

**GREATER CHENNAI CORPORATION  
STORM WATER DRAIN DEPARTMENT  
UNDER CMCDM FUND**



**BID DOCUMENT**

**TWO COVER SYSTEM**

**SWD.C.No.B3/2236/2019-13**

**Name of the work :**

Tender for Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11, Package –13.

Signature of Tenderer

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**Section I**

**SWD.C.No.B3/2236/2019-13**

Greater Chennai Corporation  
Storm Water Drain Department

**E- SHORT TENDER NOTICE**

**Sealed tenders are invited for the following work in Two Cover System as per details furnished below.**

Sl. No.	File No.	Name of the work	Approx. value of work (with G.S.T.12% ) Rs. in Lakhs	E.M.D	Eligible class	Last Date and Time of Submission
1.	SWD.C.No .B3/2236/2019- 13	<b><u>WORK:</u></b> Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.	1059.68	10,60,000/-	Class I	18.11.2019 upto 3.00 PM

- 1) Bid document will be available in web site <https://tntenders.gov.in> 18.11.2019 up to 3.00 p.m. for online bidding. The bidders must possess Digital Signature Certificate and submission of bids through online in the above web side.
- 2) Bids must be submitted online on or before 3.00 p.m on 18.11.2019. Bids received online shall be opened at 3.30 p.m. on 19.11.2019. in the office of Superintending Engineer, SWDD Department in the presence of the bidders who wish to participate in the tender. If the date of opening happens to be a holiday, the bids will be opened on the next working day at the same time and venue. The original Bid Security shall also be submitted to the tender inviting officer before 3.00 P.M on the day of online bid submission.
- 3) Bids must be accompanied with scanned copy of bid security specified for the work in the above table. Bid Security will have to be in any one of the forms as specified in the bidding document payable at Chennai in Commissioner Greater Chennai Corporation, and shall be valid for 90 days and the same shall also be submitted in cover-I of the online bidding.
- 4) Subsequent corrigendum/addendum if any shall only be available in web site indicated above.
- 5) The authority reserves the right to reject for any or all bids without assigning any reason.

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## Tender Document

### Greater Chennai Corporation STORM WATER DRAIN DEPARTMENT

NAME OF THE WORK	:	<b><u>WORK:</u></b> Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.
E.M.D.AMOUNT	:	10,60,000/-
PERIOD OF DOWN LOADING OF BID DOCUMENT	:	UPTO 15.00 hrs 18.11.2019
LAST DATE AND TIME FOR RECEIPT OF BID	:	DATE 18.11.2019 TIME : 15.00 hrs
TIME AND DATE OF OPENING OF TECHNICAL BID	:	DATE 19.11.2019 TIME : 15.30 hrs
PLACE OF OPENING OF TECHNICAL BID	:	Office of the Superintending Engineer Storm Water Drain Department Greater Chennai Corporation, Chennai -600003,
OFFICER INVITING BIDS	:	Superintending Engineer Storm Water Drain Department Greater Chennai Corporation Chennai 600003
Any Clarification contact	:	Superintending Engineer Storm Water Drain Department Greater Chennai Corporation Chennai 600003 Office Phone No 044 25619315 Email Address: seswd@chennaicorporation.gov.in

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### **CHECK LIST FOR SUBMISSION OF BID**

Bidder shall check the submission of relevant details and documents as mandated in the tender document, before submission of bids.

<b>Sl. No.</b>	<b>Compliance criteria as per clause</b>	<b>Details</b>	<b>Check</b>
1	15.1	The Earnest Money Deposit shall be either in the form of Demand Draft or an irrevocable Bank Guarantee drawn from any Nationalized / Scheduled Bank in favour of the Commissioner, Greater Chennai Corporation. The original Bid Security shall also be submitted to the tender inviting officer before 3.00 P.M on the day of online bid submission. If yes Scanned copy of Bid Security for the same should be enclosed.	YES/ NO
2	3.4 (a)	Whether copy of Certificate of registration as Class I Contractor (monetary limit <b>above Rs.75.00 lakhs</b> ) in any of the Central/State Government Dept. /Govt undertaking is enclosed?	YES/ NO
3	3.4 (b)	Whether proof for having the experience in similar works such as Storm water drain, Canal improvement work and buildings for having executed at least minimum one work not less than 40% of the value put to tender under a single agreement in any one of the preceding five years. (2014-15, 2015-16, 2016-17, 2017-18 and 2018-19) in State Government Department / Undertaking / Local Bodies is enclosed <b>40% of the Package Value= Rs. 424.00 lakhs</b> If yes <b><u>Completion certificate</u></b> obtained from client /Department should be enclosed.	YES/ NO
4	3.4(c)	Whether Proof for having in the Civil Engineering construction field should have achieved the annual turnover of 1.5 times the estimated amount of work and work of same value in any one of the	YES/ NO

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		proceeding past <b>Five years. (2014-15, 2015-16, 2016-17, 2017-18 and 2018-19)</b> is enclosed <b>1.5 times of the Package value= Rs.1590.00Lakhs</b>	
5	3.4(d)	Whether proof of the applicant for having working capital sufficient to finance atleast <b>30 %</b> of value put to tender is enclosed?  <b>30 % of the Package Value is Rs.318.00 lakhs</b> If yes, The amount available in the bank account of the applicant on the date of submission of application and the unutilized amount of overdraft / credit facility extended to the applicant by the Nationalized / Scheduled banks should be enclosed. Liquid assets and/or availability of credit facilities to carryout the work of Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11. shall not be less than <b>Rs.318.00 lakhs.</b>	YES/ NO
6	3.2(n)	The certificate containing all required machinery for this work certified by Engineer not below the rank of Executive Engineer has to be enclosed in the technical bid. This certificate should be obtained after the date of publication of tender. If the certificate is not enclosed the tender would be rejected. The original certificate thus obtained has to be enclosed along with the EMD	YES/ NO
7	3.2(g)	Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years If yes, Tenderer Attested copies to be attached.	YES/ NO
8		Whether all the certificates are Notarized	YES/ NO
9		Whether the latest TIN return enclosed	YES/ NO

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10	17.1	e – Submission		
		A	Whether the Cover Number – 1 of the online Bidding super scribed as “Technical Bid “contains Scanned copy Bid Security, Pre Qualification Documents and Tender document furnished by Greater Chennai Corporation to be submitted in Technical Bid of online bidding.	YES/ NO
		B	Whether the Financial Bid of online bidding super scribed as “Price Bid “contains Price Bid Documents.	YES/ NO

This Check List is only illustrative and not exhaustive. Hence the bidder is requested to go through the entire document and submit all relevant documents and details.

No Advance payment.

No Price Adjustment

No JOINT VENTURE /CONSORTIUM/ IS PERMITTED.

Note: This condition supersedes any other tender clause that might appear in the tender book.

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## Section II

### INSTRUCTIONS TO BIDDERS (ITB)

#### A. General

##### 1. Scope of Bid

- 1.1 The Greater Chennai Corporation invites bids for the **Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11**, as described in the Bid Data Sheet. The name and identification number of the Contract is provided in the Contract Data.
- 1.2 The successful Bidder will be expected to complete the works by the completion date stipulated in the Contract Data.

##### 2. Eligible Bidders

- 2.1 A Bidder shall be any Person, Company, Corporate body, Association, Body of individuals, Group of persons, Limited company, Firm, Organization from India who are legally competent and entitled for entering into contract as per the law of contract prevailing in India. **The Joint venture of Indian and foreign firms are not allowed**
- 2.2 The Contractors having registration in the class specified in the tender notice and above in the concerned Department of Greater Chennai Corporation, or intending Tenderer should be a registered contractor in any of the Centre Government of India / State Government Department / Government undertaking in India are eligible to participate in the Tender. Provisional Registration shall be done for the successful bidder if he is willing to abide by the rules and regulations of Chennai Corporation and on payment of prescribed fees.
- 2.3 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices in accordance with sub-clause 31.1.
- 2.4 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest in this bidding process, if:
- (a) in case of dispute or mutually agreed separation of the consortium members the lead consortium members can continue to discharge the obligation of contract.
  - (b) they or their sister concern have controlling shareholders in common; or
  - (c) they or their sister concern receive or have received any direct or indirect subsidy from any of them; or
  - (d) they or their sister concern have the same legal representative for purposes of this bid; or
  - (e) they or their sister concern have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Commissioner regarding this bidding process; or
  - (f) a Bidder or their sister concern participates in more than one bid for the same package in this bidding process. Participation by a Bidder in more than one Bid for the same package will result in the disqualification of all Bids in which the party is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or
  - (g) a Bidder or their sister concern participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid.
- 2.5 No one or non of a firm or company is eligible to participate in the tender if any one of his or any one or more of the director's of a firm or company is a blood relative of any one of an employee or a public representative of Greater Chennai Corporation.

##### 3. Qualification of the Bidder

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- 3.1 All Bidders shall provide in Section 3, a preliminary description of the proposed work method and schedule, as necessary.
- 3.2 All Bidders shall include the following information and documents with their bids in the prescribed format as per Section 3, unless otherwise stated in the Bid Data sheet:
- (a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business, written power of attorney of the signatory of the Bid to commit the Bidder;
  - (b) Total monetary value of construction work performed for each of the last five years;
  - (c) Tenderer should have the experience in similar work should have executed at least one work not less than 40 % of the value put to tender under a single agreement in any one of the preceding five years in State Government Department / Undertaking / Local Bodies. For this completion certificate should be enclosed.
  - (d) Major items of construction equipment proposed to carry out the Contract;
  - (e) Qualifications and experience of key site management and technical personnel proposed for the Contract;
  - (f) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;
  - (g) Evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
  - (h) Authority to seek references from the Bidder's bankers;
  - (i) Information regarding any litigation, current or during the last five years, in which the Bidder is involved, the parties concerned, and disputed amount; and
  - (j) Proposals for subcontracting components of the works amounting to more than 10 % of the Contract Price.
  - (k) The Bidder should have turnover of 1.50 times the estimated amount of work and work of same value in the last five years.
  - (l) The Bidder has the responsibility to meet the technical qualifications.
  - (m) The tenderer has to procure RMC from the list of reputed RMC plant companies (approved and authorized by Greater Chennai Corporation) for providing M20 Grade Concrete.
  - (n) The certificate containing all required machinery for this work certified by Engineer not below the rank of Executive Engineer has to be enclosed in the technical bid. This certificate should be obtained after the date of publication of tender. If the certificate is not enclosed the tender would be rejected. The original certificate thus obtained has to be enclosed along with the EMD.

**3.3 Bids submitted by a joint venture of two or more firms - Deleted**

**3.4 To qualify for award of the Contract, Bidders shall meet the following minimum qualifying criteria:**

- (a) Intending Tenderer should be a Class I Registered contractor in any of the Central Government of India /State Government Dept./Govt .undertaking in India
- (b) The Tenderer should have the experience in similar works for having executed at least minimum one works not less than 40% of the value put to tender under a single agreement in any one of the preceding five years. (2014-15, 2015-16, 2016-17, 2017-18 and 2018-19) in State Government Department / Undertaking / Local Bodies is enclosed.  
**40% of the Package Value= Rs. 424.00 lakhs**  
Completion certificate obtained from client /Department should be enclosed.
- (c). Proof for having in the Civil Engineering construction field should have achieved the annual turnover of 1.5 times the estimated amount of work and work of same value in any one of the proceeding past **Five years.**  
(2014-15, 2015-16, 2016-17, 2017-18 and 2018-19) is enclosed  
**1.5 times of the Package value= Rs.1590.00 Lakhs**
- (d). Proof of the applicant for having working capital sufficient to finance atleast **30 %** of value put to tender is enclosed ?  
**30 % of the Package Value is Rs.318.00 lakhs**

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The amount available in the bank account of the applicant on the date of submission of application and the unutilized amount of overdraft / credit facility extended to the applicant by the Nationalized / Scheduled banks.

Liquid assets and/or availability of credit facilities to carry out the work

**Work:**

**Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.** shall not be less than **Rs.318.00 lakhs.** in the format given below.

**BANK CERTIFICATE**

This is to certify that M/s..... is a reputed company with a good financial standing. If the contract for the work, namely **Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.** is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of **Rs.318.00 lakhs** to meet their working capital requirements for executing the above contract.

Sd/-xxxxxxx, dated.  
Name of the Bank  
Senior Bank Manager  
Address of the Bank

- (e) Proposals for the timely acquisition (own, lease, hire etc) of the essential equipment listed in the Bid Data sheet. The bidder should give an undertaking that the essential equipments will be purchased/hired for the project.
- (f) The Bidder should have the minimum Key Personnel as specified in the Bid Data sheet. Addendum/amendments, if any, issued as mentioned above and any failure in doing so will lead to consequences including rejection of Bid.
- (g) Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity is more than the total bid value. The available bid capacity will be calculated as under:

**Assessed Available Bid capacity = (A x N x 2.0-B)**

Where

A = Maximum value of construction works executed in any one year during the last **five** years (updated to 2018-19 price level) taking into account the completed as well as works in progress.

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

B= Value, at price 2018-19 level, of existing commitments and on-going works to be completed during the period of completion of the works for which bids are invited.

Note:

The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of the an Executive Engineer or equivalent. .

The evaluation of the bid capacity is at the discretion of the Greater Chennai Corporation and its decision is final and no appeal is allowed

- ii) The value of the value of works executed and Financial Turnover of the Previous Years shall be given a Weight age of 10% each per year to bring them to the Price Level of 2016-17.

Weightage is as follows for value of works executed and Financial Turnover

2018-19:	1X value of works executed / Financial Turnover
2017-18:	1.10 X value of works executed / Financial Turnover
2016-17:	1.21X value of works executed / Financial Turnover
2015-16:	1.33 X value of works executed / Financial Turnover
2014-15:	1.46 X value of works executed / Financial Turnover

**4. One Bid per Bidder**

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4.1 Each Bidder shall submit only one Bid, either individually or as a partner in a Joint venture. A Bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder's participation to be disqualified.

## 5. Cost of Bidding

5.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Commissioner will in no case be responsible or liable for those costs.

## 6. Site Visit

6.1 The Bidder, at the Bidder's own responsibility and risk, is encouraged to visit and examine the site of works and its surroundings and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the works. The costs of visiting the site shall be at the Bidder's own expense.

## B. Bidding Documents

### 7. Content of Bidding Documents

#### 7.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 9:

Section I	Tender Notice
Section II	Instructions to Bidders (ITB)
Section III	Forms of Bid and Qualification Information
Section IV	Letter of Acceptance
Section V	General Conditions of Contract
Section VI	Contract Data
Section VII	Specifications
Section VIII	Drawings
Section IX	Security Forms
Section X	Technical Specifications

7.2 The number of copies of each section supplied to the prospective Bidder and the number of copies to be completed and returned with the Bid is specified in the Bid Data Sheet.

### 8. Clarification and Pre-Bid meeting

8.1 In any case any Bidder ask for a clarification to the Bid documents before 4 days of the opening of the Bid, the Bid inviting authority shall ensure that a reply is posted on line to the clarifications sought. It is the responsibility of the Tenderer to note down any changes which is posted on line, the Tender Inviting Authority will not be held responsible in this matter.

8.2 A Pre-Bid meeting will ordinarily be conducted not later than 14 days before the last date of submission of Bid. The purpose of the meeting is to clarify the issues and doubts and to answer the question on any matter that may be raised till that date. The Bidder or his official representative is advised to attend the meeting which will be convened by the Bidding authority as specified in Bid Data sheet. The minutes of the meeting including questions raised and responses given by the Commissioner will be furnished on demand. Any addendum, modifications if required based on the Pre-Bid meeting will be posted on line..

### 9. Amendment of Bidding Documents

9.1 At any time after the issue of the Bid documents and 5 days before the opening of the Bid, the Bid inviting authority may make any changes, modifications or amendments to the Bid documents and shall send intimation of such change to all those who have purchased the original Bid documents. Prospective bidders shall promptly acknowledge the receipt thereof by telex, cable or fax to the Bidding authority. The Bid shall be furnished taking into account the addendum/amendments, if any, issued as mentioned above and any failure in doing so will lead to consequences including rejection of Bid.

## C. Preparation of Bids

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**10. Language of Bid**

**10.1** All documents relating to the Bid shall be in the language specified in the General Conditions of Contract.

**11. Documents Comprising the Bid**

**11.1** The Bid submitted by the Bidder shall comprise the following:

- (a) The Bid including the tender document issued by Greater Chennai Corporation
- (b) Bid Security;
- (c) Priced Bill of Quantities;
- (d) Qualification Information Form and Documents;
- (e) Income Tax clearance certificate and Sales Tax clearance certificate for the current year obtained from the appropriate authority; and any other materials required to be completed and submitted by bidders, as specified in the Bid Data sheet.

**11.2 Alternate design**

- (a) Unless otherwise specified in the design data sheet, alternate design shall not be considered.
- (b) Bidders wishing to offer technical alternatives to the requirement of the bidding document must first price the employer's design as described in the bidding document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer including drawings, design, calculations, technical specifications, breakdown of prices and proposed construction methodology and other relevant details. Only technical alternatives if any, of the lowest evaluated bidder confirming to basic technical requirement shall be considered by the employees.
- (c) Bidders are permitted to submit alternative technical solutions for specified parts of the projects identified in the bid data sheet.

**12. Bid Prices**

**12.1** The Contract shall be for the whole works based on the priced Bill of Quantities submitted by the Bidder.

**12.2** All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause shall be included in the rates, prices, and total Bid price submitted by the Bidder.

**12.3** The rates and prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract if provided for in the Bid Data sheet and the provisions of the Conditions of Contract. The Bidder shall submit with the Bid all the information required under the Contract Data Sheet and the Conditions of Contract.

**12.4** If the contractor offers discount / rebate in a particular item, his bid price will be after deducting the discount from the original quoted price. If the contractor offers discount / rebate in the total value of work, his bid price will be same as original quoted rate, after calculating the total amount the discount / rebate amount is to be deducted.

**13. Currency**

**13.1** The currency for the purpose of the Bid document shall be the Indian Rupee (INR).

**14. Bid Validity**

**14.1** Bids shall remain valid for a period of 90 days unless otherwise specified in the Bid Data sheet.

**14.2** In exceptional circumstances, the Commissioner may request that the Bidders to extend the period of validity for a specified additional period. The request and the Bidders' responses shall be made in writing. A Bidder may refuse the request without forfeiting the Bid Security. A Bidder agreeing to the request will not be required or permitted to otherwise modify the Bid, but will be required to extend the validity of Bid Security for the period of the extension, and in compliance with Clause 15 in all respects.

**15. Bid Security (Earnest Money Deposit)**

**15.1** The Bidder shall furnish, as part of the Bid, a Bid Security (Earnest Money Deposit) **Rs.10,60,000/- (Rupees Ten lakhs Sixty thousand only)**. The Earnest Money Deposit shall be either in the form of Demand Draft or a irrevocable bank Guarantee drawn

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from any Nationalized/Scheduled Bank in favour of the Commissioner, Greater Chennai Corporation. The Earnest Money will be refunded to the unsuccessful bidder without interest on application after intimation is sent of the rejection of the tender or at the expiration of Bid validity period. Bids not accompanied by the Bid Security will be rejected.. **Bids must be accompanied with scanned copy of bid security specified for the work in the above table. And shall be valid for 90 days and the same shall also be submitted in cover-I of the online bidding.** The original Bid Security shall also be submitted to the tender inviting officer at the time of bid opening. The Bid security of the successful Bidder will be returned as per clause 15.2.

**15.2** The Bid Security of the successful Bidder will be discharged when the Bidder has signed the Agreement and furnished the required Performance Security.

**15.3** The Bid Security will be forfeited:

- (a) If a bidder withdraws his Bid during the period of Bid validity.
- (b) If a successful Bidder fails to:
  - i) Execute the agreement or
  - ii) Furnish the necessary performance security within the specified time limit of 30 days from the date of issue of letter of acceptance of his bid ; or
- (c) in the case of a successful Bidder, if the Bidder fails within the specified time limit to
  - i) Sign the Agreement; or
  - ii) Furnish the required Performance Security.

