side slopes of common excavation upon or against which the structure is to be placed shall be finished to the prescribed dimensions and the surfaces so prepared shall be moistened and tamped with suitable tools to form firm foundation upon or against which to place the structure. The contractor shall prepare the foundation for the structures as shown on respective drawings. The natural foundation material beneath the required excavation shall be moistened if required and compacted in place.

If the Engineer-in-Charge considers it necessary to consolidate the foundation strata by grouting cement slurry, the drilling and grouting or any other foundation treatment shall be done by the contractor as directed by the Engineer-in- Charge and the payment will be as per the general contract document in respect of extra items. Densities of the compacted foundation materials and the testing thereof shall be in accordance with paragraph 5.1.2. Separate payment will not be made to the contractor for moistening and compacting the foundation of structures.

The contractor shall include cost thereof in the prices bid per cubic meter of the item of the bill of quantities for preparation of foundations. When unsuitable material is encountered in the foundation for structure the Engineer-in-Charge will direct additional excavation to remove the unsuitable material.

The additional excavation shall be refilled as follows. In excavation in soils, the over excavation shall be filled in by selected bedding material and compacted. In excavation in rock, it shall be filled by cement concrete 1:5:10 (One cement, five sand and ten aggregate of maximum size 40mm by volume). No separate payment for excavation backfill will be made as per clause 5.2.2(a).

C. Extra Excavation and Over Excavation

Should remains of old building, be met with the material shall be removed with wedges and levers. Blasting will not be allowed, without the permission in writing of the Engineer-in-Charge.

If bad ground or loose soil is met with. the contractor, will be responsible for reporting the to the Engineer-in-Charge who will issue such orders as may be necessary. For extra,

concrete and masonry arising from bad ground, the contractors shall be paid treating this as additional quantity as per the contract data of contract documents.

All excavated earth, which is unfit or surplus to requirements for filling in, shall be spread as instructed by the Engineer-in-Charge at the contractor's expense.

If at any points in common excavation the foundation material is excavated beyond the lines required to receive the structure or if at any point in common excavation the natural foundation material is disturbed or loosened during the excavation process, it shall be compacted in places or where directed, it shall be removed and replaced as follows.

In excavation in soil and in rock it shall be filled by cement concrete 1:5:10 (one cement five sand and ten aggregate of 40 mm size by volume). Any excess excavation or over excavation performed by the contractor for any purpose or reason except for additional excavation as may be prescribed by the Engineer-in-Charge and whether or not due to the fault of the contractor shall be at the expense of the contractor. Filling for such excess excavation or over excavation shall be at the expense of the contractor.

d. Measurement for Payment

Excavation for structures will be measured for payment, for box cutting with vertical sides, of foundation dimensions. The contractor will have to make his own arrangements for shoring, strutting provision of adequate slopes for the sides to prevent slips etc. and no separate charge will be paid for any incidental charges arising either during excavation of foundation or construction of the structure.

The quantity for payment of excavation in soils and rock will be arrived at by taking pre levels and finished levels of respective strata. Block levels will be taken at one meter or closer intervals. The levels will be plotted on a graph sheet and average levels arrived at for purpose of determining the quantity of excavation. The contractor's signature in token or his acceptance has to be recorded in the cross section sheets. Final payment will be based on levels only.

The contractor shall expose the surface of the strata for the inspection of Engineer-in-Charge for taking levels whenever the classification in strata gets changed.

e. Payment

Payment for excavation for structures will be made at the unit price per cubic meter bid therefor in the bill of quantities for excavation for structures shall include the cost of all Labour and materials for coffer dam and other temporary construction, of all pumping and dewatering, of all other work necessary to maintain the excavation in good order during construction, of removing such temporary construction where required shall include the cost of disposal of the excavated material except that required overhaul will be paid for.

SECTION - 5

MATERIALS

5.1.1 to 5.1.2 deleted

5.1.3 Stone for Masonry

a. General

The stones used for stone masonry shall conform to the relevant specification of clause 4.1 of I.S. 1597 (part-1) 1967 and I.S. 1123-1975 code of practice for construction of stone masonry part-1 Rubble stone Masonry.

Stone Masonry Using Granite

The stone of the required quality shall be obtained from the quarries specified in tile lead chart appended to the bill of quantities. The common types of natural stones which are generally used are Granite and other igneous rocks, and shall be sound, free from defects like decay, cavities, cracks, flaws, sand, holes, soft seams, veins, patches of soft or loose materials or any other deleterious materials like Iron Oxide, organic impurities etc. They should be free from rounded, worn or weathered surface or skin or coating which prevents the adherence of mortar. All stones used shall be clean of uniform Colour and texture, strong, hard and durable.

The stone shall be supplied from the specified quarry and shall have abrasion value of 45% and specific gravity of about 2.6. The crushing strengths of the stones shall be determined in accordance with I.S.1121-1974. (Part 1 to a) The strength shall be as detailed below in Table 4(A).

Table - 5(A)

Sl. No.	Types of stone	Minimum Crushing strength
1.	Granite	1000 Kgs/ Sq.m

The percentage of water absorption by the stones when immersed in water for 24 hours shall not exceed 5% of their dry as determined in accordance with IS 1124-1974. Samples of the stones collected from the stacks by the contractor will be tested for the standards specified above and other relevant Indian Standards and stone stacks not conforming to the standards will be rejected and their cost shall be borned by the contractor. The contractor shall obtain these stones form the approved portions of the approved quarries only.

Cost

The cost of collecting the stones for masonry will not be paid separately and their cost including the cost of quarrying, transporting, stacking, royalties charges shall be included in the unit price per cubic meter bid therefore in the relevant item on the bill of quantities.

5.1.4 Sand for Masonry

General

The term sand is used to designate fine aggregate with maximum size of particle 43.75 mm. The sand shall be of course category conforming to the Indian Standard Specifications IS-2116-1980. Sand for masonry mortars as revised from time to time. Where sand from different sources are being used at one xer at the same time, these shall be blended to ensure uniform grading in successive batches. Variations in the grading of sand being obtained from the same source shall be controlled by means of the fineness modulus test. The following control limits shall be used. Controlled to limits of plus and minus 0.25 of running average of ten consecutive test samples.

For natural sand, fineness modulus shall be greater than 2.30 and less than 3.10. For manufactured sand, the specifications should be the same as in relevant section under specifications for concrete.

Quality of sand

The sand shall consist of natural sand, crushed stone or crushed gravel sand, or a combination of any of these. The sand shall be hard, durable, clean and free from adherence coatings and organic matter and shall not contain more than permissible limit of clay balls or pellets as specified further below.

The sand shall not contain any harmful impurities, such as iron pyrites, alkalis, salts, coal, mica shale or similar laminated or other materials in such form or in such quantities as to affect adversely the hardening, the strength, the durability or the appearance of the mortar applied or to attack ary reinforcement used in the masonry work. Unless found satisfactory, as a result of further tests as may be specified by the Engineer in charge of the work, or unless evidence of such performance is offered which is satisfactory to him, the maximum quantities of clay, fine slit, fine dust and organic impurities in the sand shall not exceed the following, limits.

a.	Clay, fine silt and fine dust (determined in accordance with Appendix C of I.S.383-1963 and also I.S.2386 (part 11) 1963.	Not more than 5 per cent by weight.
b.	Organic impurities (Determined in accordance with I.S.2386 (Part 11) Specified in specified in 1963.	Below that indicated by comparison with the standard solution 6.2.2 of I.S.2386 (Part 11) 1963.

Sand shall generally conform to specifications given in paragraph 6.3.6 except that the sand for mortar shall conform to the grading of sand given in clause 4 of I.S.2116-1980 as detailed below, in Table 3(B).

Table 3 (B)

Grading of sand for use in Masonry Mortars

I.S Sieve designation	**Percentage passing by mass**
4.75mm	100
2.36mm	90 to 100
1.18mm	70 to 100
600 micron	40 to 100
300 micron	5 to 70
150 micron	0 to 15

A sand whose grading falls out-side the specified limits due to excess or deficiency or course or fine particles may be processed to comply with the standard by screening through suitably sized sieves and/or blending with required quantities of suitable sized sand particles. If the sand brought to site is not clean, it must be washed clean in water. Fine dirt sand, or sea sand, or sand containing saline impurities shall on no account be used.

b. Cost

The cost of sand for masonry will not be measured and paid separately and the cost of sand including the cost of stripping and transporting and storing and royalty charges shall be included in the unit price per cubic meter bid therefore in the relevant item of work in the bill of quantities for which this sand is required.

5.1.5 Cement

The contractor has to make his own arrangement for procurement of cement of required specifications. The specifications and conditions specified for supply of cement is given in paragraph 6.3.3 shall be applicable here also. Ordinary Portland cement conforming to I.S.269-1989 shall be used for Masonry work. Portland pozzolana cement conforming to I.S.1489-1991 may also be used for masonry work, in the event of non-availability of ordinary Portland cement with the approval of Engineer-in-charge.

5.1.6 Water

The specifications and conditions specified for procuring water in paragraph 6.3.5 shall be applicable here also.