#### **16. Format and Signing of Bid- deleted**

**16.1** The Bidder shall prepare the documents comprising the Bid as described in Clause 11 of these Instructions to Bidders, bound with the volume containing the Form of Bid,

**16.2** The Bid shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to Sub-Clauses 3.2(a) or 3.3(b), as the case may be. All pages of the Bid where entries or amendments have been made shall be initialed by the person or persons signing the Bid.

**16.3** The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initiated by the person or persons signing the Bid.

**16.4** The Bid document and Price Bid Documents uploaded in the PDF format should not be changed or converted to any other format while down loading .

#### **D. Submission of Bids**

##### **17.Procedure for e submission:**

**17.1** Bidder should do the registration in the e – tender site using the option available. Then the Digital signature registration has to be done with the e-token, after logging into the site. The e-token may be obtained from one of the authorized Certifying authorities such as SIFY/TCS/nCode etc. The list of address of the DSC vendors can be seen in [https://tntenders.gov.in/nicgep/app?component=%24DirectLink\\_1&page=DSCInfo&service=direct&session=T&sp=SDSCAddress.pdf](https://tntenders.gov.in/nicgep/app?component=%24DirectLink_1&page=DSCInfo&service=direct&session=T&sp=SDSCAddress.pdf)

**17.2** Bidder then should login to the site using user id and the corresponding passwords.

**17.3** The e-token that is registered should be used by the bidder and should not be misused by others.

**17.4** After downloading the tender schedules, the Bidder should go through them carefully and then submit the documents as directed, otherwise, the bid will be rejected.

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- 17.5 If there are any clarifications, this may be obtained online through the e-tender site, or thro' the contact details. Bidder should take into account the corrigendum published before submitting the bids online.
- 17.6 Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender schedule and they should be in the prescribed format.
- 17.7 The bidder should read all the terms & conditions mentioned in the bid document and accept the same to proceed further to submit the bids.
- 17.8 The Bidder has to submit the tender document online well in advance before the prescribed time to avoid any delay or problem during the e-submission process.
- 17.9 Bidders seeking exemption from payment of EMD, as per existing Government Orders, and choosing e-submission option shall access the relevant option available in the e-submission format and submit scanned copy of related documents without fail.
- 17.10 The details of the bid security document should be submitted physically before the opening the tender. The scanned copies furnished at time of e-submission and the original bid security . should be the same otherwise the tender will be summarily rejected.
- 17.11 The Commissioner, Municipality / Corporation will not be held responsible for any sort of delay or the technical difficulty faced in the submission of tenders online by the bidders.
- 17.12 The bidder may also submit the bid documents by online mode through the site (<https://tntenders.gov.in>)
- 17.13 The online Bidding super scribed as " Technical Bid " contains Scanned copy, Bid Security, Pre Qualification Documents and Tender document furnished by Greater Chennai Corporation to be submitted in the online bidding. **The Tender document furnished by Greater Chennai Corporation uploaded in the PDF format should not be changed or converted to any other format while submitted in the online bidding.**
- 17.14 The online bidding super scribed as "Price Bid "contains Price Bid Documents.
- 17.15 The Bid shall be shall be signed by a person or persons duly authorized to sign on behalf of the Bidder.. All pages of the Bid where entries or amendments have been made shall be signed by the person or persons signing the Bid and then Bid shall be submitted the Scanned copy in the online bidding.
- 17.16 The tendering system will give an ACKNOWLEDGEMENT Message only after successful uploading of all the required bid documents. The ACKNOWLEDGEMENT is the bid summary. With the Bid No., Date & Time of submission of the bid with all other relevant details. The documents submitted by the bidders will be digitally signed with the e-token of the bidder and then submitted.
- 17.17 The ACKNOWLEDGEMENT should be printed and to be kept as a token of the submission of the bid. The ACKNOWLEDGMENT will act as a proof of bid submission for a tender floated and will also act as an entry point to participate in the bid opening date.
- 17.18 Bidder should log into the site well in advance for bid submission so that he submits the bid in time i.e. on or before the bid submission time. If there is any delay, due to other issues, bidder only is responsible.
- 17.19 Each document to be uploaded thro' online for the tenders should be less then 2 MB, If any document is more than 2 MB, it can be reduced through zip format and the same can be uploaded. It may be however noted that. If the file size is less than 1MB the transaction uploading time will be very fast.

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- 17.20 The time setting fixed in the server side & displayed at the top of the tender site, will be valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system. The bidders should follow this time only, during bid submission.
- 17.21 All the data being entered by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered will not be viewable by unauthorized persons during bid submission & not be viewable by anyone until the time of bid opening. Overall, the submitted tender documents become readable only after the tender opening by the authorized individual.
- 17.22 The Confidentiality of the bids is maintained since the secured Socket layer 128 bit encryption technology is used. Data storage encryption of sensitive fields is done.

**18. Deadline for Submission of Bids**

- 18.1 The bidders are requested to upload all related documents through e-tendering on line system to the tender inviting authority well before the time and date specified in the Bid Data sheet.
- 18.2 The Tender Inviting Authority may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 9, in which case all rights and obligations of the Employer and the Bidders previously subject to the original deadline will then be subject to the new deadline.

**19. Late Bids-** deleted

**E. Bid Opening and Evaluation**

**20. Bid Opening**

- 20.1 Tenders will be opened by the Tender inviting authority or his authorized officer(s) at the time and date specified in the Bid Data sheet in the presence of tenderers or their authorized representatives if any & members of Tender Scrutiny Committee.
- 20.2 The Price Bid of qualified Bidders will be opened by the Tender Inviting Authority, in the presence of Bidders / authorized representatives who choose to attend. The date of opening of the price bid will be intimated to all the Prequalified Bidders after evaluation of the Prequalification Bids by the Tender Inviting Authority.
- 20.3 The Bidders' names, the Bid prices, the total amount of each Bid and such other details as the Tender Inviting Authority may consider appropriate, will be announced by the Commissioner at the opening.

**21. Process to Be Confidential**

- 21.1 Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

**22. Clarification of Bids and Contacting the Employer**

- 22.1 From the time of Bid opening to the time of contract award, if any Bidder wishes to contact the Employer on any matter related to the Bid, it should do so in writing.
- 22.2 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at the Employer's discretion, ask any Bidder for clarification of the Bidder's Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex, or facsimile, but no change in the price or substance of the Bid shall be sought, offered, or

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permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 24.

- 22.3** Any effort by the Bidder to influence the Tender Inviting Authority in the Employer's Bid evaluation, Bid comparison or contract award decisions may result in the rejection of the Bidders' Bid.

**23. Examination of Bids and Determination of Responsiveness**

- 23.1** Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid
- (a) Meets the eligibility criteria defined in Clause 2;
  - (b) Has been properly signed including the document uploaded by Greater Chennai Corporation;
  - (c) Is accompanied by the required securities; and
  - (d) Is substantially responsive to the requirements of the Bidding documents.
- 23.2** A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one
- (a) Which affects in any substantial way the scope, quality, or performance of the works;
  - (b) Which limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or
  - (c) Whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive Bids.
- 23.3** If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

**24. Correction of Errors- Deleted.**

**25. Evaluation and Comparison of Bids**

- 25.1** The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 23.
- 25.2** In evaluating the bids, the Employer will determine for each Bid the evaluated Bid price by adjusting the Bid price by making any correction for errors pursuant to Clause 24.

**F. Award of Contract**

**26. Award Criteria**

- 26.1** Subject to Clause 27, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest evaluated Bid price, provided that such Bidder has been determined to be
- (a) Eligible in accordance with the provisions of Clause 2, and
  - (b) Qualified in accordance with the provisions of Clause 3.
- 26.2** In determining the lowest evaluated price the following practice will be considered:
- i) The quoted price shall be corrected for arithmetical errors
  - ii) In case of discrepancy between prices quoted in words and in figures, whichever is minimum will be taken.
- 27. Rates to Include** The tendered rates for the items should be inclusive of all items of works required for the proper execution of the items (viz) watering, barricading, lighting, watching, safety arrangements in the interest of traffic, safeguarding the underground services etc, and no claim for extra payment on any score will be entertained. The rates to be tendered should be inclusive of Goods and Services Tax and other taxes in force. 1-28 Preliminary specification etc, in SSRB/TNBP will form part of the Agreement. Any variation in taxes, duties and levies during the currency of contract shall be borne by the contractor.

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**28. Employer's Right to Accept any Bid and to Reject any or all Bids**

(1) After negotiation with the tenderer and before passing the order accepting a tender as under sub-section (6) of section 10 of the Tamil Nadu Transparency in Tender Act, 1998 if the Tender Accepting Authority decides that the price quoted by such tenderer is higher by the percentage as may be prescribed over the schedule of rates or prevailing market price, he shall reject the Tender.

(2) The Tender Accepting Authority, before passing the order accepting a tender, may also reject all the tenders for reasons such as changes in the scope of procurement, new technologies or substantial design changes, lack of anticipated financial resources, Court orders, accidents or calamities and other unforeseen circumstances.

**29. Notification of Award and Signing of Agreement**

**29.1** The Bidder whose Bid has been accepted will be notified of the award by the Commissioner prior to expiration of the Bid validity period by cable, telex, or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Commissioner will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

**29.2** The notification of award will constitute the formation of the Contract, subject to the Bidder furnishing the Performance Security in accordance with Clause 30 and signing the Agreement in accordance with Sub-Clause 29.3.

**29.3** The bidder shall have to enter into an agreement with the Commissioner within 30 days from the date of receipt of letter of acceptance. The form of agreement will have to be stamped at the stamp office at the cost of the bidder.

**29.4** Upon the furnishing by the successful Bidder of the Performance Security, the Commissioner will promptly notify the other bidders that their bids have been unsuccessful.

**30. Performance Security (Security Deposit)**

**30.1** Within 14 days after receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Commissioner a Performance Security. The Performance Security (Security Deposit) will be 2% of the contract amount in the form of National Savings Certificate/ Small savings instrument/deposits/Accounts pledged in favour of Commissioner, Greater Chennai Corporation; irrevocable Bank Guarantee. However it is open to the Commissioner to insist on higher deposit as per rules in force.

**30.2** Failure of the successful Bidder to comply with the requirements of Sub-Clause 29.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

**30.3 Deleted**

**30.4.** As per Council Resolution No. 456/2002, Dt : 28-11-2002 the amount of **Additional Security Deposit** to be paid by the Contractor along with the tender for various percentage of rebate are as follows:

Percentage of rebate	Amount of Additional Security Deposit payable in the form of Demand Draft
5 to less than 15%	2%
15% to 20%	50% of Difference between Office value of work and Tender amount.

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above 20%	Same as above
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**As per Council Resolution No. 576/2013, Dt : 29-08-2013 , the amount of additional security deposit to be paid by the lowest tenderer at the time of issue of work order**

- 30.5 The Contractors has to pay the Additional Security Deposit in the form of Demand Draft drawn in favour of Commissioner at the time of issue of work order. For more than 1 Lakh bank Guarantee will be accepted.
- 30.6 If percentage of rebate is above 20% tenderer should furnish the break up details, risk, cost and responsibility analysis and produce documents to prove the previous experience and work on hand with performance certificate showing the satisfactory completion of works entrusted in order to substantiate that the quoted rate is workable for complete execution as detailed in tender.

**31.a. Adjudicator:**

The Commissioner will propose the person to be appointed as Adjudicator under the Contract and stipulated in the Letter of Acceptance.

**31.b. Arbitration**

In case of any dispute or difference between the parties to the contract either during progress or after the completion of the work or after the termination , abandonment , or breach of contract or as to any matter or thing arising there under except as to the matters left to the sole discretion of the Superintending Engineer as to the withholding by the Superintending Engineer of payment of any bill to which the contractor may claim to be entitled, then either party shall forthwith give to the other, notice of such dispute or difference shall be referred to the Arbitrator and the award of such Arbitrator shall be Final binding on the parties, progress of work shall not be suspended or delayed on account of the reference of the dispute to arbitration under this clause.

Either party within a period shall be fixed by the arbitration file before the arbitration statement of the case and also shall all documents relating to or having a hearing on the case The Arbitrator shall not be bound to observe the ordinary rules of procedure applicable to trials before judicial Tribunals nor to hear or receive formal evidence, but may pass an award on the documents and statements of the case filed by the parties or personal inspection or on both. The Arbitrator shall have power to view the subject matter of the dispute with or without the parties or their agents to open review and revise any certificate, opinion decision, requisition or notice have in regard to the matters, expressly examined and to determine all matters in dispute which shall be submitted to him and of which notice has been given as aforesaid, in the same manner as if no such certificate, opinion, decision, requisition, or notice been given.

The expenses of such reference to Arbitration shall be awarded by the Arbitrator in his discretion subject to the condition that the amount of expenses awarded to either party shall not exceed the limits set forth, irrespective of the actual expenses incurred by either party. The arbitrator may determine the amount of expenses to be awarded or direct the same to be shared as between solicitor and client or as party, and party and shall direct by whom and to whom and what manner the same shall be borne and paid.

The limits referred in this clause are 5 % monitory award which does not exceeds Rs. 10,000/-, 3 % on which next Rs.40, 000/- or any part thereof, 2 % on the next Rs.50, 000/- or any part there of.

**32. Corrupt or fraudulent Practices:**

The bidder shall observe highest standard of ethics during bidding process and execution of the project.

If the Contractor has engaged in corrupt or fraudulent practices, in competing for or in executing the Contract, the Employer may, after given 14 days notice to the Contractor, to terminate the Contract.

“**Corrupt practice**” means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution.

“**Fraudulent practice**” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detrimental to the interest of the Employer, and includes collusive practice among Bidders which is detrimental to the Commissioner and includes collusive practice among the bidders ( prior to or after bid submission.) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer .the benefits of free and open competition.

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The Commissioner will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question

**33. Insolvency:** If the Contractor is declared insolvent under any applicable law, the Employer may by notice in writing terminate the contract immediately. The contractor shall then demobilize from the site leaving behind, any contractor's equipment which the employer instructs in the notice is to be used until the completion of work

**34. Taking Over:** The Employer shall notify the contractor when he considers that the Contractor has completed the works stating the date accordingly. Alternatively the Employer may notify the Contractor that the works are ready for taking over, stating the date accordingly.

**35. Contractor's care of the Works:** The contractor shall take full responsibility for the care of the works from the Commencement Date until the date of the Employer's notice under clause 35. Responsibility shall then pass to the Employer. If any loss or damage happens to the Works during the above period, the Contractor shall rectify such loss or damage so that the works conform with the Contract. Unless the loss or damage happens as a result of an Employer's liability the Contractor shall indemnify the Employer, the Employer's, Contractor's Agents and employees against all loss or damage happening to the Works and against all claims or expenses arising out of the Works caused by a breach of contract, by negligence or by other default of the Contractor, his agents or employees.

**36. Compensation Events.**

The following are Compensation Events unless they are caused by the Contractor.

- (a) The Authority does not give access to a part of the Site mentioned in the current milestone.
- (b) The Authority modifies the schedule of other contractors in a way which affects the work of the contractor under the contract.
- (c) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of Letter of Acceptance from the information issued to Bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
- (d) The Engineer gives an instruction for dealing with an unforeseen condition, caused by the Authority, or additional work required for safety or other reasons.
- (e) Other contractors, public authorities, Utilities or the Authority do not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (f) The advance payment is delayed.
- (g) The effect on the Contractor of any of the Authority's Risks.
- (h) Other Compensation Events listed in the Contract Data or mentioned in the Contract if a Compensation Event would prevent the work being completed before the intended completion date, the intended completion date is extended. The Engineer has to decide by how much the intended completion date has to be extended.

As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast. It is to be assessed by the Engineer. If the Contractor's forecast is deemed unreasonable, the decision of the Engineer is final binding on the contractor. The Engineer will assume that the Contractor will react competently and promptly to the event.

The Contractor has to not be entitled to compensation to the extent that the Authority's interests are adversely affected by the contractor not having given early warning or not having cooperated with the Engineer.

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## G. Bid Data Sheet

Instructions to Bidders (ITB) Clause Reference	Bid Data
	<b>A. General</b>
1.1	<b>Work:</b> Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.
Surveys	Site Survey such as Bathymetric survey, Topographical Survey, Geo-technical Investigation Survey etc. shall be conducted by the selected contractor to understand the present profile of the lake. However, Client shall provide.
Desilting of Tank	The tank has to be deepened as per site condition.
Formation of Bund	Bund should be formed all around the water spread area to prevent further encroachments and also to protect the flooding water entering into the household area.
Removal of Debris	Removal of Debris
Formation of Pathway	Formation of Pathway all around the pond to a width of 2m and properly fenced.
Landscaping	Jungle clearance all around the pond and supplying and planting of healthy tree saplings like native species along bunds.
3.4. (a)	Intending Tenderer should be a Class I Registered contractor in any of the Central Government of India /State Government Dept./Govt .undertaking in India
3.4. (b)	The Tenderer should have the experience in similar for having executed at least minimum one work not less than 40% of the value put to tender under a single agreement in any one of the preceding five years. (2014-15, 2015-16, 2016-17 2017-18 and 2018-19) in State Government Department / Undertaking / Local Bodies is enclosed. <b>40% of the Package Value= Rs.424.00 lakhs</b> <b>Completion certificate</b> obtained from client /Department should be enclosed.
3.4. (c)	<b>The minimum required annual value of work for the successful Bidder in any of the last five years shall be 1.5 times of the tender value of Rs.1590.00 lakhs</b>
3.4. (d)	<b>The minimum amount liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder shall be 30% of the tender work value of Rs. 318.00 lakhs</b>

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<b>3.4. (e)</b>	<b>The essential equipments to be made available for the Contract by the successful Bidder shall be</b>				
	Sl. No.	Particulars of Equipment	Capacity	Own	Lease
	1.	Total Station		1 No.	
	2.	Concrete mixer machine		2 Nos	
	3.	Needle vibrator with 40 mm needle		1 No.	
	4.	Centering & shuttering material in steel		As required	
	5.	JCB		2 Nos	
	7.	Tipper Lorry		6 Nos	6 Nos
	8.	Dewatering Pump	5 to12HP	5 Nos	
	9.	Steel cutting and Bar Bending Machine		1 No.	
	10.	Concrete cube moulds		6 Nos	
	11.	Water Tanker	12000 ltr	1 Nos.	
	12.	Soil Compactor with Vibrator		2 No. (Owned/Lease)	
	13.	Hydraulic excavator		6 Nos. (Owned/Lease)	
	14.	Hydraulic excavator fitted with steel plate at boom end for consolidation of earth fill over slopes of tank bunds		1 No.	
<b>3.4. (f)</b>	<b>Technical Personnel to be deployed by the Contractor for the work.</b>				
	<b>Name of members of technical staff proposed to be employed</b>			<b>Qualifications</b>	
	Senior Engineer –1 Nos			BE Civil 10 years Experience	
	Site Engineer – 3 Nos			BE Civil 5 years Experience	
	Supervisor – 4 Nos			DCE 3 years Experience civil work	

### **RATE OF PROGRESS**

The attention of the tenderers. is directed to the contract requirements as to the time 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 the Executive Engineer certificate of the value of work done, will be required. Date of commencement of these programmes will be the date on which the site (or premises) is handed over to the contractor.

Period after date of commencement (1)	Percentage of work completed (based on contract Lumpsum amount) (2)
3 <sup>rd</sup> Month	<b>25%.</b>
6 <sup>th</sup> Month	50%
9 <sup>th</sup> Month	75%
12 <sup>th</sup> Month	100%
	The work should be completed in all respects within the period of <b>12months.</b>

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**Note :**

- 1) The period to be entered in column (1) for the purpose of defining the rate of progress may be fixed by the Executive Engineer to suit each case.
- 2) The Contractor should furnish the plan of action with the **PERT CHART**.