5.2 Mortar

5.2.1 Preparation of Mortar

Unless otherwise specified the cement mortar used in masonry works shall be cement mortar mix 1:4 (one cement four sand by volume). Mixing shall be done thoroughly preferably in a mechanical mixer. In such case, the cement and sand in the specified proportion shall be mixed dry thoroughly in the mixer operated manually or by power. Water shall be added gradually and wet mixing continued at least for 2 minutes. Water should not be more than that required for bringing the mortar to the required working consistency of 90 to 130 millimeters as required in clause 9.1.1 of IS 22501-19891. The mix shall be clean and free from injurious kind of soil, acid, alkali, organic matter or deleterious substances.

5.2.2 Time of use of Cement Mortar

Cement mortar shall be used as soon as possible after mixing before it has begun to set, within 30 minutes after the water is added to the -dry mixture. Mortar unused for more than 30 minutes should not be used and shall be removed from the site or work. The cost of such wasted mortar shall be borne by contractor. The use of re-tampered mortar will not be permitted to be used for the masonry.

5.2.3 Tests of Mortar

Mortar test cubes shall be cast for the mortar used on the work and shall be tested in accordance with Appendix-A of IS 2250-1965 code of practice for preparation and use of Masonry mortars.

Such cubes shall develop a compressive strength of at least 50 Kgs. Sq.cm for cement mortar mix, 1:5 and 75 kgs / Sq cm for mortar mix 1:4. Mortar not conforming to the specifications will be ejected and the cost of such wasted mortar shall be borne by the contractor.

5.2.4 Measurement and Payment

Cement mortar will not be measured and paid separately and its cost including cost of materials, mixing, transporting and placing shall be included in the unit price per cubic

meter bid here for in the bill of quantities of the contract for the relevant finished item of work for which cement mortar mix mentioned in the above paragraph is required.

5.3. Curing

All masonry surfaces shall be treated as specified to prevent loss of moisture from mortar until the required curing period is elapsed or until prior to placement of other masonry or concrete or backfill against surfaces. The contractor shall make his own arrangements to procure and convey water for curing. All masonry built with cement Mortar shall be kept watered continuously for a minimum period of two weeks from the date of construction. Watering shall be done carefully so as not to wash out the mortar, joints or disturb the masonry in any manner.

If the contractor fails to do curing to the satisfaction of the officer in charge of the work, the latter will either make arrangement to the masonry at the risk and cost of the contractor or order the masonry to be pulled down.

The masonry so pulled down should be rebuilt by the contractor at his own cost.

SECTION – 6

PLASTERING AND POINTING

6.1 Materials

6.1.1 Sand for Mortar for plastering and Pointing

a. General

Sand shall generally conform to specification given in paragraph 7.1.6 except that the sand for preparation of Mortar for plastering and pointing shall conform to the following gradition, shown in Table 6 (A) as per IS 1542-1977.

Table 6 (A)

Requirement of Grading for sands for External Plastering and Rendering

I.S Sieve designation	Percentage by weight passing I.S. Sieve
10.00mm	100
4.75mm	95 to 100
2.46mm	95 to 100
1.10mm	90 to 100
600 micron	80 to 100
300 micron	20 to 650
150 micron	0 to 50

The procurement of sand for mortar for plastering and pointing shall conform to the specifications given in paragraph 6.3.8.

b. Cost

The cost of sand for mortar for plastering and pointing will not be measured and paid separately and the cost of sand including the cost of stripping and transporting and storing and royalty charges shall be included in the unit price per cum bid therefore in the relevant item of work in the bill of quantities for which this sand is required.

6.1.2 Cement

The specification and conditions specified for supply of cement in paragraph 7.1.3. shall be applicable here also. Ordinary Portland cement conforming to IS 269-1976 shall be used for preparation of mortar for plastering, pointing and for masonry work. In the event of non-availability of ordinary Portland cement, Portland pozzolana cement conforming to IS 1489-1976 may be used with the approval of Engineer-in-charge.

6.1.3 Water

The specification and condition specified for procurement of water in Paragraph 7.1.5 shall be applicable here also.

6.2 Mortar

6.2.1 Preparation of Mortar for plastering work

Unless otherwise specified the cement mortar used in plastering work shall be in cement mortar 1:3 (one cement, three sand by volume). The other specifications and conditions enunciated in paragraph 5.2.1 shall apply for this mortar for plastering work also.

6.2.2 Preparation of Mortar For Pointing

The cement mortar used in pointing work shall be cement mortar mix 1:4 (one cement four sand by volume). The other specifications and conditions enunciated in paragraph 4.2.1. Shall apply for this mortar for pointing of work also.

6.3 Plastering with cement Mortar (1:4 One Cement three sand by volume) 2Omm thick

6.3.1 Preparation of surface

The roughening of the background improves the bond of plaster. All joints shall be thoroughly raked. After roughening the surface, care shall be taken to moisten the surface sufficiently before plastering as otherwise freshly exposed surface may tend to absorb considerable amount of water from the plaster. The surfaces shall be wetted evenly before applying the plaster. Care shall be taken to see that the surface is not too dry as this may cause lack of adhesion or excessive suction of water from the plaster. A fog spray may be used for this work. As far as possible, the plaster work shall not be done under hot sun.

6.3.2 Laying of plastering with cement mortar 1:3 (one cement three sand by volume) 2Omm thick

The mortar used for plastering shall be stiff enough to cling and hold when laid. TO ensure even thickness and true surface, plaster shall beapplied in patches of
150 mm x 150 mm of the required 20 mm thickness at not more than 2 meters intervals horizontally and vertically over the entire surface to serve as guides. The surface of these guides shall be truly in the plane of to be finished plaster surface and truly plump.

The mortar shall then be applied to the surface to be plastered between the guides with a trowel. Each trowel full of mortar shall overlap and sufficient pressure shall be used to force it into thorough contact with the surface. On relatively smooth surfaces, the mortar shall be dashed on with the trowel to ensure adequate bond. The mortar shall be applied to a thickness slightly more than that specified, using a string, stretched out between the guides. This shall then be brought to a true surface by working with a long wooden float with small-motion. The surface shall be periodically checked with a string stretched across it. Finally the surface shall be rendered smooth with a small wooden

float, over working shall be avoided. All corners arises and junctions shall be brought truly to a line with the necessary rounding or chambering. If it is necessary to suspend the work at the end of the day it shall be left in a clean horizontal or vertical line not nearer than 150 mm from any corner or arises or on parapet tops or on cooing etc. when recommencing the work, the edges of the old work shall be scraped clean and treated with cement slurry before the new plaster is laid adjacent to it. After the first coat is done it shall be kept undisturbed for the next 24 hours and thereafter kept moist and not to be permitted to dry until the final rendering is applied. After the plaster has sufficiently hardened cement slurry with cream like consistency shall be applied as thinly and evenly and rubbed to a fine condition.

The finished surface shall be cured with winter for a minimum period of 14 days. Should the mortar crack or perish, the work shall be removed and redone at the contractors expense or should contractor fails to cure the work to the satisfaction of the Engineer-in-charge the later may cure the work at the risk and cost of the contractor. All portions which sound hallow when tapped or found to be soft or otherwise defective shall be cut out in regular shape and redone as directed by the Engineer in charge.

6.4 Measurement and payment

a. Plastering

The measurement of plastering will be in units of square meters and it shall be paid at the relevant unit prices bid per one square meters of plastering in the bill of quantities which unit price shall include the cost of materials, their conveyance, charges for preparation of mortar including mixing charges and charges for performing the plastering work as illustrated in this division including curing.

b. pointing

Unless specified in the contract document, no separate payment will be made for pointing random rubble masonry and coursed rubble masonry and the unit prices for the rubble masonry in the bill of quantities, shall include the cost of materials, their conveyance, charges for preparation of mortar including mixing charges and charges for performing the pointing work as illustrated in this division including curing.

SECTION - 7

7.1 General concrete Requirements

7.1.1 Composition

a. General

The I.S. 456- 2000 code of practice for plain and reinforced concrete shall be followed. Concrete shall be composed of cement, sand, coarse aggregate water and admixtures (if any) as specified and all well mixed in batching plant by weight or in concrete mixer and brought to the proper consistency. The contractor shall provide such means and equipments as are required to accurately determine and control the relative amounts of various material required for the concrete. Such means, the equipment and its operation shall be subject, at this time, to the approval of the Engineer-in-charge. The measuring and weighing equipment shall operate with the degree of accuracy specified by the Engineer in charge.

For works in which water tightness is required the specification in I.S.3370 (part 1 & Part 11) 1965 para 1 to 10 shall be applied.

Mixing

Concrete shall be mixed in a mechanical mixer and shall be as dense as possible, plastic enough to consolidate well and stiff enough to stay in place on the slopes. Mixing shall be continued until there is a uniform mixing of the materials and the concrete is uniform in Colour and consistency.

The time of mixing shall be as shown in table of IS 457-1957 reproduced below:

Capacity of Mixer	Minimum time of Mixing	
	Natural Aggregates	Manufactured Aggregates
All mixers	2 minutes	2 ½ minutes

Concrete classification

It is related to the specified 28 days compressive the Table below:-

	Classification of Concrete (JS.456-2000)	Max. size Aggregates	Characteristic Compressive Strength N/mm2 for 15 cm Cube at 28 days
1.	M-10	40	10
2.	M-15	40/20	15
3.	M-20	20	20

A minimum of 3 test specimens shall be made for each 120 m3 of each class of concrete for given age. There shall be at least 3 test specimens for each day of concreting even if only a few cubic meters of the particular concrete is manufactured in a day.

The test shall satisfy the following criteria

3. The average strength of any 3 consecutive samples shall be greater than the specified strengths;

4. The overall coefficient of variation for any ten consecutive sample strength shall be less than 15%;

5. Not more than 10% of the specimen strengths shall be less than 85% of the specified strength.

Note: The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in above table.

b. Nominal maximum size of aggregates

For sizes of aggregates IS 383-1970 shall apply. The coarse aggregate to be used in concrete shall be as large as practicable, consistent with required strength, starting of reinforcement and embedded items, and placement thickness.

The size of the coarse aggregate to be used will be determined by the Engineer-in-charge and may vary incrementally according to the conditions encountered in each concrete placement. Nominal maximum size of aggregate for concrete in structures shall be as indicated in the relevant drawings appended to the contract documents.

Smaller coarse aggregate than specified shall be used where the opinion of the Engineer-in-charge that proper placement of concrete is impracticable with the size of the aggregate specified in the drawings.

Designation of size	Nominal size range
20 mm aggregate	4.75 to 20 mm
40 mm aggregate	20 mm to 40 mm

generally coarse aggregate of maximum nominal size of 40 mm shall be used in M 7.5 and of 20 mm size in M 10 grade concrete bed.

C. Mix proportions

The proportions of various ingredients to be used in the concrete for different items of the work are given in the bill of quantities. In proportioning concrete, the quantity of both cement and aggregate should be determined by mass. Water shall be either measured by volume in calibrated tanks or weighed. Wherever the quantity of concrete involved in a particular work is small, nominal mix concrete may be allowed with the specific approval of the Engineer-in charge who may also allow volumetric batching/proportioning for the restricted quantity. The proportion of materials for nominal size concrete shall be in accordance with Table.3, page 50 of IS 456-2000. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked. Adjustments shall be made as directed to obtain concrete having suitable workability, impermeability, density, strength and durability without the use of excessive cement. The acceptance of rejection of concrete shall be as per the acceptance criteria laid down in clause 15 of I.S.456-2000. The net water cement ratio exclusive of water absorbed by the aggregate shall be sufficiently low to provide adequate durability in concrete. The water cement ratio for various grades of concrete shall be as determined and ordered by the Engineer-in-charge.

Admixtures of pozzolana, if ordered, shall confirm to the requirements specified in IS 9103-1979 (Indian Standard Specification for admixtures for concrete).

Test Strength of samples

The test strength of sample shall be the average of the strength of three specimen. The individual variation should not be more than 56% of the average.

Standard Deviation

i) Standard deviation based on test result

a) Number of test results:-

The total number of the results required to constitute an acceptable regard for the calculation of standard deviation shall be not less than 30 attempts shall be made to obtain the 30 test results, as early as possible, when mix is used for the first time.

(**ii) Determination of standard deviation:-**

(a) Concrete of each grade shall be analyzed separately to determine its standard deviation

(b) The standard deviation of concrete of a given grade shall be calculated using the following formula from the results of individual test of concrete of that grade

Estimated standard deviation = Root of $\frac{\Delta \sum 2}{n - 1}$

Where T = deviation of the individual test strength from the average n = number of sample test results Where sufficient test results for a particular grade of concrete are not available the value of standard deviation given in the following table may be assumed.

Table:

Grade of Concrete Assumed standard Deviation-(N/mm2)

M10 ……..2.3

M15 ……..3.5

M20 ……..4.6

M25 ……..5.3

Acceptance Criteria

The Concrete shall be deemed to comply with the strength requirements if:

a. every sample has a test strength not less than the characteristic value; or

b. the strength of one or more samples though less than the characteristic value, is in each case not less than the greater of:

1. the characteristic strengthening minus 1:35 times the standard deviation: and

2. 0.80 times the characteristic strength; and the average strength of all the samples is not less than the characteristic strength plus

1.65 = (1.65 / number of samples) = times the standard deviation

The concrete shall be deemed not to complete with the strength requirements if:

a. the strength of any samples is less than the greater of:

1. the characteristic strength minus 1.35 times, the standard deviation; and

2. 0.80 times the characteristic strength; or

b. the average strength of all the samples is less than the characteristic strength plus

1.65 = (3 / number of samples) = times the standard deviation

Concrete is liable to be rejected if it is porous or honeycombed; its placing has been interrupted without providing a proper construction joint. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer-in-charge.

d. Consistencies

The slump of concrete at the placement shall range from 25 mm to 50 mm with vibrations achieved through the vibrators to the satisfaction of Engineer-in-charge. The slump test shall conform to IS 1199-1959.

1. Reinforced cement concrete

S. No.	Place Condition	Degree of workability	value of work ability
1.	Correcting of lightly reinforced sections without vibration or heavily reinforced sections with vibrations.	Medium	25mm to 75 mm slump for 2Omm
2.	Concreting of heavily reinforced sections without Vibration	High	75mm to 125 mm slump for 2Omm aggregate

TENDERER

ii. For plain concrete work. Slump requirements mentioned in item 1 above are applicable.
ii. Lining with slip form machine-60 to 70 mm and 50 mm for concrete paver finisher.

If the specified slump is exceeded at the placement, the concrete is unacceptable. The Engineer-in-charge reserves the right to require lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of vibration specified by the Engineer-in-charge. The use of any equipment which will not readily handle and place concrete of the specified slump will not be permitted.

To maintain concrete at proper consistency, the amount of water and sand batched for concrete shall be adjusted to compensate for any variation in the moisture content or grading of the aggregates as they enter the mixture. Addition of water to compensate for stiffening of the concrete after mixing but before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

8.1.2. Concrete quality Control Measures and concrete quality Assurance Test Programme

a. Concrete quality Control Measures

The contractor shall be responsible for providing quality concrete to ensure compliance of the contract requirements.

b. Making and curing concrete test specimens in the field: will confirm to I.S. 516-1959.

c. Capping cylindrical concrete specimens will conform to I.S.516-1959.

d. Compressive strength of concrete specimens will conform to I.S., 516-1959 and para 16 (16.1, 16.2 & 16.3) of I.S. 456-2000-core testing.

a. Sampling Procedure and Frequency

A random sampling procedure shall be adopted to ensure that each concrete batch has a reasonable chance of being tested. i.e. the sampling should be spread over the entire period of concreting and should cover all mixing units.

a. **Frequency**

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following:

Quantity of concrete M3	Number of samples
1 to 5	1
6 to 15	2
16 to 30	3
31 to 50	4
51 and above	4 plus one additional sample for each additional 50 M3 or part thereof.

Note: At least one sample shall be taken during each shift.

Test Facilities

The Samples shall be collected and the tests conducted in the presence of the engineer or his authorized representatives. Alternatively the contractor may test the materials during execution of works at the laboratories approved by the Engineer at the

contractors own cost provided that the samples are collected and given proper identification marks in the presence of the engineer or his authorized representative.

8.1.3. Cement

a. General

Cement shall conform to clause 4 of I.S. 456-2000 for the purpose of specifications. Cement used shall be one of the following two types with prior approval of the Engineer-in- charge.

1. ordinary or low heat Portland cement conforming to I.S.269-1967 (I.S. Specification for ordinary and low heat Portland cement third revision).

2. The provisions of this paragraph apply to cement for use in cast-in-place concrete required for items such as concrete pipes, precast concrete structural members and other precast concrete products, for grout and mortar and for other items is provided for in the applicable paragraphs of these specifications covering the items for which such Portland cement is required.

The contractor shall make his own arrangements for the procurement of cement for the work either bagged or in bulk as required by specification of the works. Each shipment of bagged cement shall be stored separately so that it may readily be distinguished from other shipment and shall be stored in a dry enclosed area protected from moisture.

Storage of materials shall be as described in I.S.4082-1977 (I.S. Recommendation on stacking and storage of construction materials at site). To prevent undue aging of bagged cement after delivery, the contractor shall use bags of cement in the chronological order in which they were delivered to the job site.

All storage facilities shall be subject to approval of the Engineer-in-charge and shall be constructed to prevent easy access for inspection, and identification.

b. Acceptancy of cement

Tested cement will be supplied by the contractor according to clause 1 0. 1 of I.S. 269-1976.

c. Recovery of Cost of cement in waste - concrete etc.

The cost of cement used in wasted concrete, in replacement of damaged or defective concrete, in extra concrete required as a result of over excavation, and in concrete placed by the contractor's operations shall be borne by the Contractor himself. No extra payment will be made to contractors for such additional quantity.

8.1.4. Admixtures

The contractor shall use Air Entraining admixtures as directed by the Engineer-in-charge. Admixtures shall be of uniform consistently and quality and shall be maintained at the job site at uniform strength of solution. Admixtures shall be batched in liquid form in containers capable of measuring at one time the full quantity of each admixture required for each batch chemical admixtures which harm the quality and strength of concrete shall not be used in the concrete. Admixtures to be used in concrete shall confirm to I.S. 9103-1979 Indian Standard Specifications for Admixtures for concrete.