	<b>B. Preparation of Bids</b>
(12.3)	The Contract <i>is not</i> subject to price adjustment in accordance with Clause 41 of the Conditions of Contract (Section V)
(14.1)	The period of Bid validity shall be <i>90</i> days after the deadline for Bid submission specified in the Bid Data sheet.
(15.1)	The amount of Bid Security shall Rs. <b>10,60,000/-</b>
17	<b>C. Submission of Bids- through e-tendering on line system only</b>
	The deadline for submission of bids shall be <b>18.11.2019 3.00 pm</b>
	<b>D. Bid Opening and Evaluation</b>
(20.1)	<b>The opening of the Prequalification Bid shall take place at 19.11.2019 - 3.30 PM at</b> The Superintending Engineer, Storm Water Drain Department, Ripon Buildings Greater Chennai Corporation Chennai-3
	<b>E. Award of Contract</b>
(30.0)	The Standard Form of Performance Security acceptable to the Commissioner shall be The Performance Security (Security Deposit) will be 2% of the contract amount in the form of National Savings Certificate/ Small savings instrument/deposits/Accounts pledged in favour of Commissioner, Greater Chennai Corporation; irrevocable Bank Guarantee.

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**Section III**

**1. Pre-Qualification Bid Submission Sheet**

Date:.....

Invitation for Bid No:

To:

Superintending Engineer SWD & STORM WATER DRAIN Department  
Greater Chennai Corporation,  
Chennai.

Sir,

1. **Being duly authorized to represent and act on behalf of**  
.....  
**name of the Bidder.....,**  
**hereinafter " the Bidder" and having reviewed and fully understand all the**  
**bidding information provided, the undersigned hereby applies to be pre-**  
**qualified by yourselves as a bidder for the**  
"  
.....  
.....**[Insert Name of the**  
**work]"**
2. The Bid is made in the full understanding of the following and declares:
  - a) We have examined and have no reservations to the Bidding Document, including Addenda No.(s)..... issued in accordance with ITB Clause 9.
  - b) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB Sub-Clause 2.4.
  - c) We, in accordance with GCC Sub-Clause & Appendix to Bid, plan to subcontract the following key activities or parts of the works to the following sub contractors.

Name of Sub Contractor	Address	Key activity	Tentative Amount of the sub activity

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(if no part to be sub contracted, indicate "none")

- d) We understand that you may accept/ reject any Bidding, cancel the Bidding process at any time and reject all the Bids and that you are not bound either to accept any Bids that you may received without incurring any liability to the Bidders, in accordance with ITB Clause 27.
  - e) We understand that your Agency will not be liable for any such actions and will be under no obligation to inform the Bidder of the grounds from them.
3. Attached herewith are the following:
- i) Income Tax and other tax clearance certificates for the **last five years** issued by the appropriate authority:
  - ii) Bid Security for Rs..... in the form of:
    - a) Demand Draft .....  
(furnish details of the Demand Draft).....
    - b) Chalan .....  
(furnish details of the Chalan).....
    - c) Any other Form mentioned in Cl. 15.1 of ITB (Furnish Details)
4. Attached to this letter are copies of original documents defining:
- i) the Bidder's legal status;
  - ii) the principal place of business;
  - iii) the place of incorporation (for Bidders that are corporations) or the place of registration and the nationality of the owner(s) for Bidders that are partnerships or individually owned firms).
5. The Greater Chennai Corporation and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents and information submitted in connection with this Bid, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This Prequalification Bid Submission Sheet will also serve as authorization to any individual or authorized representative or any institute referred to in the supporting information to provide such information deemed necessary and requested by the Greater Chennai Corporation to verify statements and information provided in this Bids, or with regard to the resources, experience and competence of the Bidder.
6. The Greater Chennai Corporation and its authorized representatives may contact the following persons for further information:

**Name, Telephone and Fax No. of person**

General and Management Information	Superintending Engineer / Storm Water Drain Department , 044-25619281 / 25619315
Personnel	
Technical Enquiries	
Financial Enquiries	

- 7. Appended to this Bids, we give details of the participation of each party, including capital contribution and profit/loss agreements, to the joint Venture or associations. We also specify the financial commitment in terms of the percentage of the value of the/each contract, and the responsibilities for execution of the/each contract.
- 8. We confirm that in the event that we submit bid, that as well as any resulting contract will be:
  - i) Signed so as to legally bind all partners jointly and severally; and

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- ii) Submitted with a Joint Venture agreement providing the joint and several liabilities of all partners in the event the contract is awarded to us.
9. The undersigned declare that the statement made and the information provided in the duly completed Bids are complete, true, and correct in every detail.

Name:.....

In the Capacity of .....

Signed .....

Duly authorized to sign the Bids for and on behalf of .....

Date .....

**2. DECLARATION BY THE BIDDER / TENDERER**

I/We \_\_\_\_\_ hereby declare that I/We am/are not in any way related to any officer who is in charge of..... or having control of this work as referred in Clause 2.4 of ITB. I/We agree that if, at any stage, it is found that this declaration is untrue, the bid security/performance security paid by me/us will be forfeited and the contract entered will stand cancelled at the risk and cost of contractor. It is understood that the relationship with the officer referred to herein will be restricted to those referred in Cl.2.4 of ITB.

Signature of the bidder

Place:

Date:

Signature of Tenderer

Signature of Tenderer

### 3. QUALIFICATION INFORMATION

#### 3.1 PRE QUALIFICATION BID QUESTIONNAIRE

SI No	Questions	Answers to be furnished by the bidder
1	Name of Firm	
2	Nationality	
3	Head Office Address Postal Telex No Fax No. E-Mail	
4	Type of Organization Individual Partnership Incorporated company	
5	Year & place of establishment	
6	Give brief description of field/areas in which you have executed work. Please furnish details and particulars of such works in the relevant formats attached.	
7	Are you registered with any other Government/ Department / Public undertaking ( if yes, give details)	
8	What are your sources of finance ( Please give details of bank reference – certificate from bank endorsing your financial stability and certificate to substantiate other sources)	
9	Give the last five years account with auditor's reports, balance sheet, profit and loss account, and income tax clearance certificate.	
10	How much is your paid up capital How much is your working capital How much is your annual turnover for the last five years (Give separately for each year) How much is your net income for the last five years (Give separately for each year)	
11	Do you intend to associate any other organization for the works, which you are bidding? If so, give full particulars of that organization separately under each head of questionnaire and forms	
12	Formats (enclosed may filled) Details of Engineers & Managerial Personnel Details of machinery and equipment owned by the Company List of Machinery & equipment that company proposes to take on rent and use for the work Present activities in which your firm is engaged as a Main contractor (last five years) Present activities in which your firm is working in Joint Venture (last five years) Material Testing facilities available with the firm	

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**3.2 LIST OF EQUIPMENTS PROPOSED TO DEPLOY FOR THE WORK**  
(To be filled by the Bidder)

ANNEXURE 1

Sl. No.	Particulars of Equipment	Capacity	Own	Lease
1.	Total Station		1 No.	
2.	Concrete mixer machine		2 Nos	
3.	Needle vibrator with 40 mm needle		1 No.	
4.	Centering & shuttering material in steel		As required	
5.	JCB		2 Nos	
7.	Tipper Lorry		6 Nos	6Nos
8.	Dewatering Pump	5 to12HP	5 Nos	
9.	Steel cutting and Bar Bending Machine		1 No.	
10.	Concrete cube moulds		6 Nos	
11.	Water Tanker	12000 ltr	1 Nos.	
12.	Soil Compactor with Vibrator		2 No. (Owned/Lease)	
13.	Hydraulic excavator		6 Nos. (Owned/Lease)	
14.	Hydraulic excavator fitted with steel plate at boom end for consolidation of earth fill over slopes of tank bunds		1 No.	

Signature of Tenderer

### 3.2 a. CERTIFICATE FOR OWNING/POSSESSION OF EQUIPMENTS BY THE TENDERER

THE MACHINERY CERTIFICATE DULY CERTIFIED BY THE Executive Engineer HAS TO BE ENCLOSED IN ORIGINAL IN THE TECHNICAL BID COMPULSORILY CLEARLY MENTIONING THE SCHEME UNDER WHICH TENDER IS CALLED. IF THE CERTIFICATE IS NOT ENCLOSED THE TENDER WOULD BE REJECTED.

Sl. No.	Particulars of Equipment	Capacity	Own	Lease
1.	Total Station		1 No.	
2.	Concrete mixer machine		2 Nos	
3.	Needle vibrator with 40 mm needle		1 No.	
4.	Centering & shuttering material in steel		As required	
5.	JCB		2 Nos	
7.	Tipper Lorry		6Nos	6 Nos
8.	Dewatering Pump	5 to12HP	5 Nos	
9.	Steel cutting and Bar Bending Machine		1 No.	
10.	Concrete cube moulds		6 Nos	
11.	Water Tanker	12000 ltr	1 Nos.	
12.	Soil Compactor with Vibrator		1 No. (Owned/Lease)	
13.	Hydraulic excavator		6 Nos. (Owned/Lease)	
14.	Hydraulic excavator fitted with steel plate at boom end for consolidation of earth fill over slopes of tank bunds		1 No.	

#### **\* Note:-**

If the above mentioned machineries are owned by the contractor, the invoice (attested copy) should be uploaded online.

If it is leased, original signed copy of the agreement to be uploaded in the tender.

Signature of Tenderer





**3.3 LIST OF KEY PERSONNEL PROPOSED TO DEPLOY FOR THE WORK**

Sl No	Name	Position	Qualification	Years of Experience in the relevant field

Signature of Tenderer

### 3.4 APPLICATION INFORMATION SHEET

<b>Application Information</b>	
Bidder's Legal Name	
Bidder's actual or intended year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone no., e-mail address)	
<p>Attached are copies of the following original documents</p> <p>1. In the case of single entity, articles of incorporation or constitution of the legal entity named above.</p>	
Bidder's Legal Name	

Signature of Tenderer

### 3.5 FINANCIAL STATEMENT (DATA FOR PREVIOUS FIVE YEARS - IN INDIAN RUPEES)

#### **a. Information from Balance Sheet**

Year			
Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

#### **b. Information from Income Statement**

Year			
Total Revenue			
Profit before Tax			
Profit after tax			

Attached are copies of financial statements (balance sheets including schedules and income statements) for the last three years, as indicated above, complying with the following conditions  
 All such documents reflect the financial situation of the bidder  
 Historical financial statements must be audited by a certified chartered accountant  
 Historical financial statements must be complete, including all schedules to the financial statements

Signature of Tenderer

**3.6 TOTAL ANNUAL TURNOVER**

(bidder must fill in this form)

TOTAL ANNUAL TURNOVER FOR THE LAST FIVE FINANCIAL YEARS	
Year	Indian Rupee
Total	

Signature of Tenderer

### 3.7 PRESENT ACTIVITIES IN WHICH BIDDER FIRM IS ENGAGED

(bidder must fill in this form)

SI No	Name & Type of project/work which you are presently executing & its execution	Brief technical description	Name & Address of client	Period of contract (as provided in the agreement )	Construction cost of project (in Rs)	Type & amount of portion sublet by you	Year of Starting	Percentage completed works	Name & Address of consultant if any

Signature of Tenderer

### 3.8 COMPLETED WORKS (DURING LAST 5 YEARS)

(Bidder must fill in this form)

Sl No	Name & Type of project/works and its location	Brief technical description	Name & Address of client	Period of contract (as provided in the agreement )	Construction cost of project (in Rs)	Type & amount of portion sublet by you	Year of Starting	Percentage Completed works	Name & Address of consultant if any

Signature of Tenderer

## Definitions & Interpretations

1. **Act** means the Tamil Nadu transparency in Tenders Act, 1998 (Tamil Nadu Act 43 of 1998).
2. **Rules** means The Tamil Nadu Transparency In Tender Rules, 2000
3. **Adjudicator:** The Commissioner will propose the person to be appointed as Adjudicator under the contract in the Letter of Acceptance.
4. **Arbitrator:** If a party is dissatisfied with the decision of the Adjudicator or no decision is given within the time set out the party may give notice of dissatisfaction and a dispute which has been the subject of a notice of dissatisfaction has to be finally settled by Arbitral tribunal. The Arbitrator can revise the decision of the Adjudicator. The Arbitral Tribunal consists of 3 Arbitrators, one each to be appointed by the Authority and the Contractor. The third Arbitrator has to be chosen by the two Arbitrators so appointed by the parties and has to act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator has to be appointed by President of the Institution of Engineers (India).
5. **The Authority** (Commissioner) or his authorised representative is the party who Employs the Contractor to carry out the Works
6. **Earnest Money Deposit** means the amount required to be remitted by a bidder along with his bid indicating his willingness to implement the contract.
7. **Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid.
8. **BIS** means Bureau of Indian Standards.
9. **Compensation Events** are those defined in Clause -36.
10. **The Completion Date** is the date of completion of the Works as certified by the Superintending Engineer / Zonal Executive Engineer,
11. **The Contract** is the Contract between the Authority and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 11.1
12. **The Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Authority.
13. **Tenderer Or Bidder:** Any person, firm or Corporation submitting a tender for the work contemplated, acting directly or through a duly authorized representative.
14. **The Contractor's Bid** is the completed bidding document submitted by the Contractor to the Authority.
15. **Bid Price:** The prices and discounts quoted by the bidder in the letter of bid and in the bill of quantities.
16. **The Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
17. **Days** are calendar days; months are calendar months.
18. **A Defect** is any part of the Works not completed in accordance with the Contract.
19. **The Defects Liability Certificate** is the certificate issued by Superintending Engineer upon correction of defects by the Contractor.
20. **The Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

Signature of Tenderer

21. **Drawings** include calculations and other information provided or approved by the Superintending Engineer for the execution of the Contract.
22. **The Authority** (The Commissioner) is the party who employs the Contractor to carry out the Works
23. **The Superintending Engineer** is the person named in the Contract Data (or any other) competent person appointed by the Commissioner and notified to the Contractor, to act in replacement of the Superintending Engineer) who is responsible for supervising the execution of the Works and administering the Contract.
24. **The Executive Engineer** is an Executive Engineer of Greater Chennai Corporation, who will be in charge of work in Greater Chennai Corporation.
25. **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
26. **The Initial Contract Price** is the Contract Price listed in the Authority's Letter of Acceptance.
27. **The Intended Completion Date** is the date on which it is intended that the Contractor has to complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Superintending Engineer by issuing an extension of time.
28. **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
29. **Plant** is any integral part of the Works that has to have a mechanical, electrical, chemical, or biological function.
30. **The Site** is the area defined as such in the Contract Data.
31. **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
32. **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the Superintending Engineer.
33. **The Start Date** is given in the Contract Data. It is the latest date when the Contractor has to commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
34. **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
35. **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
36. **Two-cover system** means a procedure under which the bidders are required to simultaneously submit two separate sealed covers, one containing the Technical bid with Earnest Money (Bid security) and the details of their capability to undertake the tender which will be opened first and the second cover containing the price quotation which will be opened only if the bidder is found qualified to execute the Bid



**Section IV**

**1. Letter of Acceptance**

*[Letterhead paper of the Employer]*

By Cable/Registered Post with acknowledgement due/

From	To
-----	-----
-----	-----
----	

---

Letter No.----- Dt.....

Sub: **Work:**

Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.

Ref: SWD.C.No.B3/2236/2019- 13

This is to notify you that your Bid dated *[date]* for execution of the *[name of the Contract and identification number, as given in the Contract Data]* for the Contract Price of *[amount in numbers and words]*, is hereby accepted by our Agency.

- (a) We propose that *[name of the Adjudicator]* be appointed as the Adjudicator.
- (b) You are hereby requested to furnish performance security in the form detailed in Cl. 29.1 of ITB for an amount of Rs.----- within 14 days of the receipt of the Letter of Acceptance. The performance security IN THE FORM OF Bank Guarantee shall be valid up to 2 (Two) years after completion of work certified by the Engineer in Charge. You are requested to sign the Contract within -----days from the date of receipt of this letter, failing which action as stated in ITB will be taken
- (c) You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

Authorized Signature: \_\_\_\_\_  
Name and Title of Signatory: \_\_\_\_\_  
Name of Agency: \_\_\_\_\_

Attachment: Agreement

Signature of Tenderer

**2. Contractor's Bid**

Description of Work:  
[date]

To: [name and address of Employer]

We offer to execute the.....  
.....;[name and identification number of Contract] in accordance with the Conditions of Contract accompanying this Bid for the Contract Price of [amount in numbers], [amount in words].

We accept the appointment of [name proposed in Letter of Acceptance] as the Adjudicator.

**[or]**

We do not accept the appointment of [name proposed in Letter of Acceptance] as the Adjudicator, and propose instead that [name] be appointed as Adjudicator, whose daily fees and biographical data are attached.

This Bid and your written acceptance of it shall constitute a binding Contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.

We hereby confirm that this Bid complies with the Bid validity and Bid Security required by the bidding documents and specified in the Bidding Data.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Authorized Signature: \_\_\_\_\_  
Name and Title of Signatory: \_\_\_\_\_  
Name of Bidder: \_\_\_\_\_  
Address: \_\_\_\_\_

### 3. AGREEMENT

#### **ARTICLES OF AGREEMENT MADE THIS day of**

Between the Commissioner, Greater Chennai Corporation (hereinafter called the "Commissioner" which expression shall where the context so admits include his successors in office and assigns) of the one part \* of @

(Hereinafter called the Contractor- which expressions shall where the context so admits include his heirs, executors, administrators and legal representatives) of the other part.

**WHEREAS** the Commissioner is desirous of #

and has caused estimate of probably quantities contained in Schedule A, drawings and specifications describing the work to be done to be prepared.

**AND WHEREAS** the said Schedule A, drawings numbered serially 1 to..... inclusive –(Schedule B ) – the preliminary Specifications and Schedule C have been signed signed by or on behalf of the parties hereto

**AND WHEREAS** the contractor has agreed to the retention by the Corporation of the earnest money of Rupees.....paid. by him when he submitted his tender as security for the due fulfillment of the contract to the satisfaction of the S.E..... DEPT.' E.E..... (zone ) Greater Chennai Corporation ( hereinafter referred to as the S.E.....Dept./E.E (Zone.....) or in the alternative S.E. ....

DEPT./EE(Zone.....) may direct, to deposit as security for the aforesaid purpose cash or currency notes of the value Rs..... to perfect Such security.

**AND WHEREAS** the contractor has deposited with the S.E. .... DEPT./E.E. (Zone.....) the sum of Rupees ..... cash as additional security for the due fulfillment of this contract to the satisfaction of the S.E..... DEPT. /E.E..... (zone )

**AND WHEREAS** the contractor has also signed the copy of the SSRB/TNBP and addenda volume thereto maintained in the ..... DEPT.' Zone of the Greater Chennai Corporation acknowledgement of being bound by all the conditions of the clauses of the Standard Preliminary Specification and all the Specifications for items of works described by a Standard Specification Number in Schedule 'A'.

**AND WHEREAS** the contractor has agreed to execute upon and subject to the conditions set- forth in the General conditions of contract of T .N.B.P, such other conditions as are contained in all the specifications forming part of this contract (hereinafter referred to as "the said condition") the works as shown upon the drawings and described in the said specifications and set forth in Schedule A as the "Probable quantities" and comply with the rate of progress noted at the end of the Articles of Agreement for a sum of Rupees\$.

or such other sum as may be arrived at under the clause of the standard preliminary specification relating to "payment on lump sum basis or by final measurement at unit prices." Now it is hereby agreed as follows:

In consideration of the payment of the said sum of Rupees.\$....., or such other sum as may be arrived at under the clause of the Standard preliminary specification of relating "payment on lump sum basis or by final measurement at unit prices" the Contractor will, upon and subject to the said conditions, execute and complete the works shown upon the said drawings and described in the said specification and to the extent of probable quantities shown in schedule A with such variation, by way of alterations or additions, to or deductions from the said work and method of payment therefore as are provided for in the said conditions.