8.1.5. Water

The water used in making a curing of concrete, mortar and grout shall be free from objectionable quantities of silt, organic matter injurious amounts of oils, acids, salts and other impurities etc. as per I.S. specification No.456-2000.

The Engineer-in-charge will determine whether or not such quantities of impurities are objectionable.

Such determination will usually be made by comparison of compressive strength, water requirement, time of set and other properties of concrete made with distilled or very clean water concrete made with the water proposed for use. Permissible limits for solids when tested in accordance with I.S. 3025-1964 shall be as tabulated below.

PERMISSIBLE LIMITS FOR SOLIDS IN WATER

1.	Organic	Maximum permissible limit 200 mg/litre
2.	Inorganic	300 mg/litre
3.	Sulphate (as So4)	500 mg/litre
4.	Chlorides (as CL)	2000 mg/litre for plain concrete work and 1000 mg/litre for RCC work.
5.	Suspended matter	2000 mg/litre

If any water to be used in concrete, mortar, or grout is suspected by the Engineer-in-charge of exceeding the permissible limits for solids, samples of water will be obtained and tested by the Engineer-in-charge in accordance with I.S. 3025-1964.

8.1.6. Sand (Fine Aggregate)

a. General

The term sand is used to designate aggregate most of which passes 4.75 millimeter I.S. sieve and contains only so much coarser materials as permitted in clause 4.3 of I.S.383-1970. Sand shall be predominantly natural sand which may be supplemented with crushed sand to make up deficiencies in the natural sand gradings.

All sand shall be furnished by the contractor from any approved sources specified in the contract.

Sand as delivered to the batching plant. Shall have a uniform and stable moisture content. Determination of moisture content shall be made as frequently as possible, the frequency for a given job being determined by the Engineer-in-charge according to weather conditions (I.S. 456-2000).

b. quality

The sand shall consist of clean, dense, durable, uncoated rock fragments, as per I.S. 383-1979.

Sand may be rejected if it fails to meet any of the following quality requirements.

Organic Impurities in sand

Color no darker than the specified standard in clause 6.2.2 of I.S. 23286 part 11 1963. (Indian Standard method of test for aggregates for concrete parts estimation of deleterious materials and organic impurities).

Sand shall be screened before use. If sand brought to site is not clean it must be washed clean in water. Fine drift sand or sea sand or sand containing saline impurities shall on no account to be used.

Sodium Sulphate Test for Soundness

The sand to be used shall pass a sodium or magnesium sulphate accelerated test as specified in I.S. 2386 (Part-V) 1963 for limiting loss of weight.

Specific Gravity: 2.6 Minimum

Deleterious substances

The amounts of deleterious substances in sand shall not exceed the maximum permissible limits prescribed in table 1 clause 3.2.1 of I.S.383-1970 and shall be described as Fine aggregates, grading zones – I,II,III and IV, sand complying with the requirements of any of the four grading zones is suitable for concrete. But, sand conforming to the requirements of grading zone-IV shall not be used for reinforced cement concrete work.

8.1.7 Coarse Aggregate

a. General

For the Purposes of these specifications the term "coarse Aggregate" designate clean well graded aggregate most of which is retained on 4.75 mm t.S. Sieve and containing only so such finer material as permitted for various types described under clause 2.2 of I.S. 383-1970. Coarse Aggregate for concrete shall consist of uncrushed stone, or crushed stone and partially uncrushed and crushed stone.

Coarse Aggregate for concrete shall be furnished by the Contractor from the approved quarries specified in the contract documents. The contractor shall unless otherwise specified in the tender notice and subsequently on this basis in contract be responsible for payment of seignories, quarry fees etc., on all materials.

Coarse Aggregate as delivered to the building plant shall generally have uniform and stable moisture content. In case of variations, clause 9.2.3 of I.S. 456-2000 shall govern during batching.

b. Quality

The coarse aggregate shall consist of naturally occurring (crushed or uncrushed) stones, and shall be hard, strong, durable clear and free from veins and adherent coating, and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious materials. Coarse aggregate will be rejected if it fails to meet any of the following requirements.

1. Los-Angeles Abrasion Test

The abrasion value of Aggregates when tested in accordance with the method specified in I.S. 2386 (Part IV) using Los-Angles machine shall not exceed 30% for Aggregate to be used in concrete for wearing surface and 50% for aggregate to be used in other concrete.

2. Aggregate Crushing Strength Test

Aggregate crushing value, when determined in accordance with I.S. 2386 (Part IV) 1963. The aggregate impact value shall not exceed 45% by weight for aggregates used for concrete for other than wearing surfaces, and 30% by weight for concrete for wearing surfaces such as runways, roads and payments.

3. Soundness Test

The coarse aggregate to be used for all concrete works shall pass a sodium or magnesium sulphate accelerated soundness test specified in I.S. 2381 (Part V) 1963 and the average loss of weight after 5 cycles shall not exceed

the limits specified in clause 3.6 of I.S. 383- 1970.

4. Specific Gravity: should be 2.60 Minimum

5. Deleterious Material

The maximum quantity of deleterious materials in coarse aggregates shall not exceed the limits specified in Table 1 of I.S. 383-1970 when tested in accordance with I.S. 2386-1963.

c. Separation

The coarse aggregate shall be separated into nominal sizes during production of the aggregate. Just prior to batching the coarse aggregate shall be rewashed by pressure spray and finish screened on multidisc vibrating screen capable of simultaneously removing undersized and oversized aggregate from each of the nominal aggregates entering the batches occurred during intermittent and batching then a dewatering screen will be required after the finished screens to remove the excess free moisture. Finish screen shall be mounted over the batching plant or on the ground adjutant to the batching plant. Finished screen shall be so mountered that the vibration of this screen will not be transmitted to batching bins or scales and will not affect the accuracy of the weighing equipment in any other manner.

The method and rate of feed for finish screening shall be such that the screen will not be overloaded and will result in a finished product which meets the grading requirements of these specifications. Coarse aggregate shall be fed to the finished screen in a combination of alteration of nominal sizes which will not cost noticeable accumulation of poorly graded coarse aggregate in any bin. The finish screened aggregate shall pass directly to the individual batching bin in such a manner has to minimize breakage. Below 2.36 mm materials passing through the finish screens, shall be wasted unless it is tooted back through a sand classifier in a manner which causes uniform blending with the natural sand being processed. Water from finish screening shall be drained in such a manner as to prevent aggregate wash water from entering the batching bins and weighing hoppers. Washing and finish screening requirements shall be subject to approval by the Engineer-in- charge.

Coarse aggregate for concrete shall be separated into various nominal maximum sizes specified in the relevant drawings. Separation of the coarse aggregate into the specified sizes after finish screening shall conform to the

grading requirements specified in table - 2 of I.S. 383-1970, when tested in accordance with I.S. 2386--(Part-1) 1963 (Method of test for aggregate for concrete part -1) particle size and shape.

Coarse aggregate for mass concrete may be separated as previously herein specified. Separations of the Coarse aggregate into the various sizes shall be sure that when tested in accordance with I.S. 386 (part-]) 1963 shall conform to the requirements specified in Table- 3 of I.S. 383-1970.

Sieves used in grading tests will be standard mesh sieves conforming to I.S. 460 (part-]) 1978 (specification for test sieves part-1 wire cloth test sieves).

8.1.8 Production of sand and Coarse Aggregate

a. General

Sand and Coarse aggregate for concrete, and sand for mortar and grout, may be obtained by the Contractor from the approved source shown in the contract documents.

Tests performed on samples of sand and coarse aggregate obtained from the approved sources mentioned in the contract documents indicated that they are generally suitable. Well in advance of their usage on the works, the contractor shall have his own testing of materials and satisfy himself that they conform to the specification mentioned herein for use in the works.

No separate payment will be made for such tests. If sand and coarse aggregate are to be obtained from a deposit not previously tested and approved by the Engineer-in-charge. the Contractor shall submit representative samples for pre-construction test and approval. not less than 60 days before the sand and coarse aggregates are required for use. Each, sample shall approximately consist of 100 kg. of material. In addition to pre-construction tests, the approval of deposits, the Engineer-in-Charge may test the aggregates for their suitability during their processing. The Contractor shall provide such facilities as may be necessary for procuring representative samples free of cost at the aggregate processing plant at the batch plant. Final acceptance of aggregates will be based on the samples taken from the batch plant or mixing platform.

But use and development of any such deposit shall be subject to the approval by the Engineer-in-charge. Any royalties (senior age or other charges) required for materials taken from deposits not owned by the State Government and controlled by the Department of Mines and Geology, Government of India shall be paid by the Contractors.

b. Developing Aggregate Deposits

If the Deposit is owned by the State Government and controlled by the Department of Mines and Geology, the portion of the deposit used shall be located and operated so as not to detract the usefulness of the deposit or any other property of the Government, and so as to preserve, in so far as practicable. the future usefulness on value of the deposit. The Contractor shall carefully clear the area of deposit, from which the aggregates are to be produced, of trees, roots, bush sod, solid, unsuitable sand and gravel and other objectionable matter. Materials including stripping, removed from deposits owned by the Government and controlled by the Director of mines and Geology, Government of India and not used in the work covered by these specifications shall be disposed off as directed.

Due to the overall construction Programme. it is quite likely that more than one contractor may elect to use one of the sources named in the contract document. The Contractor shall be responsible for coordinating his work such that it does not interfere with the operations of other contractors who are also using any given source.

c. **Processing Raw Materials**

Processing of the raw materials shall include screening and washing as necessary to produce sand and coarse aggregate conforming to the requirements of paragraphs 7.1.6 and 7.1.7 processing of aggregates produced from any source owned by the State Government and controlled by the Department of Mines and Geology shall be done at an approved site. Water used for washing aggregate shall be free from objectionable quantities of salts, organic matter and other impurities.

Oversize metal may be crushed to correct aggregate particle size, and excess material in individual coarse aggregate size fractions may be crushed to give the largest practical yield of usable concrete aggregate.

Suitable types of crushers shall be used with the prior approval of the Engineer-in-charge for producing coarse aggregates. Crusher fines produced in the manufacture of coarse aggregates may be used in sand. Crushed stone, sand, crushed gravels and crusher fines if used shall be predominantly cubical in shape and shall be blended uniformly with natural sand by routing them together through sand classifier. Crusher coarse aggregate shall be blended uniformly with coarse aggregate by routing both together through the classifying screens.

In the process of developing and producing aggregates from approved sources for work under these specifications, the provisions of Environmental quality protection shall apply.

d. Cost

This shall be included in the applicable prices bid in the schedule for concrete filler road works in which the aggregates are used, which prices shall include the cost of stripping and transporting and storing materials. The Contractor shall not be entitled to; any additional compensation for materials wasted from a deposit. including crushed fines, excess materials of any of the sizes into which the aggregates are required to be separated by the contractor, and materials which have been discarded by the reasons of being above the maximum sizes specified for use.

8.1.9 Mixing

a. General

The Concrete ingredients shall be thoroughly mixed in mechanical mixers designed to positively ensure uniform distribution of all the component materials throughout the concrete at the end of the mixing period. Mixing shall be done as per clause 9.3 of I.S.456-2000. The mixer should comply with I.S. 1791-1985 (I.S. Specifications for batch type concrete mixers).

The concrete as discharged from the mixer shall be uniform in composition and consistent from batch to batch. Workability shall be checked at frequent intervals as per I.S. 1199-1959. Mixers will be examined regularly by the Engineer-in-charge or his authorized Engineer for changes in condition due to accumulation of hardened concrete or mortar or to wear of blades. The mixing shall be continued until there is a uniform distribution of the materials so that the mass is uniform in Colour and consistency and to the satisfaction of the Engineer-in-charge. If there is segregation after unloading the concrete should be remixed.

Any mixer that at any time produces unsatisfactory mix, shall not be used until repaired. If repair attempts are unsuccessful, a defective mixer shall be replaced. Batched size shall be at least 10% of, but not in excess of the rate capacity of the mixer unless otherwise authorized by the Engineer-in-charge.

8.1.10 Forms

a. General

Form shall be used wherever necessary, to confine the concrete and shaping it to the required lines. If a type of form does not consistently perform in an acceptable manner, as determined by the Engineer-in-charge, the type of
form shall be changed and method of creation shall be modified by the contractor subject to approval of the Engineer in-charge.

Plumb and string lines shall be installed before, and maintained during concrete placement. Such lines shall be used by the contractor's personnel and by the Engineer-in-charge and shall be in sufficient number and properly installed as determined by the Engineer-in-charge. During concrete placement, the contractor shall continuously monitor plumb and string lines, form positions and immediately correct deficiencies.

Forms shall have sufficient strength to with-stand the pressure resulting from placement and vibration of the concrete and shall be maintained rigidly in position. Where form vibrators are to be used, forms shall be sufficiently rigid to effectively transmit energy from the form vibrators to be concrete. While not damaging or altering the positions of forms. Forms shall be sufficiently tight to prevent loss of mortar from the concrete.

Chamfer strips shall be placed in the corners of forms and at the top of wall placement to produce beveled edges on permanently exposed concrete surfaces. Interior angle of inter-setting concrete surfaces and edges of construction joints shall not be beveled except where indicated on the drawings.

Suitable struts of stiffeners of ties shall be used for the form work wherever necessary. All supports shall be braced and cross braced into two directions. All splices and braces shall be secured by bolting unless specially intended otherwise. All struts shall be firmly supported against settlement and sliping, by suitable means as directed. All supports shall be cut square at both ends and firmly supported against settlement and slipping. When the formwork is supported on soils, planks. sleepers etc., shall be used to properly disperse the loads. In case, the supports rest on already completed beam or slab, suitable props shall be provided under the latter.

a. The joint between the form work and existing concrete shall also be 'grant tight'. Forms shall over lap the hardened concrete in the lift previously placed by not more than 75mm and shall be tightened against the hardened concrete so that when concrete placement is resumed the forms will not allow loss of mortar at the construction joint.

b. The form work shall be of well seasoned timber or steel. When timber forms are used, they shall be lined, with mild sheet or other suitable smooth faced non-absorbent materials as specified. Supports may be of timber or steel. Suitable wedges in pairs to facilitate adjustment and subsequent releasing of forms shall be provided preferably at the upper end of the support. The details of the proposed form work and supports shall be submitted to the Engineer- in-Charge and got approved before erection.

c. In case of columns, retaining walls of deep vertical component the height of the column shall facilitate any placement and compact in of concrete and suitable arrangement may be made for securing the form to the already poured concrete for placing the subsequent lifts. No steel ties or wires used for securing this form work shall be left exposed on the face of the finished work.

d. Suitable inserts for blackouts for electrical and other service fixtures where necessary shall be provided in the required locations as specified.

e. Cleaning and oiling of forms at the time the concrete is placed in forms, the surfaces of the forms shall be free from encrustations of mortar, grout or other foreign material. Before concrete is placed, the surface of the forms shall be oiled with commercial forms of oil.

f. Removal of Forms

The stripping of form work shall conform to clause 10.3 of I.S. 456-2000. The contractor shall be liable for damage and injury caused by removing forms before the concrete has gained sufficient strength. Forms on upper sloping faces of concrete such as forms on the water sides of warped transitions, shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed immediately by the specified curing.

To avoid excessive stresses in concrete that might result from swelling of forms. Wood for wall openings shall be loosened as soon as the loosening can be accomplished damages to the concrete. Forms for the openings shall be constructured so as to such loosening. Forms shall be removed with care so as to avoid injury to and any concrete so damaged shall be repaired in accordance with paragraph 7.3.21.

g. Cost

The cost of furnishing all materials and performing all work for constructing forms, including any necessary treatment or coating of forms are to be included at applicable prices bid in the schedule.

8.1.11 Tolerances for Concrete Constructions

a. General

Tolerances are defined as allowable variations from specified lines, grades, and dimensions and as the allowable magnitude of the surface irregularities. Allowable variations from specified lines, grades and dimensions are listed in table given under sub paragraph (b) below.

The intent of this paragraph is to establish tolerances that are consistent with modern construction practice that the governed by the effect that permissible variation may have upon a structure.

The Government reserves the right to diminish the tolerances set-forth herein if such tolerances impair the structural action, operational function or architectural appearance of a structure or portion thereof.

Concrete shall be within all stated tolerances even though more than one tolerance may be specified for a particular concrete structure. Provided that the specified variation for one element of the structure to exceed its allowable variation. Where tolerances are not specified for a particular structure, tolerances shall be those specified for a similar work. As an exception to clause 2 of the general provisions, specific tolerances shown herein in connection with any dimension shall govern. The Contractor shall be responsible for finishing the concrete forms with in the limits necessary to insure that the completed

work will be within the tolerances specified. Concrete work that exceeds the tolerance limits specified shall be remedied in accordance with the sub paragraphs (d and e).

b. Variations From Specified Lines, Grades And Dimension

Hardened concrete structures shall be checked by the contractor and will be subject to such inspection and measurement as needed to determine that the structures are within the tolerance specified in the table below.

Variation is defined as the distance between the actual position of the structure or any element of the structure and the specified position in plan for the structure or the particular element. Plus or minus variations shown as (+) indicate a permitted actual position up or down and in or out from the specified position in plan. Variations not designated as plus or minus indicate the maximum deviation permitted between designated successive points on the completed element of construction.

Specified position in plan is defined as the lines, grade and dimensions described in these specifications or shown on the drawings or as otherwise prescribed by the Engineer-in-charge.

NOTE: Tolerances apply to concrete dimensions only, but not for positioning of vertical reinforcing bars or dowels.

C. Concrete surface Irregularities

1. General

Bulges, depressions and offsets are defined as concrete surface irregularities. Concrete surface irregularities are classified as "abrupt" or gradual and are measured relative to the actual concrete surface.

2. Abrupt surface Irregularities

Abrupt surface irregularities are defined herein as offsets such as those cause be misplace or loose forms, loose knots in form number, or other similar, forming faults. Abrupt surface irregularities are measured using a straight irregularity and the magnitude of the offset is determined by direct measurement.