Now this Agreement witnesses as follows:

- 1.In this Agreement, words and expressions has to has the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they has to be deemed to form and be read and construed as part of this Agreement.
- 2.In consideration of the payments to be made by the Authority to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Authority to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
- 3.The Authority hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

Signature of Tenderer

4. The following documents shall be deemed to form and be read and treated as part and parcel of this Agreement, viz.:
- i) Tender Document including the Contractor's Bid Documents and all other documents furnished by the bidder and submitted as part of the Bid;
  - ii) Conditions of contract (including Additional Conditions of Contract);
  - iii) Specifications;
  - iv) Drawings;
  - v) Bill of Quantities;
5. Detailed conditions agreed in the tender document form part of the agreement. The services to be performed, timelines to be met with, penalty clauses for non performance, and the other stipulations will be as furnished herein:
- i. **Contract Period:** The Contract period is for 12 months from the date of issue of Letter of Acceptance to the successful contractor.
  - ii. **Retention Money:** The Greater Chennai Corporation shall retain a sum equivalent to 5% of the value of the each part bill as retention money from each payment due to the Contractor. Out of the 5% of the retention amount, on issue of completion certificate for the work, 2.5% will be released to the Contractor, while the balance 2.5% will be retained till the defect liability period (ie., 5 years). The retained 2.5% will be released, after ensuring no liability in connection with work executed.
  - iii. **Quality Control** : Inspections will be carried out by Quality control Team in order to maintain quality control
    - iv. **Price Adjustment Clause:** Deleted
    - v. In Witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

In witness whereof the contractor..... \*

.....has hereunto set his hand and # .....

**the Commissioner has hereunto set his hand the day and year first above written.**

**Signed by the Contractor ;**

Full Address :

**In the presence of witness.**

**Signed by the Commissioner.**

**The Common Seal of the Corporation of .  
Chennai hereunto affixed in presence of :**

\* Contractor's name

# Name and designation

Signature of Tenderer

## Section V

### 1. Conditions of Contract

#### **A.General**

##### Definitions

1. Boldface type is used to identify defined terms.
2. **Act** means the Tamil Nadu transparency in Tenders Act, 1998 (Tamil Nadu Act 43 of 1998).
3. **Rules** means The Tamil Nadu Transparency In Tender Rules, 2000
4. **Adjudicator:** The Commissioner will propose the person to be appointed as Adjudicator under the contract in the Letter of Acceptance.
5. **Arbitrator:** If a party is dissatisfied with the decision of the Adjudicator or no decision is given within the time set out the party may give notice of dissatisfaction and a dispute which has been the subject of a notice of dissatisfaction has to be finally settled by Arbitral tribunal. The Arbitrator can revise the decision of the Adjudicator. The Arbitral Tribunal consists of 3 Arbitrators, one each to be appointed by the Authority and the Contractor. The third Arbitrator has to be chosen by the two Arbitrators so appointed by the parties and has to act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator has to be appointed by President of the Institution of Engineers (India).
6. **The Authority** (Commissioner) or his authorised representative is the party who Employs the Contractor to carry out the Works
7. **Earnest Money Deposit** means the amount required to be remitted by a bidder along with his bid indicating his willingness to implement the contract.
8. **Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid.
9. **BIS** means Bureau of Indian Standards.
10. **Compensation Events** are those defined in Clause - hereunder.
11. **The Completion Date** is the date of completion of the Works as certified by the Authority.
12. **The Contract** is the Contract between the Authority and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in Clause 2.3 below.
13. **The Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Authority.
14. **Tenderer Or Bidder:** Any person, firm or Corporation submitting a tender for the work contemplated, acting directly or through a duly authorized representative.
15. **The Contractor's Bid** is the completed bidding document submitted by the Contractor to the Authority.

Signature of Tenderer

16. **Bid Price:** The prices and discounts quoted by the bidder in the letter of bid and in the bill of quantities.
17. **The Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
18. **Days** are calendar days; months are calendar months.
19. **A Defect** is any part of the Works not completed in accordance with the Contract.
20. **The Defects Liability Certificate** is the certificate issued by Authority upon correction of defects by the Contractor.
21. **The Defects Liability Period** is the period named **in the Contract Data and calculated from the** Completion Date.
22. **Drawings** include calculations and other information provided or approved by the Authority for the execution of the Contract.
23. **The Authority** (The Commissioner) is the party who employs the Contractor to carry out the Works
24. **The Authority** is the person named in the Contract Data (or any other) competent person appointed by the Commissioner and notified to the Contractor, to act in replacement of the Authority) who is responsible for supervising the execution of the Works and administering the Contract.
25. **The Executive Engineer** is an Executive Engineer of Greater Chennai Corporation, who will be in charge of work in Greater Chennai Corporation.
26. **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
27. **The Initial Contract Price** is the Contract Price listed in the Authority's Letter of Acceptance.
28. **The Intended Completion Date** is the date on which it is intended that the Contractor has to complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Authority by issuing an extension of time.
29. **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
30. **Plant** is any integral part of the Works that has to have a mechanical, electrical, chemical, or biological function.
31. **The Site** is the area defined as such in the Contract Data.
32. **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
33. **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the Authority.

Signature of Tenderer

34. **The Start Date** is given in the Contract Data. It is the latest date when the Contractor has to commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
35. **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
36. **Temporary Works** are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
37. **Two-cover system** means a procedure under which the bidders are required to simultaneously submit two separate sealed covers, one containing the Earnest Money (Bid security) and the details of their capability to undertake the tender which will be opened first and the second cover containing the price quotation which will be opened only if the bidder is found qualified to execute the Bid.

### 38 Alteration, Additions and Omissions

The Engineer shall make any variation of the form, quality or quantity of the works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

- (a) Increase or decrease the quantity of any work included in the Contract,
- (b) Omit any such work (but not if the omitted work is to be carried out by the Authority or by another contractor).
- (c) Change the character or quality or kind of any such work (d) Change the levels, lines, position and dimensions of any part of the works.
- (e) Execute additional work of any kind necessary for the completion of the Works, or
- (f) Change any specified sequence or timing of construction of any part of the works.

No such variation shall in any way vitiate or invalidate the Contract but the effect if any, of all such variations shall be valued in accordance with Clause 52, provided that where the issue of an instruction to vary the works is necessitated by some default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

A **Variation** is an instruction given by the Authority which varies the Works. A variation may an alteration/ alterations, addition / additions and omission / omissions.

Instructions for Variations: The Contractor shall not make any such variation without an instruction of the Engineer, provided that no instruction shall be required for increase or decrease in the quality of any work where such increase or decrease is not the result of an instruction given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Authority, as defined in the Contract Data.

## 2. Interpretation

- 2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Authority will provide instructions clarifying queries about these Conditions of Contract.

Signature of Tenderer

- 2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:
- (1) Agreement,
  - (2) Letter of Acceptance,
  - (3) Contractor's Bid,
  - (4) Contract Data,
  - (5) Conditions of Contract,
  - (6) Specifications,
  - (7) Drawings,
  - (8) Bill of Quantities, and
  - (9) Any other document listed in the Contract Data as forming part of the Contract.

### **3. Language and Law**

- 3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

### **4. Decision of Authority**

- 4.1 Except where otherwise specifically stated, the Authority will decide contractual matters between the Authority and the Contractor in the role representing the Authority.

### **5. Delegation**

- 5.1 The Authority may delegate any of his duties and responsibilities to his sub-ordinates except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

### **6. Communications**

- 6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

### **7. Subcontracting**

- 7.1 The Contractor may subcontract with the approval of the Authority, but may not assign the Contract without the approval of the Authority in writing. Subcontracting shall not alter the Contractor's obligations. Any fault identified during the execution of work carried out by the subcontractor, the contractor will be liable to rectify the defects as per the direction of the Authority.

### **8. Other Contractors**

- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Authority between the dates given in the Schedule of Other Contractors, as referred to in the Contract Data. The Contractor shall also provide facilities and services for them as described in the Schedule. The Authority may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

### **9. Personnel**

- 9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the Contract Data, to carry out the functions stated in the Schedule or other

Signature of Tenderer



personnel approved by the Authority. The Authority will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule.

- 9.2 If the Authority asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

## **10. Contractor's Risks**

- 10.1 The Contractor carries the risks which this Contract states are Contractor's risks.

## **11. Contractor's Risks**

- 11.1 From the Starting Date until the Defects Correction Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Authority's risks, but are of Contractor's risks.

## **12. Insurance**

- 12.1 The contractor shall have to provide a minimum insurance of man power and equipments. This insurances cover should start from the date of starting of work and should be valid upto the end of execution period. The responsibility of timely payment of the premium as well as that of lodging claims as and when situation arises, will be that of contractor. All insurances which the contractor requires to enter into under the contract shall be effected with an insurer or insurers and in terms approved by the Authority.

### **12.2 Accident or Injury to Contractor's Employees**

The department shall not be liable for or in respect of any damages or compensation payable by law in respect of or in consequences of any accident or injury to any person in the employment of the contractor (other than accident or injury as may be attributed to the department or its employees) & the contractor shall indemnify the department against all such damages and compensations and against all acts, suits, claims, cost or expenses arising there from. The contractor shall insure against such liabilities and shall continue such insurance during the whole of the time that any persons are employed by him on the works

### **12.3 Remedy on Contractor's Failure to Insure**

If the contractor fail to effect and keep in force the insurances referred to or any other insurance which he may be required to effect under the terms of the contract then and in any such case the department may effect and keep in force any such insurance and pay such premiums as may be necessary for the purpose and from time to time deduct the amount so paid by the department as aforesaid from any moneys due or which may become due to the contractor or recover the same as a debt due from the contractor.

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

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

- 12.6 Alterations to the terms of an insurance shall not be made without the approval of the Engineer in -Charge.

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

Signature of Tenderer

**13. Queries about the Contract Data**

13.1 The Authority will clarify queries on the Contract Data.

**14. Contractor to Construct the Works**

14.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

**15. The Works to Be Completed by the Intended Completion Date**

15.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Authority, and complete them by the Intended Completion Date.

**16. Approval by the Authority**

16.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Authority, who is to approve them if they comply with the Specifications and Drawings.

16.2 The Contractor shall be responsible for design of Temporary Works.

16.3 The Authority's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

16.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

16.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Authority before this use.

**17. Safety**

17.1 The Contractor shall be responsible for the safety of all activities on the Site.

**18. Discoveries**

18.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Authority. The Contractor shall notify the Authority of such discoveries and carry out the Authority's instructions for dealing with them.

**19. Possession of the Site**

19.1 The Authority shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data, the Authority will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.

**20. Access to the Site**

20.1 The Contractor shall allow the Authority and any person authorized by the Authority access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

**21. Instructions, Inspections and Audits**

21.1 The Contractor shall carry out all instructions of the Authority which comply with the applicable

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laws where the site is located.

21.2 The Contractor shall permit the Corporation to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Corporation, if so required by the Corporation.

## **22. Disputes**

22.1 If the Contractor believes that a decision taken by the Authority was either outside the authority given to the Authority by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Authority's decision.

## **23.Procedure for Disputes**

**23.1.** The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.

**23.2 .** The Adjudicator shall be paid daily at the rates specified in the contract data together with reimbursable expenses of the type specified in the contract data and cost shall be divided equally between the Authority and the Contractor, whatever the decision is reached by the Adjudicator .Either party may refer a decision of the Adjudicator to an Arbitrator within 30 days of the Adjudicator's written decision. If neither party refers the dispute to the Arbitration within the above 30 days, the Adjudicator's will be final and binding.

**23.3 .** The Arbitration shall be conducted in accordance with the arbitration published by the Government of Tamil nadu and in the place shown in the conditions of the contract.

## **24. Replacement of adjudicator.**

. Should the Adjudicator resign or die, or should the Authority and the Contractor agree that the Adjudicator is not functioning in Accordance with the provisions of the contract, a new Adjudicator will be jointly appointed by the Authority and the Contractor. In case of disagreement between the Authority and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority , designated in the contract data at the request of either party, within 14 days of receipt of such request.

## **B. TIME CONTROL**

### **25. Program**

**25.1** Within the time stated in the Contract Data, the Contractor shall submit to the Authority for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the works.

25.2 .An update of the program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequences of the activities.

25.3. The contractor shall submit to the Authority for approval an updated Program at intervals no longer than the period stated in the contract data. If the Contractor does not submit an updated program within this period, the Authority may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.

25.4. The Authority's approval of the program shall not alter the Contractors' obligations. The contractor may revise the program and submit it to the Authority again at any time. A revised Program shall show the effect of Variations and Compensation events.

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## **26. Extension of the intended completion date.**

- 26.1** If the delay is due to the failure attributable to the contractor, the Authority I have the powers to decide whether to grant extension or not on the request for extension or time from the contractor. If the extension is granted under such circumstances, the contractor shall not be paid any revised rates or extra rates due to extension of time. The quoted rates in the contract shall prevail during the extension period. The contractor shall have to pay liquidated damages as per contract date for the beyond extended period.
- 26.2** If the delay is due to the failure attributable to the department or due to force, the Authority shall have the power to decide whether extension of time is to be given or not on request from the contractor of extension of time is given, the contractor shall not be paid extra rate or revised rate due to extension of time. The quoted rates in the contract shall prevail during extension period. The contractor has to pay liquidated damages as per contract data for the beyond extended period.

## **27. Delays Ordered by the Authority**

- 27.1** The Authority may instruct the Contractor to delay the start or progress of any activity within the Works.

### **27.2 Damages for Delays and Non Completion**

If the contractor fails to complete the works within the period Specified in the Contract Data or within any extended time allowed by the Authority, due to failure attributable to the contractor, the contractor shall pay or allow the Corporation to levy the amount mentioned in the table below as liquidated and ascertained damages for every day beyond the said date or extended time as the case may be during which the works shall remain unfinished. Liquidated and ascertained damages will be levied at the rate of 0.05% (zero point zero five percentage) of the contract value of the work for each day. The total liquidated and ascertained damages will be levied upto a maximum of 5% (five percentage) of the value of the contract and if the contractor fails to complete the work even then, action will be taken to terminate the contract and execute the work at his risk and cost as per provisions of the general conditions of contract of T.N.B.P.

## **28. Management Meetings**

- 28.1** Either the Authority or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early intimation procedure.
- 28.2** The Authority shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Authority. The responsibility of the parties for actions to be taken shall be decided by the Authority either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

## **29. Early Intimation**

- 29.1.** The Contractor shall intimate the Authority at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of the Works. The Authority may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 29.2.** The Contractor shall cooperate with the Authority in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Authority

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## **C. Quality Control**

### **30. Identifying Defects**

**30.1.** The Authority shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Authority may instruct the Contractor to search for a Defect and to uncover and test any work that the Authority considers may have a Defect.

### **30.2. Tests**

**30.3.** If the Authority instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, or not the contractor shall pay for the test and any samples.

### **30.4 Correction of Defects**

**30.5.** The Authority shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

**30.6.** Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the time framed by the Authority, the defect has to be rectified.

## **31. Uncorrected Defects**

**31.1.** If the Contractor has not corrected a Defect within the time specified in the Authority notice, the Authority will assess the cost of having the Defect corrected, and the Contractor will have to pay this amount.

## **D. Cost Control**

### **32.. Bill of Quantities**

**32.1** The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.

### **33. Changes in the Quantities**

**33.1.** Payment to the contractor will be made for the actual quantities only of the work, performed or materials furnished accordance with the contract, and Tender Accepting Authority shall be ordinarily permitted to vary the quantity finally ordered only to the extent of 25 % either way of requirement indicated in the tender documents. The payment will be made as per originally approved rate.

**33.2** If requested by the Authority, the Contractor shall provide the Authority with a detailed cost breakdown of any rate in the Bill of Quantities.

### **34. Variations**

**34.1.** All Variations shall be included in updated Programs produced by the Contractor.

### **35. Payments for Variations**

**35.1.** The Contractor shall provide the Authority with a quotation for carrying out the Variation when requested to do so by the Superintending Engineer. The Authority shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Authority and before the Variation is ordered.

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- 35.2** If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Authority, the quantity of work above the limit stated in Sub-Clause 36.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
- 35.3** If the Contractor's quotation is unreasonable, the Authority may order the Variation and make a change to the Contract Price, which shall be based on the Authority own forecast of the effects of the Variation on the Contractor's costs.
- 35.4** If the Authority decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- 35.5** The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early intimation.
- 36. Cash Flow Forecasts**
- 36.1** When the Program is updated, the Contractor shall provide the Authority with an updated cash flow forecast.
- 37. Payment Certificates**
- 37.1** The Contractor shall submit to the Authority monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
- 37.2** Payment will be made to the contractor under the certificates to be issued at reasonable frequent intervals by the Authority. An intermediate payment will be made of a sum equal to 95 percent of the value of the work, as so certified and the balance of 5 percent will be withheld and retained as a security for the due fulfillment of the contract. Under the certificate to be issued by the Authority on completion of the entire works, the contractor will receive the final payment of all the moneys due or payable to him under or by virtue of the contract except security deposit, provided there is no recovery from or forfeiture by the contractor to be made. No certificate of the Authority shall be considered conclusive evidence as to be sufficiency of any work or materials or correctness of measurements to which it relates, nor shall it relieve the contractor from his liabilities to make good defects as provided by the contract. The Contractor when applying for a certificate shall prepare a sufficiency certificate to the satisfaction of the Authority to enable the Authority or the Executive Engineer or the Assistant Executive Engineer to check the claim and issue the certificate.
- 37.3** The value of work executed shall be determined by the Authority
- 37.4** The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
- 37.5** The value of work executed shall include the valuation of Variations and Compensation Events.
- 37.6** The Authority may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
- 38. Payments**
- 38.1.** Payments shall be adjusted for deductions for advance payments, retention and other recoveries in terms of the contract and deduction at source of taxes as applicable under the law.

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**38.2** If the amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

**38.2.** Items of the Works for which no rate or price has been entered in will not be paid for by the Authority and shall be deemed covered by other rates and prices in the Contract.

### **39. Tax**

**39.1.** The rates quoted by the contractor shall be deemed to be inclusive of the Good and Service Tax, Duties and other levies on materials that the contractor will have to pay for the performance of the contract, and the Authority will reform such duties in regard to reduction of taxes at source as per law applicable. Any variation in taxes, duties and levies during the currency of contract shall be borne by the contractor.

### **40. Currencies**

40.1 All payments shall be made in Indian Rupees.

### **41. Price Adjustment - Deleted**

**41.1** Contract price shall be adjusted for increase or decrease in rates and price of labour , materials, fuels and lubricants in accordance with the following principles and procedures.

a) The price adjustment shall apply for the work done from the start date given in the contract. Data up to the end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.

b) The price adjustment shall be determined during each quarter.

c) Following expressions and meanings are assigned to the work done during each quarter.

R = Total value of work done during the quarter. It would include the value of materials on which secured advance has been granted , if any , during the quarter , less the value of materials in respect of which the secured advance has been recovered, if any during the quarter. It will exclude value of works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed..

### **41.2. Adjustment for labour component. - Deleted**

( 1) Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula.

$$V_L = 0.85 \times P_1 / 100 \times R \times (L_1 - L_0) / L_0$$

$V_L$  = increase or decrease In the cost of work during the quarter under consideration due to changes in rates for local labour.

$L_0$ = the average consumer price index for industrial workers for Chennai centre for the quarter preceding the date of opening of bids as published by labour Bureau, Ministry of Labour, Govt. of india.

$L_1$ = The average consumer price index for industrial workers for Chennai centre for the quarter Under consideration as published by Labour bureau , Ministry of labour Govt. of .India.

$P_1$  Percentage of labour component of the work.

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**41.3. Adjustment for Cement component**

( ii ) Price adjustment for increase or decrease in the cost of cement procured by the

Contractor shall be paid in accordance with following formula.

$$V_c = 0.85 \times P_c / 100 \times R \times ( C_i - C_o ) / C_o$$

$V_c$  = increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for cement.

$C_o$  = The all india average wholesale price index for cement for the quarter preceding the date of opening of bids as published by the Ministry of Industrial Development, Ministry of Industrial Dev Govt. of India, New-Delhi.

$C_i$  = The All India Average wholesale price index for cement for the quarter under consideration as published by the Ministry of Industrial Dev. Govt. of India, New-Delhi.

**$P_c$  = Percentage of cement component of the work.**

**41.4. Adjustment for steel component - Deleted**

( III ).Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid according with the following formula.

$$V_s = 0.85 \times P_s / 100 \times R \times ( S_i - S_o ) / S_o$$

$V_s$  = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for steel.