3. Gradual Surface Irregularities

Gradual surface irregularities are defined herein as bulges and depressions resulting in gradual changes on the concrete surface. Gradual surface irregularities are measured using a suitable template conforming to the design profile of the concrete surface being examined. The magnitude of the gradual surface irregularities is defined herein as a measure of the rate of change in slopes of the concrete surface. The surface irregularities shall not exceed 6mm for bottom slab and 12 mm for side slopes when tested with a straight edge of 1.5 meter in length. The magnitude of gradual surface irregularities on concrete shall be checked by the contractor to ensure that the surfaces are within the specified tolerances. The Engineer-in-charge will also make such checks of hardened compliance with such specifications.

d. Repair of Hardened Concrete Not within Specified Tolerances

Hardened concrete which is not within specified tolerances shall be repaired to bring it within those tolerances. Such repair shall be in accordance with paragraph 6.3.21 and shall be accomplished in a manner approved by the Engineer-in-Charge. Concrete repair to bring concrete with the tolerances shall be done only after consultation with a

representative of Engineer-in-Charge regarding the method of repair. The Engineer-in-Charge shall be notified as to the time when repair will be performed. Concrete shall be finished in a manner which will result in a concrete surface with a uniform appearance.

The tins and any rough projections can then be rubbed down and the whole surface brought to an even finish by rubbing with an wooden float using a mortar of one part cement by two parts of coarse sand as an abrasive, the mortar at the same time filling the voids. A neat cement work shall then be applied to give a smooth surface. If the concrete has set hard, the tins and rough projections, if any, shall be removed by using carborundum brick or a paved grinding machine by chipping, before finishing off with the smoothing wash. If the work of chipping is not done with care or if the surface exposed after removal of the forms cannot be satisfactorily dealt with in this manner due to bad form work or for other reasons, a coat of cement plaster of 1:2 of thickness as ordered by the Engineer-in-charge shall be applied. No extra payment will be given for finishing concrete surface as instructed above in this clause.

e. Prevention of Repeated Failure To Meet Tolerances

When concrete placements result in hardened concrete that does not meet the specified tolerances, the contractor shall submit to the Engineer-in-Charge an outline of all preventive actions such as modification to forms, modified procedure for setting screeds, and different finishing techniques to be implemented by the contractor to avoid repeated failures. The Engineer-in-Charge reserves the right to delay concrete placement until the contractor implements such preventive actions which are approved by the Engineer-in-Charge.

8.1.12 Reinforcing Bars

a. General

Reinforcing bars shall be placed in the concrete as shown in the drawings or as directed. For anchoring the concrete to the Hard rock provision of Anchor rods is made in the Drawing and the contractor shall place these anchor rods to the spacing and depth shown in the drawings.

b. Materials

Unless shown otherwise on the 1786-1985 (I.S. specification for high yield strength deformed steel bars and wires for concrete reinforcement.

c. Placing

Reinforcement shall be bent and fixed in accordance with the procedure specified in I.S. 2502-1963 (code of practice for bending and fixing of bars for concrete reinforcement). All reinforcement shall be placed and maintained in the position shown in the drawings splices shall be located where shown in the drawings, provided that the location of the splices may be altered subject to the written approval of the Engineer-in-Charge.

Subject to the written approval of the Engineer-in-Charge, the contractor may for his convenience, splice bars at additional locations other than those shown on the drawings. All additional splices allowed shall be at the expense of the contractor. In order to meet design and space limitation on splicing, some bent bars may exceed usual clearance cutting and bending of such bars from select lengths may be required at the site.

Unless otherwise prescribed, placement dimensions shall be to the centre lines of the bars. Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing, position, and amount after it has been placed, but before being laid with concrete. Before reinforcement is embedded in concrete the surface of the bars and the surfaces shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease or other foreign substances which in the opinion of the Engineer-in-Charge are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap, or equivalent treatment is considered objectionable. As specified in clause 11.3. of I.S. 456-2000 unless otherwise specified by the Engineer-in-Charge, reinforcement shall be placed with the following tolerances.

a. For effective depth 20Omm or less = ± 10 mm

b. For effective depth more than 20Omm = ± 15 mm

c. The cover in no cases be reduced by more than one third of specified cover or 5mm whichever is less.

Reinforcement shall be securely held in position so that it will not be displaced during the placing of the concrete and special care shall be exercised to prevent any disturbances of the reinforcement in concrete that has already been placed.

Welding of bars shall be done as directed by the Engineer-in-Charge and in conformity with the requirements of clause 11.4 of I.S. 456-2000. Chairs, hangers, spacers and other supports for reinforcement shall be of concrete, metal or other approved material. Concrete cover shall be as shown on the drawings.

d. Reinforcement Drawings

The Engineer-in-Charge will supply drawings of reinforcement details and bar bending schedules for adoption.

e. Measurement and Payment

Measurement for payment of reinforcement bars will be based on the weight of the bars placed in the concrete in accordance with the drawings supplied by the Engineer-in-Charge in conformation with those specified drawings has been determined at the time of embedment. Except as otherwise provided below payment for furnishing and placing reinforcing bars will be made at the unit price per one quintal bid in the bill of quantities for furnishing and placing reinforcing bars, which unit price shall include the cost of reinforcing bars, attaching, wire ties or other approved supports and of cutting, bending cleaning securing and maintaining in position reinforcing bars as shown on the drawings.

The total weight of bars placed as reinforcement in concrete shall be arrived at by adding the products of lengths of each size and mass per meter (vide Table 1 and para 6.2.1. of IS 1786-1985) of that size of rod.

8.1.13 Dowels

The dowels shall be of same H.Y.S.D. bars of grade Fe 415 conforming to I.S. 1786-01985 as used for reinforcement.

Details for dowels shall be as shown on the drawings or as directed by the Engineer-in-Charge.

Dowels shall be placed in the concrete where shown on the drawings or where directed and will be accepted for compliance with requirements as to size, shape, length, position,

and amount after they have been placed but before being covered by concrete. Before the dowels are embedded in concrete, the surfaces of dowels shall be cleaned of all dirt, grease or other foreign substances which in the opinion of the Engineer-in-Charge are objectionable.

The dowels shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete. Measurement for payment of dowels will be made only on the weight of the dowels placed in the concrete in accordance with the drawings or as directed.

Payment for furnished and placing of dowels will be made at the unit price per one quintal bid in the bill of quantities for furnishing and placing of reinforcing bars which unit price shall include the costs of furnishing all the materials and for placing the dowels as required.

8.1.14 Preparation for Placing

a. General

No concrete shall be placed until all form work installation of items to be embedded and preparation of surface involved in the placement have been approved. The Contractor shall supply concrete placement checkout cards (Placement Register) satisfactory to the Engineer-in-Charge and shall provide a water tight container for such cards at the convenient location near each individual concrete placement site. The cards shall list all the various work items for example "cleanup" and "embedded items" required prior to placement of concrete. After each work item for an individual placement has been completed that item on the cards shall be signed by contractor or his representative signifying completion of the required work. Engineer authorized by the Engineer-in-Charge will inspect the work during and after completion of each phase of the preparation and if the work is satisfactory will sign the check-outward placement register. Approval of preparation to placement will not be complete units the contractor or his representative and above authorized Engineer have approved by signature all applicable items for that placement. All surfaces of forms and embedded materials shall be free from curing compound, dried mortar for previous placements, and other foreign substances before the adjacent or surrounding concrete placement is begun. Prior to beginning concrete placement, the contractor shall make ready a sufficient number of properly operating vibrators and operators and shall have readily available additional vibrators to replace defective one during the progress of the placement. The Engineer's representatives at the placement may require that the contractor delay the start of the concrete placement until the number of working vibrators available is acceptable.

b. FOUNDATION SURFACES

All surfaces upon or against which concrete is to be placed shall be free from frost, ice, water, mud and debris.

1. Rock surfaces shall be free from oil, objectionable coatings, and, loose semi-detached and unsound fragments. Immediately prior to placement of concrete, surfaces of rock shall be washed with an air water jet and shall be

brought to a uniform surface dry condition.

2. Earth foundation surfaces shall be wet to a depth of 15cm, or to impermeable material whichever is less before concrete is placed.

c. Construction Joints

Construction joints are defined as concrete surfaces upon or against which concrete is to be placed and to which new concrete is to adhere but which have become so rigid that the new concrete cannot be incorporated integral

with that previously placed. The provision of construction joints shall conform to clauses 12.4.1 and 12.4.2 of I.S. 456 - 2000. When the work has to be resumed on a surface which has hardened such surface shall be roughened. It shall then be swept clean and thoroughly wetted. For vertical joints neat cement slurry shall be applied on the surface before it is dry. For horizontal joints the surface shall be covered with a layer of mortar about 10 to 15 mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing of the concrete.

Where the concrete has not fully hardened ail laitance shall be removed by scrubbing the wet surface with writ or bristle brushes, care being taken to avoid dislodgement of particles or aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work, particular attention being paid to corners and close spots, and work thereafter shall proceed in the normal way.

Preparation of Proper Construction Joints

Preparation of proper construction joints must be ensured by the contractor through the following guidelines. The contractor must use such air water guns.