$S_o$  = The all India average wholesale price index for steel ( bars & rods ) for the quarter preceding the date of opening of bids as published by the Ministry of industrial Development, Gov. of India., New-Delhi.

$S_i$  = The All India average wholesale price for steel ( Bars & rods ) for the quarter under consideration as published by Ministry of Industrial Dev. , New-Delhi.

**$P_s$  = Percentage of steel component of the work.**

Note: For the application of this clause , index of bars & rods has been chosen to represent steel group.

**41.5. Adjustment of POL ( Fuel and Lubricant ) component..- Deleted**

( V ) Price adjustment for increase or decrease in cost POL ( fuel and lubricant ) shall be paid in accordance with the following formula.

$$V_f = 0.85 \times P_f / 100 \times R \times ( F_i - F_o ) / F_o$$

$V_f$  = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for fuel and lubricants.

$F_o$  = The average official retail price of high Sped Diesel ( HSD ) at the existing consumer pumps of IOC at Chennai on the day 30 days prior to the date of opening of bids.

$F_i$  = THE average official retail price of HSD at the existing consumer pumps of IOC at Chennai for the 15<sup>th</sup> day of the middle calendar month of the quarter under consideration.

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$P_f$  = Percentage of fuel and lubricants component of the work.

**Note :** For the application of this clause ,the price of High speed Diesel Oil has been .  
chosen to represent fuel and lubricants group.

#### **41.6.Adjustment for Plant and Machinery spares component.- Deleted**

( VI ) Price Adjustment for increase or decrease in the cost of plant and machinery spares procured by the Contractor shall be paid in accordance with the following formula.

$$V_p = 0.85 \times P_p / 100 \times R (P_i - P_o) / P_o$$

$V_p$  = Increase or decrease in the cost of work during the quarter under consideration due to changes in the rates for plant and machinery spares.

$P_o$  = The All India average wholesale price index for heavy machinery and parts for the quarter preceding the date of opening of bids as published by the Ministry of Development, Government of India, New-Delhi.

$P_i$  = The All India average wholesale price index for heavy machinery and parts for the quarter under consideration as published by the Ministry of Development, New-Delhi.

$P_p$  = Percentage of plant and machinery spares component of the work.

**Note :** For the application of this clause , index of Heavy Machinery and Parts has .  
been chosen to represent the plant and machinery spares group.

#### **41.7.Adjustment of local materials - Deleted**

( VII ) Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen and POL , procured by the contractor shall be paid in accordance with the following formula.

$$V_m = 0.85 \times P_m / 100 \times R \times (M_i - M_o) / M_o$$

$V_m$  = Increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local materials other than cement, steel, bitumen and POL.

$M_o$  = The All India average price index ( all commodities ) for the quarter preceding the date of opening of bids as published by the Ministry of Industrial Development , Government of India, New-Delhi.

$M_i$  = = The All India average price index ( all commodities ) for the quarter under consideration as published by the Ministry of Industrial Development , Government of India, New-Delhi.

$P_m$  = Percentage of local material component (other than cement, steel, bitumen and POL) of the work.

41.8.The following percentages will govern the price adjustment for the entire contract.

1. Labour –  $P_l$  .40%
2. Cement --  $P_c$  =25%
3. Steel -  $P_s$  = .5%
4. POL -  $P_f$  .5%

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**5.** Plant And Machinery Spares – 15%

**6.** Other Materials - P<sub>m</sub>- 10%

#### **42. Retention**

**42.1** The Authority shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

**42.2** On completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Authority has certified that all Defects notified by the Authority to the Contractor before the end of this period have been corrected.

**42.3** On completion of the whole Works, the Contractor may substitute retention money with an “on demand” Bank guarantee.

#### **43.. Liquidated Damages**

**43.1** The Contractor shall pay liquidated damages to the Authority if he fails to execute and complete the work within the period of completion, at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Authority may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

**43.2** If the Intended Completion Date is extended after liquidated damages have been paid, the Authority shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in Sub-Clause 41.1.

**43.4 Maintenance Period:** The contractor has to maintain the works executed by him for a period of 5(five) years from the date of completion of work in satisfactory condition at his own risk, cost and responsibility. The contractor has to make good the loss or damage that may be caused to the Greater Chennai Corporation in respect of rectification of any defect noticed due to the faulty workmanship by the contractor substandard materials used by the contractor in the execution of the work, at his own risk, cost and responsibility till the Defects Liability Period.

#### **44. No Advance Payment**

**44.1** No **Mobilization Advance:**

**44..2** Nil

**44.3** Nil

#### **45. Securities.**

**45.1** The Performance Security shall be provided to the Authority not later than the date

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specified in the Letter of Acceptance and shall be issued in an amount and form specified in Clause 30 of ITB. The Performance Security shall be valid upto 28 days from the date of expiry of defect liability period mentioned in the Contract Data.

#### **46. Secured Advance**

**46.1** The Authority shall make advance payments in respect of materials intended for but not yet incorporated in the works in accordance with the conditions stipulated in the contract data. The Contractor is not eligible for secured advance if he has already availed mobilization advance as per Clause 46.1.

### **E. Finishing the Contract**

#### **47. Completion**

**47.1** The Contractor shall request the Authority to issue a certificate of Completion of the Works, and the Authority will do so upon deciding that the work is completed.

#### **48. Taking Over**

**48.1** The Authority shall take over the Site and the Works within seven days of the Authority issuing a certificate of Completion.

#### **49. Final Account**

**49.1** The Contractor shall supply the Authority with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Authority shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Authority shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Authority shall decide on the amount payable to the Contractor and issue a payment certificate.

#### **50. Operating and Maintenance Manuals**

**50.1** If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

**50.2** If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Authority approval, the Authority shall withhold the amount stated in the Contract Data from payments due to the Contractor.

#### **51. Termination**

**51.1** The Authority or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

**51.2** Fundamental breaches of Contract shall include, but shall not be limited to, the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Authority;
- (b) the Authority instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
- (c) the Authority or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Authority is not paid by the Authority to the Contractor within

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84 days of the date of the Authority certificate;

- (e) the Authority gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Authority;
  - (f) the Contractor does not maintain a Security, which is required; and
  - (g) the Contractor has delayed the completion of the Works by the number of days for which the amount of liquidated damages upto a maximum of 5 % of the value of the Contract unless otherwise specified in the Contract Data.
  - (h) if the Contractor, in the judgment of the Authority has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
- 51.3** When either party to the Contract gives notice of a breach of Contract to the Authority for a cause other than those listed under Sub-Clause 57.2 above, the Authority shall decide whether the breach is fundamental or not.
- 51.4** Notwithstanding the above, the Authority may terminate the Contract for convenience.
- 51.5** If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

## **52. Payment upon Termination**

- 52.1** If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Authority shall issue a certificate, for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate less other recoveries due in terms of the contract less taxes to deducted at source as per applicable law and less the percentage to apply to the value of the work not completed, as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Authority exceeds any payment due to the Contractor, the difference shall be a debt payable to the Authority.
- 52.2** If the Contract is terminated for the Authority convenience or because of a fundamental breach of Contract by the Authority, the Authority shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

## **53. Property**

- 53.1** All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Authority if the Contract is terminated because of the Contractor's default.

## **54. Release from Performance**

- 54.1** If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Authority or the Contractor, the Authority shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

## **2. Special Conditions of Contract**

### **1. GENERAL**

- 1.1** The following special conditions of contract shall supplement the conditions of contract. Whenever there is a conflict, the provision herein shall prevail over the conditions of contract and / or those elsewhere.

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- 1.2 The numbers given under each sub head represents the clause No. in conditions of Contract.
- 1.3 The bidder shall inspect the site and quarries and satisfy himself about the availability of the quality and quantity of materials required for the work.
- 1.4 The contractor shall make his own arrangements to procure all materials required for the work.
- 1.5 The Contractor shall make his own arrangements for water supply required for the work, at his own cost.
- 1.6 The Contractor shall make his own arrangements to obtain electricity for consumption on the work, at his own cost.

## 2. LABOUR

The Contractor shall unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer in charge, deliver to the Contractor, a return in detail, in such form and at such intervals as the Engineer in charge may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the site and such information, respecting Contractor's Equipment as the Engineer in charge may require.

## 3. COMPLIANCE WITH LABOUR REGULATIONS

During continuance of the contract, the Contractor and his subcontractors shall abide at all times by all existing labour enactments and rules made there under regulations, notifications and by laws of the State or Central Government or local authority and any other labour law (including rules), regulations, byelaws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Some of the major laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case of any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act of rules made there under, regulations and notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications / byelaws / acts / rules / regulations including amendments, if any, on the part of the Contractor, the Engineer / Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. Employer / Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The Employees of the Contractor and the subcontractor in no case shall be treated as the employees of the Employer at any point of time.

### **Some major Labour Laws applicable to Establishments engaged in Construction Work**

- a. ***Workmen Compensation Act 1923 :***
- b. ***Payments of Gratuity Act 1972 :***
- c. ***Employees P.F. and Miscellaneous provisions Act 1952 :***

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- d. **Maternity Benefit Act 1951 :**
  - e. **Minimum Wages Act 1948 :**
  - f. **Payment of Wages Act 1936 :**
  - g. **Equal Remuneration Act 1979 :**
  - h. **Payment of Bonus Act 1989 :**
  - i. **Industrial Disputes Act 1974 :**
  - j. **Industrial Employment (Standing Orders) Act 1946 :**
  - k. **Trade Unions Act 1926 :**
  - l. **Child Labour (Prohibition and Regulation) Act 1986 :**
  - m. **Inter – State Migrant Workmen’s (Regulation of Employment & Conditioning of Service) Act 1979 :**
  - n. **The Building and Other Construction Workmen (Regulation of Employment and Condition of Service) Act and the cess Act of 1996 :**
  - o. **Factories Act 1940 :**
4. **ARBITRATION** (GCC Clause 24.3)

The procedure for arbitration will be as follows:

- 4.1 If either party is dissatisfied with the decision of the Adjudicator, the party concerned, may within thirty days after receiving the decision of the Adjudicator shall notify to the Commissioner, of his intension to go in for arbitration. Within 30 days of receipt of notice from the Contractor/ Employer of his intention to refer the dispute to arbitration the Commissioner shall send to the Contractor / Employer, a list of five officers of the rank of a Superintending Engineer or of a higher rank who are not connected with the work for selection and appointment of arbitrators.
- 4.2 In event of dispute or difference arising between the Employer and a contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitration tribunal shall consist of 3 arbitrators, one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the presiding Arbitrator shall be appointed by the Indian Council of Arbitration.
- 4.3 If one of the portion fails to appoint its arbitrator in pursuance of sub- clauses above within 30 days after arbitrator by the other party, than the presiding Arbitrator shall be nominated by Indian Council of Arbitration shall appoint the arbitrator. A certified copy of the order of the President of the institution of Engineers (India).

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- 4.4** Arbitration proceedings shall be held at Chennai, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
- 4.5** The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, this expenses incurred by each party in connection with the preparation, presentation, etc., of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
- 4.6** In the event the value of the contract is up to Rs.5 Crores, the disputes or difference arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties, failing such agreement, the appointing authority is the Indian Council of Arbitration.
- 4.7** Performance under the contract shall continue during the Arbitration proceedings and payments due to the contractor by the owners shall not be withheld, unless they are the subject matter of the arbitration proceedings such as, but not limited to matters related to quality of work.
- 4.8** Neither party is entitled to bring claim to arbitration unless the same is made before the expiration of 30 days after defect liability period.

#### **5. Income Tax**

During the course of contract period deductions of Income Tax shall be made as per the rule in the force of the gross amount of each bill or as directed by the Income Tax department from time to time and such Income Tax amounts shall be remitted to Government of India.

#### **6. Sales Tax**

Valid Sales Tax Clearance or exemption certificate should be produced before the payment of final bill, otherwise the final payment to the contractor will be withheld. Any variation in taxes, duties and levies during the currency of contract shall be borne by the contractor.

#### **7. TESTS ON MATERIALS AND FINISHED ITEM OF WORK**

- 7.1** Charges for carrying out all the tests specified in specification on materials and finished item of works should be borne by the contractor.
- 7.2** Charges for carrying out all the tests other than those specified in specification on materials and finished item of work should be borne by the contractor / Employer as below:
- a) If the materials / works pass the tests, the charges will be borne by the employer.
  - b) If the materials / works fail the tests, the charges will borne by the contractor.
- 7.3** The Contractor should establish a field laboratory at the work site to carryout all tests specified as well as not specified in the specification both for materials and finished items of work in the presence of the Engineer.

#### **8. PAYMENT**

- 8.1** Payment for the work done by the contractor will be based on measurements recorded at various stages of the work by the Engineer or Officer authorized by the Engineer. The Contractor or his authorized agent or representative shall be present at the time of recording of each set of measurements and sign the measurement book or leveling field book in token of their acceptance.

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- 8.2** If for any reason the Contractor or his authorized agent is not available, and the work is suspended by the Engineer to avoid recording of measurements in the absence of the Contractor or his authorized agent, the department shall not entertain any claim from the contractor for any loss incurred by him on this account. If the Contractor or his authorized agent or representative does not remain present at the time of such measurement may be taken in his absence and shall be deemed to be accepted by the Contractor.
- 8.3** Any amount due to the department from the Contractor arising out of the Contract will be received from the bills of the Contractor. If sufficient amount is not available in the bills the same will be recovered under Revenue Act or from the amount due to the Contractor under any other Contract

### **9. Extension of Time**

Granting extension of time shall be governed as under:

- 9.1** If the delay is due to the failure attributable to the Contractor, the Engineer shall have powers to decide whether to grant extension or not on the request for attention of time from the Contractor. If the extension is granted under such circumstances, the Contractor shall not be paid any revised rates or extra rate due to extension of time. The quoted rates in the contract shall prevail during the extension period. The Contractor has to pay liquidated damages as per contract data for the extended period.
- 9.2** For this fixed price contract, if the delay is due to failure attributable to the department, or due to force, the Engineer shall have the power to decide whether extension of time is to be given or not on request from the contractor. If extension of time is given, the contractor shall not be paid extra rate or revised rate due to extension of time. The quoted rates in the contract shall prevail during extension period.

### **10. Fundamental Breach of Contract:**

The Contractor becoming insane or imprisoned shall be deemed as a fundamental Breach or Contract.

### **11. Extra Item of Works**

Extra item of work shall not vitiate the contract. The contractor shall be bound to execute extra items of works as directed by the Engineers.

### **12. Employment of Project Manager and Other Key Personnel**

Other Key Personnel as furnished in the Contract.

### **13. Contract Period**

The contract period is continuous from start date to intended completion date including monsoon and non-monsoon seasons without any break.

### **14. Inconvenience to Public**

The contractor shall not deposit materials at any site which will cause inconvenience to Public. The Engineer may direct the Contractor to remove such materials or may undertake the job at the cost of the Contractor.

### **15. House and Hutments**

The Contractor should arrange to provide accommodation for his staff & Labourers he needs, at his own cost. The Contractor shall make his own arrangements for supply of food-grains and other provisions to his staff and laborers including controlled commodities. If women are employed in more than 50 at a place, the Contractor shall arrange the crèches at his own cost.

### **16. Water Supply**

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It is the responsibility of the Contractor to make his own arrangements for water supply and drainage for the work site, in his own cost. The distribution system measures for purification of water, shall be the responsibility of the Contractor and shall be accordance with rules and regulations of the Public Health Department. No compensation will be allowed to the Contractor in this account.

### **17. Watching and Lighting:**

The Contractor shall in connection with the works, provide and maintain at his own cost all lights, guards, fencing and watching when and wherever necessary or required by the Engineer or Engineer's Representative, or by any duly constituted authority for the protection of the works, or for the safety and convenience of the public or others. The Contractor shall make his own arrangements to obtain electricity for consumption on the works at his own cost.

### **18 Construction Plant**

The Contractor shall provide and install at his own cost all necessary construction tools and plant, equipment, machinery and shall use such methods and appliances for the performance of all the operations connected with the work emprised under the contract as will secure a satisfactory quality of work and rate of progress which will ensure the completion of the work within the time specified.

### **19. Reference Marks and Bench Marks**

**19.1** The basic central lines, reference points and bench marks will be fixed by the Department.

**19.2** The Contractor shall establish at his own cost, at suitable points, additional reference lines and bench marks as may be necessary. The Contractor shall remain responsible for the sufficiency and accuracy and of all his bench marks and reference lines. He shall take precaution to see that the lines, points and bench marks fixed by the Department are not disturbed by his work and shall make good to any such damages.

### **20. Setting out Works**

The Contractor shall be responsible for the correct setting out of all works at his cost. The Contractor shall execute the work true to alignment, grade and levels as shown in the drawings and as directed by the Engineer and shall check these at frequent intervals. The Contractor shall provide all facilities like labor and instruments, and shall co-operate with the departmental officers to check all alignments, grades, levels and dimensions, such checking shall not absolve the contractor of his own responsibility in maintaining the necessary of the work.

### **21. Use and Care of Site**

The Contractor will be permitted to use without charge, the site and the lands shown for execution of work, labor, staff colonies, site offices, workshops or store and for related activities. The Contractor shall not commence any operation on such lands, except with the approval of the Engineer. If these lands are not adequate, the Contractor may have to make his own arrangements for additional lands at his own cost. The Contractor shall not demolish, remove or alter the structures, trees or other facilities on the site without prior approval of the Engineer.

The rubbish shall be removed from the site as it accumulates. All surface and soil drains shall be kept in a clean, sound and workmen like state. All the means of the Contractor's operations shall be cleared before returning them to the Department. The Contractor shall make good any damage or alteration made to property or land handed over to him before these are returned.

### **22. Protection of adjoining Premises**

The Contractor shall protect adjoining sites against structural, decorative and other damages that could be caused by the execution of these works and make good at his cost any such damages.

### **23. Local Roads**

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In addition to the existing public roads, near the site of works and the roads constructed by the Government in the works area, the Contractor may construct and maintain additional roads as required at his own expenses and as per the directions of the Engineer.

#### **24. Work during Night or Sundays and Holidays**

No work shall be done on holidays or during nights without the written permission Superintending Engineer /Zonal Executive Engineer and the Contractors shall comply with the provision of the Factories Act, if and so far they are applicable.

The contractor shall give prior information to the Police Department , if necessary , for carrying out the work during night hours.

### **Section VI**

#### **Contract Data**

1 The Employer is Commissioner , Greater Chennai Corporation

The Engineer in Charge is Superintending Engineer, SWD & STORM WATER DRAIN Department

The name and identification number of the Contract is SWD.C.No.B3/2236/2019-13

The adjudicator appointed jointly by the Employer and Contractor is (Name and Address of the Adjudicator).

The Works consist of

#### **Work:**

Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.

Ref: SWD.C.No.B3/2236/2019-13

The Start Date shall be issue of notice to proceed the work

The Intended Completion Date for the whole of the Works shall be **12 months** from the commencement of work

#### **MILESTONE DATES**

Sl. No.	Description of Work	Milestone I (3 <sup>rd</sup> Month from Start Date)	Milestone II (6 <sup>th</sup> Months from Start Date)	Milestone III (9 <sup>th</sup> Months from Start Date)	Milestone III (12 <sup>th</sup> Months from Start Date)
1	<b><u>Work:</u></b> Restoration and Rejuvenation work in Alapakkam lake in Dn-146, Zone-11.	25%	70%	100%	100%

2. The Contractor shall submit a revised Program for the Works within Seven days of delivery of the Letter of Acceptance.

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3. The Site Possession Date shall be Seven days of delivery of the Letter of Acceptance.
4. The Site is located at *Chennai*
5. The Defects Liability Period is 2 years
6. The minimum insurance covers shall be:
  - (a) Insurance of the Works and of Plant and Materials.
  - (b) Insurance of Equipment
  - (c) Insurance of other property.
  - (d) The minimum cover for personal injury or death insurance
    - (i) for the Contractor's employees is Rs.10 lakhs.
    - (ii) and for other people is Rs.10 lakhs.
7. The Compensation Events as per Section II Clause 36 of ITB.
8. The period between Program updates is 90 days.  
The amount to be withheld for late submission of an updated Program is *Rs, 1,00,000/-*
9. The language of the Contract documents is English  
The law that applies to the Contract is the law of Union of India.
10. Institution whose arbitration procedures shall be used Indian Council of Arbitration/President of Institution of Engineers (India)  
Fees and types of reimbursable expenses to be paid to the Adjudicator shall be fixed by Commissioner, Greater Chennai Corporation.
11. Appointing Authority for the Adjudicator: Commissioner, Greater Chennai Corporation.
12. Arbitration will take place in accordance with arbitration and conciliation act, 1996
13. The proportion of payment retained is 5% in the each part bill and 2.5% in the final bill.
14. The liquidated damages for the whole of the Works are 0.1% of the final Contract Price per day. The maximum amount of liquidated damages for the whole of the Works is five percent percent of the final Contract Price
15. The Performance Security shall be for the following minimum amounts equivalent as a percentage of the Contract Price:
  - (a) 2% of the contract amount

The standard form(s) of Performance Security acceptable to the Employer shall be of the type presented in Section 3 Cl.29 of ITB of the Bidding Documents.
16. The date by which operating and maintenance manuals are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be.  
\*The date by which "as-built" drawings are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be.  
The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is *Rs.1,00,000/-*

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## **Section VII**

### **General Technical Specifications**

#### **1. Earthwork**

##### **1.1 General**

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night. Rock excavated shall be stacked properly as approved by the Engineer-in-charge.

##### **1.2 Clearing**

The area to be excavated / filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they shall also be removed. The material so removed shall be disposed off as approved by the Engineer-in-charge.

##### **1.3 Excavation**

Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the approved drawings or such other lines and grades as may be agreed with the Engineer-in-charge. Rough excavation shall be carried out to a depth of 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed below the final level and extra excavation filled up with material as approved by the Engineer-in-charge. Should any excavation be taken below the specified elevations, the Contractor shall fill it up with concrete of the same class as in the foundation resting thereon, up to the required elevation at no cost to the department. Every precaution shall be taken to prevent slips. If slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope.

#### **1.4 Fill, Backfilling and Site Grading**

##### **1.4.1 General**

All fill material shall be subject to the Engineer-in-charge's approval. If any material is rejected by Engineer-in-charge, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited /disposed off as directed by Engineer-in-charge after the fill work is completed.

No earth-fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Engineer-in-charge.

##### **1.4.2 Material**

To the extent available, selected surplus soil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken

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or removed unless otherwise stated. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murrum or earth to fill the voids and the mixture used for filling. If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Engineer-in-charge. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Top soil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Engineer-in-charge. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

#### **1.4.3 Filling in pits and trenches around foundations of structures, walls, etc.**

The spaces around the foundations, structures, pits, trenches, etc., shall be cleared of all debris, and filled with earth in layers not exceeding 15 cm, each layer being watered, rammed and properly consolidated to the satisfaction of Engineer-in-charge. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Engineer-in-Charge is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to a proper profile to the approval of the Engineer-in-charge.

The filling shall be done after the concrete or masonry is fully set and done in such a manner as not to cause undue thrust on any part of the structure.

#### **1.4.4 Plinth Filling**

Plinth filling shall be carried out with approved material such as soil, sand or murum as in layers not exceeding 15 cm watered and compacted with mechanical compaction machines. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlement at a later stage. The finished level of the filling shall be trimmed to the level/slope specified.

At some locations/ areas, it may not be possible to use rollers because of space restrictions, etc. The Contractor shall then be permitted to use pneumatic tampers, rammers, etc. and he shall ensure proper compaction.

#### **1.4.5 Sand Filling in Plinth and Other Places**

Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Engineer-in-charge has inspected and approved the fill.

#### **1.4.6 General Site Grading**

Site grading shall be carried out as indicated in the approved drawings. Excavation shall be carried out as specified in the Department's Requirements. Filling and compaction shall be carried out as specified under relevant Clause and elsewhere unless otherwise indicated below.

If no compaction is called for, the fill may be deposited to the full height in one operation and leveled. If the fill has to be compacted, it shall be placed in layers not exceeding 150 mm and leveled uniformly and compacted as indicated in relevant Clause before the next layer is deposited.

To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor.

Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.

The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. If any slip occurs, the Contractor shall remove the affected material and make good the slip.

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**1.4.7 Fill Density**

Unless otherwise specified the compaction, where so called for, shall comply with minimum 90% compaction by Standard Proctor at moisture content differing not more than 4% from the optimum moisture content. The Contractor shall demonstrate adequately by field and laboratory tests that the specified density has been obtained.

**1.4.8 Timber Shoring**

The provisions of relevant ISS shall apply.

**2 Concrete****2.1 General**

The Engineer-in-Charge shall have the right at all times to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment and the quality control system. Such an inspection shall be arranged and the *Engineer-in-Charge's* approval obtained, prior to starting of concrete work. This shall, however, not relieve the Contractor of any of his responsibilities. All materials which do not conform to the Specifications shall be rejected.

Materials complying with codes/standards shall generally be used.

**2.2 Materials****2.2.1 Cement**

Unless otherwise called for by the Engineer-in-charge, cement shall be ordinary Portland cement conforming to IS: 2697, IS: 8112 or IS: 12269. Super Sulphated cement conforming to IS 6909 or super resistant Portland cement conforming to IS 12330 or Pozzolana Portland Cement conforming to IS 1489..

Sulphate resistant cement conforming to IS 12330 shall be used for all cement concrete works wherever necessary as directed by the Engineer-in-charge.

Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the Engineer-In-Charge.

Cement which is not used within 90 days from its date of manufacture shall be tested at a laboratory approved by the Engineer-In-Charge and until the results of such tests are found satisfactory, it shall not be used in any work.

**2.2.2 Aggregates (General)**

It shall comply with requirement of IS 383 and as specified in IS 456-2000. Aggregates shall consist of naturally occurring stones (crushed or uncrushed), gravel and sand. They shall be chemically inert, strong, hard, clean, durable against weathering, of limited porosity, free from dust/slit/organic impurities/deleterious materials such as iron pyrites, cod, mica, slate, clay alkali, soft fragments, sea shells and conform to IS: 383. Aggregates such as slag, crushed over burnt bricks, bloated clay aggregates, sintered fly ash and tiles shall not be used.

Aggregates shall be washed and screened before use where necessary or if directed by the Engineer-in-Charge.

Aggregates containing reactive silica shall not be used.  
Graded aggregate shall conform to I.S. specification.

**2.2.3 Water**

Water used for both mixing and curing shall conform to IS : 456-2000 and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials that may be deleterious to concrete or steel.

**2.2.4 Reinforcement**

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Reinforcement shall be any of the following:

- a) Mild Steel and medium tensile bars to IS 432 Part 1.
- b) High strength deformed bars and wires to IS 1786.
- c) Rolled steel Grade A made from structural steel to IS 2062.

All reinforcement shall be free from loose mill scales, loose rust and coats of paints, oil, mud or other coatings, which may destroy or reduce bond.

### **2.2.5 Admixtures**

Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the Engineer-in-Charge. Accelerating, retarding, water reducing and air entraining admixtures shall conform to IS : 9103 and integral water proofing admixtures to IS : 2645.

### **2.2.6 Samples and Tests**

All materials used for the works shall be tested before use.

Sampling and testing shall be as per IS: 2386 under the supervision of the Engineer-in-Charge.

The Contractor shall furnish manufacturer's test certificates and technical literature for the admixture proposed to be used. If directed, the admixture shall be got tested at an approved laboratory at no extra cost.

### **2.3 Design Mix Concrete**

For Design Mix Concrete, the mix shall be designed according to IS: 10262 and SP 23 to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The minimum cement content for Design Mix Concrete shall be as per IS: 456.

The minimum cement content stipulated above shall be adopted irrespective of whether the Contractor achieves the desired strength with less quantity of cement. It shall be the Contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to the Engineer-in-Charge at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456.

Grades lower than M20 shall not be used for reinforced concrete (general) grading lower than M25 shall not be used for reinforced concrete in liquid retaining structures.

#### **b) Batching & Mixing of Concrete**

Proportions of aggregates and cement, as decided by the concrete mix design, shall be by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value.

### **2.4 Nominal Mix Concrete**

#### **Mix Design & Testing**

Mix Designing and preliminary tests are not necessary for Nominal Mix Concrete. However works tests shall be carried out as per IS: 456.

#### **Mixing**

Concrete shall be mixed in a mechanical mixer conforming to IS 1791. The mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. If there is segregation after unloading, the concrete should be remixed.

### **2.5 Formwork**

Formwork shall be all inclusive and shall consist of but not be limited to shores, bracings, sides of footings, walls, beams and columns, bottom of slabs etc. including ties, anchors, hangers, inserts, false work, wedges etc.

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The design and engineering of the formwork as well as its construction shall be the responsibility of the contractor; however, if so desired by the Engineer-in-Charge, the drawings and calculations for the design of the formwork shall be submitted to the Engineer-in-Charge for the approval.

Formwork shall be designed to fulfill the following requirements:

- a) Sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and appropriate to the methods of placing and compacting.
- b) Made of suitable materials.
- c) Capable of providing concrete of the correct shape and surface finish within the specified tolerance limits.
- d) Capable of withstanding without deflection the worst combination of self weight, reinforcement and concrete weight, all loads and dynamic effects arising from construction and compacting activities, wind and weather forces.
- e) Capable of easy striking out without shock, disturbance or damage to the concrete.
- f) Soffit forms capable of imparting a camber if required
- g) Soffit forms and supports capable of being left in position if required
- h) Capable of being cleaned and/or coated if necessary immediately prior to casting the concrete; design temporary openings where necessary for these purposes and to facilitate the preparation of construction joints.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the Engineer-in-Charge.

Wire ties passing through beams, columns and walls shall not be allowed. In their place bolts passing through sleeves shall be used. Formwork spacers left in-situ shall not impair the desired appearance or durability of the structure by causing spalling, rust staining or allowing the passage of moisture.

Formwork showing excessive distortion, during any stage of construction, shall be repositioned and strengthened. Placed concrete affected by faulty formwork, shall be entirely removed and formwork corrected prior to placement of new concrete at Contractor's cost.

## **2.6 Transporting, Placing and Compacting Concrete**

Concrete shall be transported from the mixing plant to the formwork with minimum time lapse by methods that shall maintain the required workability and will prevent segregation, loss of any ingredients or ingress of foreign matter or water.

In all cases concrete shall be deposited as nearly as practicable directly in its final position to avoid re-handling. To avoid segregation, concrete shall not be re-handled or caused to flow. For locations where direct placement is not possible and in narrow forms and Contractor shall provide suitable drops and "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.0 m. Care shall be taken to avoid displacement of reinforcement or formwork.

Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by tremies or by pipeline from the mixer and shall never be allowed to fall freely through the water.

While placing concrete the Contractor shall proceed as specified below and also ensure the following:

- a) Continuously between construction joints and pre-determined abutments.
- b) Without disturbance to forms or reinforcement
- c) Without disturbance to pipes, ducts, fixings and the like to be cast in; ensure that such items are securely fixed. Ensure that concrete cannot enter open ends of pipes and conduits etc.
- d) Without dropping in a manner that could cause segregation or shock.

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- e) In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.
- f) Do not place if the workability is such that full compaction cannot be achieved
- g) Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary in supported excavations, withdraw the linings progressively as concrete is placed.
- h) If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.
- i) Ensure that there is no damage or displacement to sheet membranes.
- j) Record the time and location of placing structural concrete.

Concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration, blending and melding of the concrete between successive layers.

## 2.7 Curing

Curing and protection shall start immediately after the compaction of the concrete to protect it from

1. Premature drying out, particularly by solar radiation and wind;
2. leaching out by rain and flowing water;
3. high internal thermal gradient;
4. vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement
5. After the concrete has begun to harden i.e. 1 to 2 hr. after laying curing shall be started.
6. All concrete, unless approved otherwise by the Engineer-in-Charge, shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, or other absorbent material for the period of complete hydration with a minimum of 7 days. The quality of curing water shall be the same as that used for mixing.
7. Where a curing membrane is approved to be used by the Engineer-in-Charge, the same shall be of a non-wax base and shall not impair the concrete finish in any manner. The curing compound to be used shall be approved by the Engineer-in-Charge before use and shall be applied with spraying equipment capable of a smooth, even textured coat.
8. When concrete is used as sub-grade for flooring, the flooring may be commenced before the curing period of sub-grade is over, but curing of sub-grade shall be continued along with the top layer of flooring for a minimum period of 7 days.
9. Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be well sealed and fastened.

## 2.8 Construction Joints and Keys

The position and arrangement of construction joints shall be as indicated by the contractor in his working drawings duly approved by the department. Concrete shall be placed without interruption until completion of work between construction joints. If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made with the approval of the Engineer-in-Charge.

## 2.9 Repair and Replacement of Unsatisfactory Concrete

Immediately after the shuttering is removed, all defective areas such as honey-combed surfaces, rough patches, holes left by form bolts etc, shall be inspected by the Engineer-in-Charge who may permit patching of the defective areas or reject the concrete work.

All through holes for shuttering shall be filled for full depth and neatly plugged flush with surface.

Rejected concrete shall be removed and replaced by the Contractor at no additional cost to the Employer.

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For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the Engineer-in-Charge.

The decision of the Engineer-in-Charge as to the method of repairs to be adopted shall be final and binding on the Contractor.

## **2.10 Hot Weather Requirements**

Concreting during hot weather shall be carried out as per IS 7861 (Part I).

Adequate provision shall be made to lower concrete temperatures which shall not exceed 40 deg C at time of placement of fresh concrete.

For major and large scale concreting works the temperature of concrete at times of mixing and placing, the thermal conductivity of the formwork and its insulation and stripping period shall be closely monitored.

## **3 Structural Steel Work**

### **3.1 Fabrication**

#### **3.1.1 General**

As much fabrication work as is reasonably practicable work shall be completed in shops, where steel work is fabricated.

All workmanship and finish shall be of the best quality and shall conform to the best approved method of fabrication. All materials shall be finished straight and shall be machined/ground smooth true and square where so specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Tolerances for fabrication of steel structures conform IS 7215. Tolerances for erection of steel structures shall conform to IS 12843.

#### **3.1.2 Welding**

Welding shall be in accordance with IS 816, IS 819, IS 1024, IS 1261, IS 1323 and IS 9595 as appropriate.

### **3.2 Site Erection**

#### **3.2.1 Plant and Equipment**

The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the EIC.

#### **3.2.2 Storing and Handling**

All structural steel should be so stored and handled at the site that the members are not subject to excessive stresses and damage.

#### **3.2.3 Setting Out**

The positioning and leveling of all steelwork, the plumbing of stanchions and the placing of every part of the structure with accuracy shall be in accordance with approved drawings and to the satisfaction of EIC.

#### **3.2.4 Security during Erection**

Safety precaution during erection shall conform to IS 7205:1974. During erection, the steel work shall be securely bolted or otherwise fastened and, when necessary, temporarily braced to provide for all load to be carried by the structure during erection including those due to erection equipment and its operation.

No riveting, permanent bolting or welding should be done until proper alignment has been obtained.

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### 3.2.5 Field Connections

All field assembly by bolts, rivets and welding shall be executed in accordance with the requirements of shop fabrication excepting such as manifestly apply to shop conditions only. Where the steel has been delivered painted, the paint shall be removed before field welding, for a distance of 50 mm at least on either side of the joint.

### 3.3 Painting

All fabricated steel material, except those galvanised shall receive protective paint coating as prescribed in IS 1477 Parts 1 & 2.

Parts to be encased on concrete shall not be painted or oiled.

## 4. Brickwork

### 4.1 Materials

Bricks used in the works shall conform to the requirements laid down in IS : 1077, IS 2180, IS 2222, IS 2691, IS 3952, IS 6165. The class of the bricks shall be as specifically indicated in the respective items of work prepared by the Contractor.

### 4.2 Compressive Strength :

Five bricks shall be tested. The average compressive strength shall be as per class designation. The compressive strength of individual brick shall not be less than 20 % of the specified value.

#### 4.2.1 Classification of burnt clay solid bricks

The classes and sub-classes of burnt clay solid bricks shall be as given in Table 1.

**Table 1 – Classes of Burnt Clays Solid Bricks and their Principal requirements.**

Type of Brick	Class designation (see more below)	Compressive strength kg/cm <sup>2</sup> Min	Water absorption (24 hr. immersion percentage max.	Efflorescence
(1)	(2)	(3)	(4)	(5)
Heavy duty (See IS:2180-1970)	450	450	10	Nil
	400	400	10	Do
Common burnt clay building bricks (see IS: 1077-1970)	350	350	15	Slight
	300	300	15	Do
	250	250	15	Do
	200	200	15	Do
	175	175	15	Do
	150	150	15	Do
	125	125	20	Moderate
	100	100	20	Do
	75	75	20	Do
	50	50	20	Do

Note : Each class of bricks shall further be divided into sub-classes A, B, etc. based on the following :

Sub-class A – Tolerance limit shall be  $\pm 3$  percent and shall have smooth rectangular faces with sharp corners and emit clear ringing sound.

Sub-class B – Tolerance limit shall be  $\pm 8$  percent and shall be permitted to have slight distortion and round edges, provided no difficulty shall arise in laying of uniform courses.

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## 4.2.2 Specification for burnt clay facing bricks

### Classification

The facing bricks shall be of two classes :

- (a) Class I; and
- (b) Class II

## 4.2.3 General Quality

4.2.3.1 The facing bricks shall be made of clay, shale or mixture of these materials with or without admixtures and burnt to meet the requirements of this standard. The coloring material added to the clay shall be of suitable ceramic materials and shall be well distributed throughout the body. The brick shall be of uniform colour.

4.2.3.2 The bricks shall be free from cracks, flaws and nodules of free lime and of even texture. These shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled edges.

## 4.2.4 Dimensions and Tolerances

4.2.4.1 The standard sizes of the facing bricks shall be 19 x 9 x 9 cm and 19 x 9 x 4 cm.

4.2.4.2 The permissible tolerances shall be as under :

Dimensions Cm.	Tolerances	
	Class I Mm	Class I MM
19	± 3	± 5
9	± 2	± 3
4	± 1.5	± 2

## 4.2.5 Physical Requirements

4.2.5.1 The average compressive strength obtained in accordance with the procedure laid down in Table I of IS: 3495-1966 (Method of sampling and testing clay building bricks shall not be less than 75kg/cm<sup>2</sup> for Class I.

4.2.5.2 The water absorption requirement when tested in accordance with the procedure laid down in Table 2 of IS: 3495-1966 for 24h immersion shall not exceed 15 percent.

4.2.5.3 When tested in accordance with the method specified in Table 3 of IS : 3495 – 1966 efflorescence requirements shall be 'Nil' for both classes.

4.2.5.4 When measured in accordance with the method specified in Table 4 of IS: 3495 – 1966 the warpage for both classes shall not exceed 2.5 mm.

## 4.3 Water absorption :

Five bricks shall be tested for water absorption and shall not exceed 20 % by weight upto class 12.5 & 15% by weight for higher classes.

## 4.4 Efflorescence :

Five bricks shall be tested for efflorescence. The efflorescence shall be 'nil' to 'moderate'

Sample bricks shall be submitted to the Engineer-in-Charge for approval and bricks supplied shall conform to approved samples. If demanded by Engineer-in-Charge, brick samples shall be got tested as per IS : 3495 by Contractor. Bricks rejected by Engineer-in-Charge shall be removed from the site of works within 24 hours.

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#### 4.5 Preparation of Mortar

##### Materials :

**Water** : Water used shall be clean and reasonably free from injurious or deleterious materials such as oils, acids, alkalis, salts. Sand for masonry mortars shall conform to IS 2116  
Mortars shall be prepared and tested as per IS 2250.

#### 4.6 Workmanship

Workmanship of brick work shall conform to IS : 2212. All bricks shall be thoroughly soaked in clear water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work prepared by the Contractor.

All brickwork shall be plumb, square and true to dimensions shown.