GUIDELINES ON PREPARATION OF CONSTRUCTION JOINTS (LIFT JOINTS)

Objective

The objective in concrete placement in walls 1 cross drainage structures, etc., is to be absolutely sure of achieving a good bond at the joints between the successive concrete "lifts". The surface of each lift has to be thoroughly cleaned of all laitance, grout, and dirt before concrete for the next lift is placed.

Green Cutting

2. The surface of the respective lift shall be thoroughly green-cut with an air water jet. Green cutting is usually done 8 to 12 hours after the top surface of a concrete lift had been completed and sufficiently hardened. The actual time for taking up the green cutting operation shall depend upon the following factors:

- Concrete placement temperature;
- atmospheric temperature;
- concrete mix; and
- Slump.

The air-water jet will remove the thin surface film of laitance and grout to expose clean surface.

3. Green cutting, if done at the proper time, shall Yield very good results. When started too early, it shall result in oversetting and removing too much mortar. It is also liable to loosen the aggregate particles and leaving too poor a surface to bind the fresh concrete. On the other hand, if green-cutting is delayed to long, the cutting action of the air and water jet would be ineffective for proper removal of laitence. It, therefore, requires much greater care and judgment for proper use at the proper time.

4. Skill of Jet Operator Besides determining the proper time for initiating green-cutting, the process will require constant attention on the part of the air-water jet operator.

By correct manipulation of the high velocity air-water jet, a trained operator can ensure the removal of the thin surface film of laitance and grout effectively and at the same time leaving the aggregate stones, already embedded in the mortar, undistributed.

5. Proper Air - Water Gun: In addition to the skill of the jet operator, a proper air-water gun is also a vital requirement for effective green-cutting. The issuing nozzle must be about 460 mm (18 inches) long to ensure the requisite cutting force close to the concrete surface.

6. Quantum of Compressed Air and Water, For effective green cutting, it is essential that the air pressure should be around 6.33 to 7.03 Kg/Cm2 (90 to 100 lbs. per square inch). It should not be allowed to fall below 90 lbs per square inch. The water pressure, of course, should be sufficient to bring the water into effective influence of the air pressure. As an approximate estimate, the quantity of compressed air required by the Breen-cutting gun is 2 cubic meters per minute (70 cbm) and the quantity of water 60 gallons (273 liters) per minute.

7. An Important Aspect. An important aspect to be taken note of is that 'Green Cutting" as an exclusive operation shall be fully useful only if the next lift of concrete is placed within 3 to 4 days (or a maximum of 5 days) of the placement of the previous lift. If there be a delay in concrete placement beyond this period, the laitance will come up to the concrete surface again at some places. Removal of such laitance shall then be not possible by the ordinary green-cutting operation alone. Legit sand blasting of even the green-cut lint shall need to be resorted to. However, if there is excessive delay in concrete placement, it will require either "wet sand blasting" or the application of high pressure 'water blaster' to remove the laitance for effective binding with the fresh concrete. The effort to achieve this will be considerably less if green cutting has already been done.

8. Sand Blasting

Sand blasting is the process of roughening and cleaning the surface of old and set concrete by means of coarse sand and air applied under pressure of 90 to 100 pounds per square inch (6.33 to 7.03 kilograms per square centimeter) through the nozzle, so as to erode the laitance and grout from the old and fresh concretes monolithic. Sand blasting of rock is also done so that concrete may be placed on or against a clean surface as required according to specifications.

9. There are two types of sand blasting, namely "wet sand blasting' and "dry sand blasting". In wet sand blasting water is also used along with sand and air under pressure,

while in the latter, only sand and air under pressure are used. Normally the concrete and rock surface etc., are wet sand blasted to keep down the dust.

The percentages of different sizes of sand particles for efficient sand blasting shall be as follows

Size	Percentage
8 mesh per inch (25.40 millimeters)	26
16 mesh per inch (25.40 millimeters)	30
30 mesh per inch (25.40 millimeters)	23
50 mesh per inch (25.40 millimeters)	21

1. For effective sand blasting it is essential that pressure of air should be between 90 to 1000 pounds per square inch (6.33 to 7.03 kilograms per square centimeter). If pressure fails below 90 pounds per square inch (6.33 kilograms per square centimeter), sand blasting becomes ineffective. If sand having large percentage of fines is used, it will not provide the requisite cutting power and the whole effort goes waste. A good quality well graded "Sand-blast sand" is needed for achieving the objective of sand blasting.

11. High Pressure Water Blasters.

Green cutting is far cheaper than sand blasting, Proper quality sand (known as sand-blast sand) is the most expensive item and special efforts are needed to arrange such sand. A high pressure water blaster offers a workable alternative to sand blasting, On the Sardar Sarovar Project, indigenously manufactured water blaster are being used which can develop pressures in the range of 50-150 bars, with their water jet capacity adjustable to 880-1760 liters per hour (viz 15 liters/minute - 30 liters/minute). The equipment has a very small sand blasting attachment as well.

12. Summary:

Green - cutting offers the most economical methodology in the preparation of good construction joints. It has, however, to be initiated at the proper time and with a proper air - water gun (as per enclosed dimensional sketch) to yield the best results. It is far cheaper than sand blasting. If a delay of more than 3 to 5 days is anticipated in placing the concrete over the previous lift, the concrete surface of the lifts should be properly 'green-cut" and thereafter (say one day prior to placement of concrete) it should be light sand-blasted or water blasted in order to remove the "re-appeared" laitance.

D. Contraction Joints

Contraction joints serve to provide for volumetric shrinkage of monolithic concrete and for movement between monolithic unit at established joints, thus preventing formation of objectionable shrinkage cracks elsewhere in concrete. Prior to application of wax-based curing compound to contraction joints, the surfaces of all joints shall be cleaned thoroughly of accretion of concrete or other foreign material by scraping, chipping or other means approved by the Engineer-in-Charge. Water stops, reinforcing bars and other embedded items shall be free of curing compound when adjoining concrete is placed.

8.1.15 Placing

a. General

The contractor shall notify the Engineer-in-Charge before batching begins for placement of concrete. Placing shall be performed only in the presence of an authorized Engineer's representative. Placement shall not begin until after preparations are complete and the concrete placement check out card has been signed by the contractor or his representative and the authorized representative of the Engineer-in-Charge substantiating completion of all preparation for that placement. All surface upon or against which concrete is to be placed shall be prepared in accordance with paragraph 7.3.16. Re-tempering of concrete will not be permitted. Any concrete which has become so stiff that proper placing cannot be assured shall be wasted.

Concrete shall not be placed in standing water except with written permission of the Engineer-in-Charge and the method of placing shall be subject to approval.

Concrete shall not be placed in running water and shall not be subjected to running water until after the concrete has hardened. Concrete shall be deposited as nearly as practical in its final position and shall not be allowed to flow in such a manner that the lateral movement will cause segregation of the coarse aggregate from the concrete mass. Methods and equipment employed in depositing concrete in forms shall minimize clusters of coarse aggregate clusters that occur shall be scattered before the concrete is vibrated. Forms shall be constantly monitored and their position adjusted as necessary during concrete placement in accordance with paragraph 6.3.12. All concrete shall be placed in approximately horizontal layers. All construction joints which intersect exposed concrete surfaces all be made straight and level to plumb except as shown otherwise on the drawings. The placing of concrete shall be in accordance with clause 12.2 of I.S. 456-2000. If concrete is placed monolithically around openings having vertical dimension greater than 60 cm, or if concrete in decks, floor slabs, or other similar parts of structures is placed monolithically with supporting concrete, the following requirements shall be strictly observed.

1. Concrete shall be placed up to the top of the formed openings at which point further placement will be delayed to accommodate settlement of fresh concrete. If levels are specified beneath nearly horizontal structural members such as decks, floor slabs beams and girders such levels being between the nearly horizontal members and the vertical supporting concrete below. Concrete shall be placed to the bottom of the bevels before delay of placement.
2. The last 60 cm or more of concrete placed below horizontal members or bevels shall be placed with a 50 mm or less slumps and shall be thoroughly consolidated.

In placing concrete or unformed slopes so steep as to make internal vibration of the concrete impractical without forming, the concrete shall be placed ahead of non-vibrating slip form screed extending approximately 0.75 meters back from its leading edge.

Concrete ahead of the slip form screed shall be consolidated by internal vibrations so as to ensure complete filling under the slip form.

A cold joint is an unplanned joint resulting when a concrete surface harden before the next batch is placed against it cold joints would be allowed only in the event of equipment breakdown or other unavoidable prolonged interruption of continuous placing. If such unavoidable delays in placing occur which make it appear that unconsolidated concrete may harden to the extent that later vibration will not fully consolidate it. The contractor shall immediately consolidate such concrete to a stable and uniform slope. If delay of placement is then short, enough to permit penetration of the under lying concrete placement shall resume with particular care being taken to thoroughly penetrate and re-vibrate the concrete surface placed before the delay.