Brickwork shall be kept constantly moist on all the faces for at least seven days after 24 hrs of laying. The arrangement for curing shall be got approved from the Engineer-in-Charge.

Double scaffolding having two sets of vertical supports shall be provided to facilitate execution of the masonry works. The scaffolding shall be designed adequately considering all the dead, live and possible impact loads to ensure safety of the workmen, in accordance with the requirements stipulated in IS : 2750 and IS : 3696 (Part - I). Scaffolding shall be properly maintained during the entire period of construction. Single scaffolding shall not be used on important works and will be permitted only in certain cases as decided by the Engineer-in-Charge. Where single scaffolding is adopted, only minimum number of holes, by omitting a header shall be left in the masonry for supporting horizontal scaffolding poles. All holes in the masonry shall be carefully made good before plastering/ pointing.

All brick work shall be built tightly against columns, floor slabs or other structural members.

To overcome the possibility of development of cracks in the brick masonry following measures shall be adopted.

For resting RCC slabs, the bearing surface of masonry wall shall be finished on top with 12 mm thick cement mortar 1:3 and provided with 2 layers of Kraft paper Grade 1 as per IS : 1397 or 2 layer of 50 micron thick polyethylene sheets.

RCC/ steel beams resting on masonry wall shall be provided with reinforced concrete bed blocks of 150 mm thickness, projecting 150mm on either sides of the beam, duly finished on top with 2 layer of Kraft paper Grade 1 as per IS : 1397 or 2 layers of 50 micron thick polyethylene sheets.

### 5. Random Rubble Masonry, in Foundation Plinth and Superstructure

#### 5.1 Materials

Stones for the works shall be of the specified variety which are hard, durable, fine grained and uniform in colour ( for superstructure work ) free from defects like cracks, sand holes, patterns of soft / loose materials veins, other defects. Quality and work shall conform to the requirements specified in IS: 1597 (Part-I). The percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS: 1124. The Contractor shall supply sample stones to the Engineer-in-Charge for approval. Stones shall be laid with its grains horizontal so that the load transmitted is always perpendicular to the natural bed.

Cement-stand mortar for stone masonry works shall be as per IS 2250.

#### 5.2 Scaffolding

Type of scaffolding to be used shall be as specified in the section of brick masonry.

#### 5.3 Workmanship

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For all works below ground level the masonry shall be random rubble with ordinary quarry dressed stones for the hearting and selected quarry dress stones for the facing.

For all R.R. masonry in superstructure the masonry shall be well bonded, faced with hammer dressed stones with squared quoins at corners. The maximum thickness of joints shall not exceed 20 mm. All joints shall be completely filled with mortar. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20 mm by a raking tool during the progress of the work while the mortar is still green.

Green work shall be protected from rain by suitable covering. Masonry work shall be kept constantly moist on all the faces for a minimum period of seven days for proper curing of the joints.

## **6. Damp - Proof Course**

### **6.1 Materials and Workmanship**

All the walls in a building shall be provided with damp-proof course covering plinth to prevent water from rising up the wall. The damp-proof course shall run without a break throughout the length of the wall, even under the door or other opening. Damp-proof course shall consist of minimum 50mm thick cement concrete of 1:2:4 nominal mix with nominal reinforcement and approved water-proofing compound admixture conforming to IS: 2645 in proportion as directed by the manufacturer. Concrete shall be with 10mm down graded coarse aggregates.

## **7. Wood work in Doors, Windows, Ventilators & partitions**

### **7.1 Materials**

Timber shall be of the best quality conforming to IS 287, well seasoned by the suitable process before being planed to the required sizes. Flush door shutters of the solid core type with plywood face panel shall conform to IS: 2202 (Part-1)

Transparent sheet glass conform to the requirements of IS: 2835 or IS: 2553 (Part-1). Wired and figured glass shall be as per IS: 5437. Builder's hardware for fittings and fixtures shall be of the best quality from approved manufacturers. Each wooden door shutter shall have a minimum of three hinges and two fastenings like tower bolt, handle and mortise lock etc. floor stoppers, handles, kick plates etc. shall also be provided. Each window shutter shall have minimum of 3 hinges and one fastening like tower bolt and one handle for opening and closing.

### **Workmanship**

The workmanship and finish of wood work in doors, windows, ventilators and partitions shall be of a very high order. Contractor shall ensure that work is executed in a professional manner by skilled carpenters for good appearance, efficient and smooth operation of the shutters.

All works shall be executed as per the detailed Drawing prepared by the Contractor and approved by the Engineer-in-Charge.

The workmanship shall generally conform to the requirements specified in IS : 4021.

## **8. Steel Doors, Windows and Ventilators**

### **8.1 Materials**

Hot rolled steel sections for the fabrication of steel doors, windows and ventilators shall conform to IS: 7452 which are suitable for single glazing.

Pressed steel door frames for steel flush doors shall be out of 1.25mm thick mild steel sheets of profiles as per IS : 4351.

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Transparent sheet glass shall conform to the requirements of IS: 2835. Wired and figured glass shall be as per IS: 5437.

Builder's hardware of fittings and fixtures shall be of the best quality from the approved manufacturers. Hot rolled sections shall conform to IS 7452 Fire check doors shall conform to IS 3614 Part 1 & 2. Steel windows for industrial buildings shall conform to IS 1361.

## **8.2 Workmanship**

All steel doors, windows and ventilators shall be of the type as specified in the respective items of work prepared by the Contractor and of sizes as indicated in the Drawings prepared by the contractor. Steel doors, windows and ventilators shall conform to the requirements as stipulated in IS : 1038. Steel windows shall conform to IS : 1361 if so specified.

## **9. Cement Plastering Work**

### **9.1 Materials**

The proportions of the cement mortar for plastering shall be as per approved drawings and specifications. Cement and sand shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS standards. The quality and grading of sand for plastering shall conform to IS : 1542. Any mortar which is partially set shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances.

### **9.2 Workmanship**

Preparation of surfaces and application of plaster finishes shall generally conform to the requirements specified in IS : 1661 and IS : 2402.

Plastering operations shall not be commenced until installation of all fittings and fixtures such as door/ window panels, pipes, conduits etc. are completed.

All joints in masonry shall be raked as the work proceeds to a depth of 10 mm / 20mm for brick/ stone masonry respectively with a tool made for the purpose when the mortar is still green. The masonry surface to be rendered shall be washed with clean water to remove all dirt, loose materials, etc., Concrete surfaces to be rendered shall be roughened suitably by hacking or bush hammering for proper adhesion of plaster and the surface shall be evenly wetted to provide the correct suction. The masonry surfaces should not be too wet only damp at the time of plastering. The dampness shall be uniform to get uniform bond between the plaster and the masonry surface.

### **9.3 Interior & Exterior plain faced plaster**

This plaster shall be laid in a single coat of specified thickness. The mortar shall be dashed against the prepared surface with a trowel. The dashing of the coat shall be done using a strong whipping motion at right angles to the face of the wall or it may be applied with a plaster machine. The coat shall be trowelled hard and tight forcing it to surface depressions to obtain a permanent bond and finished to smooth surface. Interior plaster shall be carried out on jambs, lintel and sill faces, etc. as shown in the drawing and as directed by the Engineer-in-Charge.

### **9.4 Plain Faced Ceiling plaster**

This shall be applied in a single coat of specified thickness. Application of mortar shall be as stipulated in above paragraph.

For external plaster, the plastering operation shall be commenced from the top floor and carried downwards. For internal plaster, the plastering operations for the walls shall commence at the top and carried downwards. Plastering shall be carried out to the full length of the wall or to natural breaking points like doors/ windows etc. Ceiling plaster shall be completed first before commencing wall plastering.

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## **10. Cement Pointing**

### **10.1 Materials**

The cement mortar for pointing shall be in the specified proportion. Sand shall conform to IS : 1542 and shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by Engineer-in-Charge and if so directed it shall be washed/ screened to meet specification requirements.

### **10.2 Workmanship**

Where pointing of joints in masonry work is specified, the joints shall be raked at least 15 mm/ 20 mm deep in brick/ stone masonry respectively as the work proceeds when the mortar is still green.

Any dust/ dirt in the raked joints shall be brushed out clean and the joints shall be washed with water. The joints shall be damp at the time of pointing. Mortar shall be filled into joints and well pressed with special steel trowels. The joint shall not be disturbed after it has once begun to set. The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be raised, flat, sunk or 'V' as may be specified in the respective items of work. No false joints shall be allowed.

The work shall be kept moist for at-least 7 days after the pointing is completed.

## **11. Painting of Concrete, Masonry & Plastered Surfaces**

### **11.1 Materials**

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-Charge for the brand of manufacture and the colour/ shade. All materials shall be brought to the site of works in sealed containers.

### **11.2 Workmanship**

The surfaces to be treated shall be prepared by thoroughly brushing them free from dirt, mortar droppings and any loose foreign materials. Surfaces shall be free from oil, grease and efflorescence. Efflorescence shall be removed only by dry brushing of the growth. Cracks shall be filled with Gypsum. Workmanship of painting shall generally conform to IS : 2395.

## **12. Painting & Polishing of Wood Work**

### **12.1 Materials**

1. Wood primer shall conform to IS : 3536
2. Filler shall conform to IS : 110
3. Varnish shall conform to IS : 337
4. French polish shall conform to IS : 348
5. Synthetic enamel paint conform to IS : 2932

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-Charge for the brand of manufacture and the colour/ shade. All materials shall be brought to the site of works in sealed containers.

### **12.2 Workmanship**

The type of finish to be provided for woodwork of either painting or polishing, the number coats, etc. shall be as specified in the respective items of work to be prepared by the Contractor.

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Painting shall be either by brushing or spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirements of IS : 2338 (Part I).

### 13. Painting of Steel Work

#### 13.1 Materials

1. Zinc chrome primer shall conform to IS : 2074
2. Synthetic enamel paint shall conform to IS : 2932
3. Aluminium paint shall conform to IS : 2339

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer-in-Charge for the brand of manufacture and the colour/ shade. All the materials shall be brought to the site in sealed containers.

#### 13.2 Workmanship

Painting work shall be carried out only on thoroughly dry surfaces. Painting shall be applied either by brushing or by spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirement of IS : 1477 (Part 2).

IS No.	Title
	<b>Construction Planning and Storage of Materials</b>
4082 :	Recommendation on stacking and storage of construction materials at site (first revision)
7969 :	Safety code for handling and storage of building materials
	<b>EARTHWORK</b>
1498	Classification and identification of soils for general engineering purposes (first revision) (Amendments 2) (Reaffirmed)
3764: 1992	Excavation work - Code of safety (first revision)
4081	Safety code for blasting and related drilling operations
	<b>FOUNDATIONS</b>
269 :	33 grade ordinary Portland cement.
432 (Part 1)	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part 1 Mild steel and medium tensile steel bars (third revision)
455	Portland slag cement
456	Code of practice for plain and reinforced concrete (Reaffirmed 2000)
1080 : 1986	Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell)
1489 (Part 1)	Portland pozzolana cement: Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement: Part 2 Calcined clay based
1786	High strength deformed steel bars and wires for concrete reinforcement
1904	Code of practice for design and construction of foundations in soils: General requirements
2062	Steel for general structural purposes
6909	Specification for supersulphated cement
8041	Rapid hardening Portland cement
12269	53 grade ordinary Portland cement.
SP 36 (Part 2) :1988	Compendium of Indian Standards on soil engineering : Part 2 Field testing
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IS No.	Title
	<b>Part 1 Mortars</b>
269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural sources for concrete
455	Portland slag cement
456	Code of practice for plain and reinforced concrete
1344	Calcined clay pozzolana
1489 (Part 1)	Portland pozzolana cement: Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement: Part 2 Calcined clay based
2250	Code of practice for preparation and use of masonry mortars
2720 (Parts 1 to 41)	Methods of test for soils
3812	Fly ash for use as pozzolana and admixture
6452	Specification for high alumina cement for structural use
6909	Specification for supersulphated cement
8041	Rapid hardening Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
12269	53 grade ordinary Portland cement
12600	Low heat Portland cement
SP 20 (S &T) :	Handbook on masonry design and construction
SP 21 (S &T)	Summaries of Indian Standards for building materials
	<b>Part 2 Brickwork</b>
269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural sources for concrete
455	Portland slag cement
456	Code of practice for plain and reinforced concrete
1489 (Part 1)	Portland pozzolana cement: Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement: Part 2 Calcined clay based
2645	Integral cement waterproofing compounds
3812	Fly ash for use as pozzolana and admixture
5454	Methods of sampling of clay building bricks
6452	Specification for high alumina cement for structural use
4014 Part 1 & 2	Code of practice for steel tubular scaffolding
6909	Specification for supersulphated cement
8041	Rapid hardening Portland cement
8042	White Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
9103	Admixture for concrete
12269	53 grade ordinary Portland cement
12600	Low heat Portland cement
SP 20 (S &T)	Handbook on masonry design and construction
SP 21 (S &T)	Summaries of Indian Standards for building materials
1077	Common burnt clay building bricks
2212	Code of practice for brick work
3696 (Part 1)	Safety code of scaffolds and ladders: Part 1 Scaffolds
4014 (Part 2)	Code of practice for steel tabular scaffolding: Part 2 Safety regulations for scaffolding
SP 25 (S & T)	Handbook on caused and prevention of cracks in building
	<b>Stonework</b>
1123	Method of identification of natural building stones
1127	Recommendations for dimensions and workmanship of natural building stones for masonry work
1597 (Part 1)	Code of practice for construction of stone masonry: Part 1 Rubble stone masonry

IS No.	Title
2250	Code of practice for preparation and use of masonry mortars
3316	Specification for structural granite
3696 (Part 1)	Safety code of scaffolds and ladders: Part 1 Scaffolds
4101 (Part 1)	Code of practice for external facing and veneers: Part 1 Stone facing
SP 20 (S & T)	Handbook on masonry design and construction
SP 21 (S & T)	Summary of Indian Standards for building materials
	<b>Plain And Reinforced Concrete</b>
269	33 grade ordinary Portland cement
383	Coarse and fine aggregates from natural resources for concrete
432 (Part 1 & 2)	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement: Part 1 Mild steel and medium tensile steel bars. Part 2 Hard drawn steel wire
455	Portland slag cement
456	Code of practice for plain and reinforced concrete
516	Method of test for strength of concrete
650	Standard sand for testing of cement
3085	Method of test for permeability of cement mortar & concrete
9284	Method of test for abrasion resistance of concrete
5816	Method of test for splitting tensile strength of concrete cylinders
8142	Method of test for determining setting time of concrete by penetration resistance
12600	Low heat Portland cement masonry cement
3466	Masonry cement
3558	Code of practice immersion Vibrator for consolidating concrete
8042	White Portland cement
1343	Code of practice for Prestressed concrete
883	Design of structural timber in building - Code of practice
1199	Methods of sampling and analysis of concrete
1344	Calcined clay pozzolana
1489 (Part 1)	Portland pozzolana cement: Part 1 Fly ash based
1489 (Part 2)	Portland pozzolana cement: Part 2 Calcined clay based
1786	High strength deformed steel bars and wires for concrete reinforcement
1791	Batch type concrete mixers
1946	Code of practice for use of fixing devices in walls, ceilings and floors of solid construction
2062	Steel and general structural purposes
2386 (Part 1)	Methods of test for aggregates for concrete: Part 1 Particle size and shape
2386 (Part 2)	Methods of test for aggregates for concrete: Part 2 Estimation of deleterious materials and organic impurities
2386 (Part 3)	Methods of test for aggregates for concrete: Part 3 Specific gravity, density, voids, absorption and bulking
2386 (Part 4)	Methods of test for aggregates for concrete: Part 4 Mechanical properties
2386 (Part 5)	Methods of test for aggregates for concrete: Part 5 Soundness
2386 (Part 6)	Methods of test for aggregates for concrete: Part 6 Measuring mortar making properties of fine aggregates
2386 (Part 7)	Methods of test for aggregates for concrete: Part 7 Alkali aggregate reactivity
2386 (Part 8)	Methods of test for aggregates for concrete: Part 8 Petrographic examination
2502	Code of practice for bending and fixing of bars for concrete reinforcement
2505	Concrete vibrators - Immersion type - General requirements
2506	General requirements for screed board concrete vibrators
2514	Concrete vibrating tables
2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction
3025	Methods of sampling and test (physical and chemical) for water used in industry
3812	Fly ash for use as pozzolana and admixture

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IS No.	Title
4031 (Part 1)	Methods of physical tests for hydraulic cement: Part 1 Determination of fineness by dry sieving
4656	Form vibrators for concrete
4925	Concrete batching and mixing plant
4926	Ready mixed concrete
4990	Plywood for concrete shuttering work
6452	Specification for high alumina cement for structural use
6909	Specification for supersulphated cement
7861 (Part 1)	Code of practice for extreme weather concreting: Part 1 Recommended practice for hot weather concreting
8041	Rapid hardening Portland cement
8043	Hydrophobic Portland cement
8112	43 grade ordinary Portland cement
9012	Recommended practice for Concreting
9013	Method of making, curing and determining compressive strength of accelerated cured concrete test specimens
9103	Admixtures for concrete
10262	Recommended guidelines for concrete mix design
12269	53 Grade ordinary Portland Cement
13330	Sulphate resisting Portland Cement
12600	Low heat Portland cement
13311 (Part 1)	Non-destructive testing of concrete - Methods of test: Part 1 Ultrasonic pulse velocity
13311 (Part 2)	Non-destructive testing of concrete - Methods of test: Part 2 Rebound hammer
SP 23 (S & T)	Handbook on concrete mixes (based on Indian Standards)
SP 24 (S & T)	Explanatory handbook on Indian Standard Code for plain and reinforced concrete
SP 33 (S & T)	Handbook on timber engineering
SP 34 (S & T)	Handbook on concrete reinforcement and detailing
	<b>Door and Windows (Wood And Metal)</b>
208	Door handles
303	Plywood for general purposes
399	Classification of commercial timbers and their zonal distribution
401	Code of practice for preservation of timber
419	Putty, for use on window frames
1003 (Part 1)	Timber panelled and glazed shutters: Part 1 Door shutters
1003 (Part 2)	Timber panelled and glazed shutters: Part 2 Window and ventilator shutters
1038	Steel doors, windows and ventilators
1081	Code of practice for fixing and glazing of metal (steel and aluminum) doors, windows and ventilators
1328	Veneered decorative plywood
1658	Fibre hardboards
1659	Block boards
2191 (Part 1)	Wooden flush door shutters (cellular and hollow core type): Part 1 Plywood face panels
2191 (Part 2)	Wooden flush door shutters (cellular and hollow core type): Part 2 Particle board and hard board face panels
2202 (Part 1)	Wooden flush door shutters (solid core type): Part 1 Plywood face panels
2202 (Part 2)	Wooden flush door shutters (solid core type): Part 2 Particle board and hard board face panels
2553 (Part 1)	Safety glass: Part 1 General purpose
2835	Flat transparent sheet glass
3087	Wood particle boards (medium density) for general purposes
3097	Veneered particle boards
3129	Low density particle boards