If concrete cannot be penetrated with vibrator the cold joint shall be then treated as a construction joint. Care shall be taken to prevent cold joints when placing concrete in any part of the work. The concrete placing rate shall ensure concrete is placed with the previously placed adjacent concrete in plastic so that the concrete can be made monolithic by normal use of vibrators/tamping. Concrete shall not be placed in rain sufficiently heavy or prolonged to wash mortar from concrete. A cold joint may necessarily result from prolonged heavy rainfall. The Contractor shall not be entitled to any additional payment, over the unit prices bid in the schedule for concrete, by reason of any limitation in the placing of concrete, required under the provisions of this paragraph.

b. Transportation

The transportation of concrete still confirm to clause 12.1 of I.S. 456-2000. The methods and equipment used for transporting concrete from the batch plant to its final position in to placement and the time that elapses during transportation shall not cause measurable segregation of coarse aggregate or slump loss during transportation exceeding 5 centimeters. Concrete shall be deposited as near as practical to its final position. The use of Aluminum pipe or Aluminum chutes for delivery of concrete will not be permitted. Concrete buckets shall be capable of promptly discharging concrete of the specified mix design and the dumping mechanism shall be capable of discharging at one location shall portions of concrete from a full bucket.

If used to transport concrete, the truck mixers shall meet the applicable requirements of paragraph 6.3.10. If used to transport concrete, the truck mixers shall meet the applicable requirements of paragraph 6.3.10. The transporting equipment for placing concrete shall readily handle the place concrete of the specified slump, The Contractor shall when directed, replace in-adequate transporting equipment with acceptable equipment.

C. Compaction

The compaction of concrete shall conform to clause 12.3 to I.S. 456-2000. Concrete shall be consolidated by vibrators 1 tampers. The vibrations shall be sufficient to removal all undesirable air voids from the concrete, including the air voids trapped against the forms. After consolidation, the concrete shall be free of rock pockets and honeycomb areas and shall be closed tightly against all surfaces of forms and embedded materials. All concrete shall be properly consolidated before it hardens. Except as herein after provided,

consolidation of all concrete shall be by immersion-type vibrators. Immersion type vibrators shall be operated in nearly vertical position and the vibrating head shall penetrate and re-vibrate the concrete in the upper portion of the underlying layer. Care shall be exercised to avoid contact of the vibrating head with embedded items and with formed surfaces which will later be exposed to view.

Concrete shall not be placed upon either plastic concrete until the previously placed concrete has been thoroughly consolidated. Form vibrators shall be used in conjunction with slip form lining machines to consolidate concrete in canal linings. Such vibrators shall be arranged for effective uniform consolidation of the concrete. The Engineer-in-Charge or his representative may remove samples of the hardened concrete for testing and examination, and the contractor shall repair, at no cost to the Government, concrete from which such samples are removed. Immersion type vibrator shall be operated at speeds at 7000 revolutions per minute when immersed in concrete. Form vibrators shall operate at speeds of at least 6000 revolutions per minute when being used to consolidate concrete. The contractor shall immediately replace improperly operating vibrators with acceptable vibrators.

8.1.16. FINISHES AND FINISHING

The requirements for finishing of concrete surface shall be as specified in this paragraph or as otherwise indicated on the drawings. The contractor shall notify the Engineer-in-Charge before finishing concrete. Unless inspection is waived, in each specific case, finishing of concrete shall be performed only when on Engineer's representative is present. General surfaces will be tested by the 'Engineer-in-Charge in accordance with paragraph where necessary to determine whether the concrete surface is within the specified tolerances shall be repaired. Interior surfaces shall be sloped for drainage where shown on the drawings or as directed. Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage. Floating may be performed by use of hand on power driven equipment. Floating shall be started as soon as the screened surface has stiffened sufficiently by and shown to the minimum necessary to produce a surface what is force from screened mark and in and uniform in texture. Joints and got shall be tooled where shown on the drawing or as directed. After the surfaces of road way slabs of concrete bridges, have been wood floated, the surfaces shall be given a broom finish. The finish shall be applied when the water sheet has practically disappeared. The broom shall be drawn transversely across the pavement with adjacent strokes slightly overlapping. The brooming shall be completed before the concrete is in such condition that the surface will be torn or unduly roughened by the operation. The finished surface shall have a uniform appearance and shall be free of corrugations exceeding 1.5 millimeters in depth. Broom shall be of quality, size and construction and be so operated as to produce a surface finish satisfactory to the Engineer-in-Charge.

8.1.17 PROTECTION

The contractor shall protect all concrete against damage until final acceptance by the Engineer-in-Charge. The Contractor shall provide protection to prevent erosion to fresh concrete whenever precipitation either periodic or sustaining is imminent or occurring.

When precipitation appears imminent, the contractor shall immediately make ready at the placement site all materials which may be required for protection of fresh concrete.

The Engineer-in-Charge may delay placement of concrete until adequate provisions for protection against weather are made.

All fresh concrete surfaces shall be protected from contamination and from foot traffic until the concrete has hardened. Hardened concrete surfaces which have to receive finish shall be protected against damage from foot traffic and other construction activity by covering with protective iiiats, plywood or by other effective means. Methods of protection shall be subject to approval by the Engineer-in-Charge.

8.1.18 Curing

a. General

The contractor shall furnish all materials and perform all work require for curing concrete. The uniformed top surfaces of concrete shall be cured for 28 days with a damp sand cover or curing mat over. The sand or curing mats shall both be kept so wet as to allow alter to drain from them and stain other concrete. The sand or curing mats shall be removed after the expire of the during period. All concrete surfaces shall be treated as specified to prevent loss of moisture from the concrete until the required curing period elapsed or until immediately prior to placement of other concrete or backfill against those surfaces. Only sufficient time to prepare construction joint surfaces and to bring them to a surface dry condition shall be allowed between discontinuance of curing and placement of adjacent concrete. Forms shall be removed within 24 hours after the concrete has hardened sufficiently conforming to clause 10.3 of I.S. 456-2000 to prevent structural collapse of other damage by careful form removal. Where required, repair of all minor surface imperfections shall be made immediately after form removal and pr; or to curing. Minor surface repair shall be completed within 2 hours after form removal and shall be immediately followed by the initiation of curing by the applicable method specified herein. Concrete surfaces shall be kept continuously moist after form removal until initiation of curing.

b. Material

Concrete cured with water shall be kept wet for at least 28 days from the time the concrete has attained sufficient set to prevent detrimental effect to the concrete surfaces. The concrete surfaces to be cured shall be kept wet by covering them with water - saturated material by using a system of perforated pipes mechanical sprinklers or porous hose, or by other methods which will keep all surface continuously (not periodically) wet. All curing methods are subject to approval of Engineer-in-Charge.

c. Cost

The cost of furnishing all materials and performing all work for curing concrete shall be included in the price bid in the bill of quantities for the concrete on which the particular curing methods are required.

8.1.19 Repair of Concrete

a. General

Concrete shall be repaired in accordance with clause 5.7 of I.S. 3873-1978. Imperfections and irregularities on concrete surface shall be corrected in accordance with paragraph 6.3.13 and clause 5.7 of I.S. 3873-1978.

b. Types of Repair

All repairs shall be made with concrete. Repairs to concrete surfaces and addition where required shall be made by cutting regular opening into the concrete and placing fresh concrete to the required lines. The chipped openings shall be sharp and shall not be less than 70 mm in depth. The fresh concrete shall be reinforced and chipped and toweled to the surface of the openings. The mortar shall be placed in layers not more than 2Omm in thickness after being compacted and each layer shall be compacted thoroughly. All exposed concrete surfaces shall be cleaned of impurities, lumps of mortar or grout unsightly stains.

c. Cost

The cost of furnishing all materials and performing all work required in the repair of concrete shall be borne by the contractor.

8.1.20 Measurement of Concrete

Measurement for payment of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made. In measuring concrete for payment, the volume of all openings, arises, embedded pipes and metal work, each of which is large than 0.1 square meter in cross section will be deducted.

8.1.21 Payment for Concrete

Payment for concrete in the various parts of the work will be made at the applicable unit prices therefore in the bill of quantities, under unit price shall include the cost of furnishing all materials and performing all works required for the concrete construction, except that payment for furnishing and placing reinforcing bars will be made at the respective unit price's bid therefore in the schedule.

APPENDIX HEREIN BEFORE REFERRED TO CLAUSE NUMBERS

1. Defect Liability Period	**Five Years**
2. Date of commencement ofthe Work	The date of commencement of the work willreckon from the date of handing over of site.
3. Period of completion	**Three Months**
4. Agreed liquidated damages	Rs.5900/- per day (Rupees Five thousand and Nine Hundred only)
5. Minimum value of work forinterim certificate	Rs.5,00,000/- (Rupees Five Lakhs only)
6. Earnest Money Amount	**Rs.72,500/-**
7. Security Deposit	2% of Contract value less EMD/-
8. Retention Amount	5% of the Contract value
9. Release of security deposit & performance security deposit(if any)	a. 50% of the total withheld amount shall be refunded after completion of work, alongwith final bill. b. Remaining 50% of the total amount along with the Earnest money deposit, security deposit and additional performance security deposit shall be refunded after one year from the date of completion of work and on production of Indemnity bond for the balance defect liability period of four years.
10. Period of honouring certificate	Two weeks from the date of receipt of the certified copy of bill from the Project Officer.

TENDERER