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IS No.	Title
3348	Specification for Fibre insulation boards
3478	Specification for high density wood particle boards
3548	Code of practice for glazing in building
1361	Steel windows for industrial buildings, ventilation blinds for windows
4021	Timber door, window and ventilator frames
1826	Venation blinds for windows
1948	Aluminum doors, windows and ventilators
4020 (Parts 1-16)	Door shutters, method of test
4351	Specification for steel door frames
4913	Code of practice for selection, installation and maintenance of timber doors and windows
4962	Specification for wooden side sliding doors
5187	Flush bolts
5437	Figured, rolled and wired glass
5509	Fire retardant plywood
5539	Specification for preservative treated plywood
6198	Legged, braced and battened timber door shutters
6248	Specification for metal rolling shutters and rolling grills
6534	Guiding principles of grading and inspectiopn of timber
7452	Hot-rolled steel sections for doors, windows and ventilators
12896	Classification of Indian timbers for door and window shutters and frames
SP 21 (S & T)	Summarise of Indian Standards for building materials
SP 33 (S & T)	Handbook on timber engineering
	<b>Steel Construction</b>
104	Ready mixed paint, brushing, zinc chrome, priming
123	Ready mixed paint, brushing, finishing, semi-gloss, for general purposes to Indian Standard Colours No.445, 446, 448, 449, 451, 473 and red oxide
800	Code of practice for general construction in steel
801	Code of practice for use of cold formed light gauge steel structural members in general building construction.
811	Cold formed light gauge structural steel sections
1024	Code of practice for use of welding in bridges and structures subject to dynamic loading
1030	Carbon steel castings for general engineering purposes
1148	Hot-rolled rivet bars (up to 40 mm dia) for structural purposes
1149	High tensile steel rivet bars for structural purposes
1161	Steel tubes for structural purposes
1977	Structural steel (ordinary quality)
2062	Steel for general structural purposes
2074	Ready mixed paint, air drying, red oxide-zinc chrome, priming
	<b>White Washing, Colour Washing and Painting of Masonry, Concrete and Plaster Surfaces (Calcareous Surfaces)</b>
44	Iron oxide pigments for paints
55	Ultramarine blue for paints
109	Ready mixed paint, brushing, priming, plaster, to Indian Standard Colour No. 361 and 631 White and off white
133	Enamel, interior: (a) undercoating, (b) finishing
158	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting
168	Ready mixed paint, air drying, for general purpose
427	Distemper, dry, colour as required
428	Distemper, oil emulsion, colour as required
2395 (Part 1)	Code of practice for painting concrete masonry and plaster surfaces : Part 1 Operation and workmanship

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IS No.	Title
2395 (Part 2)	Code of practice for painting concrete masonry and plaster surfaces : Part 2 Schedule
2932	Enamel, synthetic, exterior (a) undertaking (b) finishing
2933	Enamel, exterior (a) undertaking (b) finishing
3384	Specification for bitumen primer for use in waterproofing and damp proofing
5410	Cement paint
5411 (Part 1)	Plastic emulsion paint: Part 1 for interior use
5411(Part 2)	Plastic emulsion paint: Part 2 for exterior use
6278	Code of practice for whitewashing and colour washing
9862	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali, water and chlorine resisting
	<b>Painting, Varnishing and Allied Finishes (Wood And Metals)</b>
102	Ready mixed paint, brushing, red lead, non settling, painting
110	Ready mixed paint, brushing, Grey filler, for enamels for use over primers
117	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes to Indian Standard Colours No. 101 to 104, 169,174,216, 217, 219, 275, 278, 280,281, 283, 352 to 354, 358 to 365, 384 to 388, 397, 410, 442 to 444
124 (Part 3)	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes: Part 3 (superseding IS 119)
127	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes white
128	Ready mixed paint, brushing, finishing exterior, semi-gloss for general purposes black
133	Enamel, interior: (a) undercoating, (b) finishing
137	Ready mixed paint, brushing, matt or eggshell flat, finishing, interior to Indian Standard colour as required
144	Ready mixed paint, brushing, petrol resisting, air-drying, for interior painting of tanks and container, red oxide (colour unspecified)
158	Ready mixed paint, brushing, bituminous, black lead-free, acid alkali and heat resisting
198	Varnish gold size
207	Gate and shutter hooks and eyes
337	Varnish, finishing interior
348	French polish
401	Code of practice for preservation of timber
423	Plastic wood for joiners filter
524	Varnish, finishing, exterior, synthetic, air drying
525	Varnish, finishing, exterior and general purposes
1477 (Part 1)	Code of practice for painting of ferrous metals in buildings: Part 1 Pretreatment
1477 (Part 2)	Code of practice for painting of ferrous metals in buildings: Part 2 Painting
2338 (Part 1)	Code of practice for finishing of wood and wood based materials: Part 1 Operations and workmanship
2338 (Part 2)	Code of practice for finishing of wood and wood based materials: Part 2 Schedules
2339	Aluminium paint for general purposes, in dual container
2554 (Part 1&2)	Code of practice for painting of non ferrous metals in buildings
2524 (Part 1)	Code of Practice for painting of non-ferrous metals in buildings; Part 1 Pretreatment
2524 (Part 1)	Code of Practice for painting of non-ferrous metals in buildings; Part 2 Painting
2932	Enamel, synthetic, exterior (a) undertaking (b) finishing

<b>IS No.</b>	<b>Title</b>
2933	Enamel, exterior (a) undertaking (b) finishing
3531	Glossary of terms relating to corrosion of metals
3536	Ready mixed paint, brushing, wood primer, pink
3537	Ready mixed paint, finishing interior, for general purposes, to Indian Standard Colours No. 101, 216, 217, 219, 275, 281, 352, 353, 358 to 361, 363, 364, 388, 410, 442, 444, 628, 631, 632, 634, 693, 697, white and black
3539	Ready mixed paint, undercoating for use under oil finishes to Indian Standard Colours, as required
3585	Ready mixed paint, aluminium, brushing priming water resistant, for woodwork
SP 27(S & T) 1987	Handbook on method of measurement of buildings works (first revision)
IS 1200 (Part 2) 1974	method of measurement of building and engineering works : Part2 concrete works (third revision) (Amendment No.2)
IS 1200 (Part 3) 1976	Method of measurement of building and civil engineering works: Part 3 brickwork(third revision)
IS 1200 (Part 4) 1976	Method of measurement of building and civil engineering works: Part 4 stone masonry (third revision)
IS 1200 (Part 5) 1982	Method of measurement of building and civil engineering works: Part 5 form work (third revision) (Amendment No.1)
IS 1200 (Part 6) 1974	Method of measurement of building and civil engineering works: Part 6 refractory work(second revision) (Amendment no.2)
IS 1200 (Part 7) 1976	Method of measurement of building and civil engineering works: Part 7 hardware(second revision)
IS 1200 (Part 8) 1993	Method of measurement of building and civil engineering works: Part 8 steelwork and iron work(fourth revision)
IS 1200 (Part 9) 1973	Method of measurement of building and civil engineering works: Part 9 roof covering (including cladding) (second revision) (Amendment No.1)
IS 1200 (Part 10) 1973	Method of measurement of building and civil engineering works: Part 10 ceiling and linings (Second revision) (Amendment No.2)
IS 1200 (Part 11) 1977	Method of measurement of building and civil engineering works: Part 11 paving, floor finishes dado and skirting (third revision) (Amendment No.1)
IS 1200 (Part 12) 1976	Method of measurement of building and civil engineering works: Part 12 plastering and pointing (third revision)
IS 1200 (Part 13) 1994	Method of measurement of building and civil engineering works: Part 13 whitewashing, colour washing, distampering and painting of building surfaces (fifth revision)
IS 1200 (Part 14) 1984	Method of measurement of building and civil engineering works: Part 14 glazing (third revision)
IS 1200 (Part 15) 1987	Method of measurement of building and civil engineering works: Part 15 painting, polishing. varnishing etc (fourth revision)
IS 1200 (Part 16) 1979	Method of measurement of building and civil engineering works: Part 16 laying of water and sewer lines including appurtenant items (third revision)

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IS No.	Title
IS 1200 (Part 17) 1985	Method of measurement of building and civil engineering works: Part 17 road work including air field pavements (third revision)
IS 1200 (Part 18) 1974	Method of measurement of building and civil engineering works: Part 18 demolition and dismantling(third revision)
IS 1200 (Part 19) 1981	Method of measurement of building and civil engineering works: Part 19 water supply, plumbing and drains (third revision)
IS 1200 (Part 20) 1981	Method of measurement of building and civil engineering works: Part 20 laying of gas and oil pipelines (third revision)
IS 1200 (Part 21) 1973	Method of measurement of building and civil engineering works: Part 21 wood-work and joinery(second revision) (Amendment No.1)
IS 1200 (Part 22) 1982	Method of measurement of building and civil engineering works: Part 22 materials
IS 1200 (Part 23) 1988	Method of measurement of building and civil engineering works: Part 23 piling (fourth revision)
IS 1200 (Part 24) 1983	Method of measurement of building and civil engineering works: Part 24 well foundations (third revision) (Amendment No.1)
IS 1200 (Part 25) 1971	Method of measurement of building and civil engineering works: Part 25 tunneling (second revision) (Amendment No.4)
IS 1200 (Part 26) 1987	Method of measurement of building and civil engineering works: Part 26 Acid resistant lining
IS 1200 (Part 27) 1992	Method of measurement of building and civil engineering works: Part 27 earthwork done by mechanical appliances.
IS 3861:2002	Method of measurement of plinth, carpet and rentable area of buildings (second revision) (Amendment No.3)
IS 1200 (Part 1) 1992	Method of measurement of building and civil engineering works: Part 1 earthwork (fourth revision)
IS 1200 (Part 28) 1992	Method of measurement of building and civil engineering works: Part 28 Sound insulation works
IS 875(Part 1)	Code of practice for dead loads (other than earthquake) for Buildings & Structures.
IS 875(Part 2)	Code of practice for . Imposed loads
IS 875(Part 3)	Code of practice for wind loads
IS 875(Part 4)	Code of practice for snow loads
IS 875(Part 5)	Code of practice for Special loads & combinations
IS 1893 (Part 1)-2002	Criteria for earthquake resistant design of structure.
IS 13920-1993	Ductile detailing of reinforced concrete structures subjected to seismic forces
IS 2911(Part 4) 1985	Code of practice for design & Construction of pile foundation (Load Test on piles)
IS 2911(Part 1)	Sec 2-1979 Code of practice for design & construction of pile foundations (Bored Cast-in Situ pile).

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IS No.	Title
SP 34 (S&T) 1987	Handbook on Concrete reinforcement and detailing.
SP 22 (S&T) 1982	Explanatory handbook on codes for earthquake engineering(IS 4326:1976)
SP 7	National Building (Code-2005) of India.
SP 16(S&T) 1980	Design aids for reinforced concrete to IS 456:1978
IS 1786:1985 & 2008	Specification for High Strength deformed steel bars and wires for concrete reinforcement (third revision) (superseding IS 1139-1966) (Amendment No.1)
SP 24(S&T) 1983	Explanatory handbook on Indian Standard Code of practice for plain and reinforced concrete(IS 456:1978)

## LANDSCAPE & PLANTING STRATEGIES

### (i) Species to be planted

Supply and planting of healthy trees that are grown in 35 litre bags or more with a trunk height of at least 3 meters or more and well-formed root system. Trees to be planted in pits of size 100 cm x 100 cm and 100 cm depth, with a mix of 1/3rd of top soil earth, 1/3rd river sand, 1/3 organic manure/compost. The rate includes transportation of tree sapling, loading, unloading at site, fixing stacking stick of suitable height, pit excavation, manuring, initial watering, cutting, trimming, soil racking, weeding and soil tilting, maintenance of plants for a period of 3 months including mortality replacement if any in complete and as directed by Engineer in charge.

S.no	Large Trees	Local name	Proposed Location
1	<i>Delonix Regia</i>		Bund + Enterece
2	<i>Peltoforum pterocarpum</i>		Entrance, Parking
3	<i>Albizia Saman</i>		Bund(water body)
4	<i>Azadiracta indica</i>		Walk way + parking
5	<i>Pongamia Pinnata</i>		Walk way
6	<i>Palm tree</i>		Walk way

Supply and planting large sized shrubs as per plant list, that are grown in 5 liter bags or more with a trunk height of at least 0.5 metres and well-formed root system, in pits of size 45 cm x 45 cm x 45 cm or trenches of section 45cmx45cm, distance between shrubs should be at least 100 cms and planting to be done with 1/3 rd quantity of top soil earth, 1/3rd river sand, 1/3 organic manure/compost. The rate includes transportation of sapling, loading, unloading at site, fixing stacking stick of suitable height, pit excavation, manuring, intial watering, cutting, trimming, soil racking, weeding and soil tilting, maintenance of plants for a period of 3 months including mortality replacement if any in complete and as directed by Engineer in charge.

S.no	Shrubs	Local Name	Proposed Location
1	<i>Canna indica</i>		Along the compound wall
2	<i>Wind flower</i>		Walkway
3	<i>Taberbernae montana</i>		Walk way
4	<i>Plumeria rubra</i>		compound wall

Supply and planting Ground Covers as per plant list, that are grown in 0.5 litre bags with a height of at least 35cm, and well formed root system, in pits of size 30 cm x 30 cm x 30cm , or trenches of section 30cmx30cmx30cm. The rate includes transportation of sapling, loading, unloading at site, fixing stacking stick of suitable height, pit excavation, manuring, intial watering, cutting, trimming,soil racking, weeding and soil tilting, maintenace of plants for a period of 3 months including mortality replacement if any in complete and as directed by Engineer in charge.

S.no	Ground cover - Creepers		Proposed Location
1	<i>Bougainvillea spectabilis</i>		Along the compound wall
2	<i>Quisqualis indica</i>		Enterance+ walk way+ childrens park
3	<i>Jasmine wine</i>		Enterance+ walk way+

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		childrens park
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Supply and planting Grass cover as per plant list to be done over RCC grid pavers with a mix of 50mm thick layers of soil and manure consisting of 1 part of top soil earth, 1 part of river sand and organic manure/compost and grass seed. This mix to be filed uniformly in the gaps of RCC paver grids The rate includes transportation of plants, loading, unloading at site, manuring, intial watering, cutting, trimming, soil racking, weeding and soil tilting, maintenance of plants for a period of 3 months including mortality replacement if any in complete and as directed by Engineer in charge.

<b>S.no</b>	<b>Grasses</b>	<b>Proposed Location</b>
1	<i>Zypharanthus candida</i>	Resting Places and buildings/ open areas
2	<i>Zoysia japonica</i>	along the bunds

**Section VIII****1. SCHEDULE - A**

**Note:- BOQ statement separately uploaded in E-tender**

- (1) Unit rates and prices shall be quoted by the bidder in Indian rupee
- (2) Where there is a discrepancy between the rate in figures and words, lesser of the two will govern.
- (3) Bill of quantities should be submitted separately as a Financial Bid.

**SCHEDULE - B**  
**LIST OF DRAWINGS**

(attached)

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**Section IX**

**Security Forms**

**FORM OF BID SECURITY (BANK GUARANTEE)**

WHEREAS, ..... (Name of Bidder) (hereinafter called “the Bidder”) has submitted his bid dated ..... (Date) for the {Name of Work} .....(hereinafter called “the Bid”).

KNOW ALL MEN by these presents that We ..... (Name of Bank) of ..... (Name of Country) having our registered office at ..... (hereinafter called “the Bank”) are bound unto ..... (Name of Employer) (hereinafter called “the Employer”) in the sum of ..... for which payment well and truly to be made to the said Employer the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this ..... day of ..... 20.....

THE CONDITIONS of this obligation are :

- (1) If the Bidder withdraws his Bid during the period of bid validity specified in the Form of Bid: or
- (2) If the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the instruction to Bidders: or
- (3) If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of bid validity :
  - a. Fails or refuses to execute the Form of Agreement in accordance with the instructions to Bidders, if required : or
  - b. Fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders; or
  - c. Fails or refuses to furnish the Domestic Preference Security, where required.

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of all of one or more of the above conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date of 162 days after the deadline for submission of bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE..... SIGNATURE OF THE BANK.....

Signature of Tenderer

SEAL OF THE BANK.....

SIGNATURE OF THE WITNESS.....

Name and address of the witness

### Section X

## TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

### A. SPECIAL CONDITION FOR PILE FOUNDATIONS

1. The tenderer shall fill in quantities, rates and amounts for all items except 9,10,11 and for alternative items where only rates are to be quoted.
2. The tenderer shall fill in, the designed capacity of RCC piles for which he is quoting his rate. He must give quantities against items 4 or 5 as per his design and quote his rate thereof. The design calculations for pile caps grade beams and piles must accompany the tender.
3. Details of dowel bars will be given by the Executive Engineer / Superintending Engineer during execution of work but quantity of steel in pile caps and grade beams will be in accordance with the design of the tenderer and to be approved by the competent authority. The cost of reinforcement in piles should be included in the cost of piles against items 4 and 5 of the schedule
4. The number of tests to be conducted in items 9 to 11 shall depend on the direction of the Executive Engineer / Superintending Engineer.
5. The tenderer shall fill in the schedule, the quantities of steel and cement required if supplied by the department and recovered at issue rate for the execution of the job. He should also enclose detailed calculations in support of the figures.
6. The tenderer shall also enclose a layout of piles as per pile design proposed by him.
7. The piles shall be designed and executed generally conforming to the IS 2911(Part II Part III and Part IV) 1979 and National Building Code and other National Standards prevailing from time to time.
8. Payment shall be restricted only to the quantity furnished in the tender for items of work (Grade beams, pile caps, mat concrete, etc.) or as per the tenderer's design to be approved later on, if any alternative design is furnished by the tenderer. It may be noted that under no circumstances payment shall be made for any additional quantities over and above the quantity furnished in the tender. However payment shall be made for quantities executed at the request of the department if for which approval will be obtained by the tenderer from competent authority.
9. The rates shall include work in shift system also and no extra will be entertained for such shift system of work.
10. The tenderer must state the number of piling equipment, the type of equipment and the staff that will be ear-marked for this work.
11. The tenderer must furnish the capacity of jack, the number of dial gauges and their range, the range of pressure gauge, the last date of calibration of pressure gauge, and the manufacturing details for jack, pressure gauge and dial gauges at the time of submitting his tender.

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12. The tenderers must also furnish in his tender a diagrammatic sketch of the load test arrangement offered by them indicating all details of the load test therein if they do not agree to the standard norms for load test prescribed by the Department.
13. The tenderer must offer what only in the department schedule furnished in the tender documents.
14. If the Tenderer is a registered tenderer of COC , he should renew it in time and the renewal is compulsory on the part of the tenderer.
15. Tenders which do not comply with the above conditions will be summarily rejected without assigning any reasons.

## **B. GENERAL CONDITIONS FOR PILE FOUNDATIONS**

### **DEFINITION OF TERMS**

1. **Driven cast-in-situ pile:**  
The pile formed within the ground by driving a casing of uniform diameter, permanent or temporary and subsequently filling in the hole so formed with plain or reinforced cement concrete.  
For displacing the sub-soil, the casing tube is installed with a shoe or plug at the bottom end. When the casing is left permanently it is termed as cased pile and when the casing is taken out it is termed as uncased pile.
2. **Cut off level:**  
It is the level where the installed pile is cut off to support the pile caps or beams or any other structural components at that level
3. **Test Pile:**  
A pile which is selected for subjects to load test and which is subsequently loaded, for that purpose. The test pile may form a working pile itself if subjected to routine load test upto 1.5 times the safe load..
4. **Trial Piles:**  
Initially one or more piles, which are not working piles, may be installed to assess load carrying capacity of the piles by load test. These are called trial piles. The piles are tested either to their ultimate bearing capacity or twice the working load.
5. **Proposed working load:**  
This shall mean the safe load carried by the pile or group of piles indicated by tenderer while submitting the tender.
6. **Final working Load:**  
This shall mean the safe loads that will finally becoming on each pile or pile group due to RCC columns and grade beams. If the loading tests, as defined in clause show that the proposed working load cannot be obtained, the Superintending Engineer shall work out the safe load of pile or group of piles which shall be binding on the tenderer.
7. **Routine Test Load :**  
This is the load applied to a selected pile or group of piles to test its behaviors, under excess of loading at 150 percent of the working load.
8. **Settlement :**  
This is the downward movement of the pile recorded from time to time during the test loading of pile.
9. **Total settlement:**  
This is the downward movement during the test loading of the piles and may consist of closer deformation of the pile itself, deforming of the ground surrounding the pile and any movement of the piles through the ground.

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- 10. Residual Settlement:**  
This is the difference between the total settlement and amount of recovery records if the test load has been totally removed from the pile.
- 11. Elastic deformation:**  
It is the shortening of pile within the elastic limit of the material forming.
- 12. Follower tube:**  
A tube which used following the main casing tube when adequate set is not obtained with the main casing tube and if it requires to be extended further. The inner diameter of the follower tube should be the same as the inner diameter of the casing. The follower tube shall preferably be an outside guide and should be watertight when driven in water bearing strata or soft clays.
- 13. Bored-cast-in-situ pile:**  
The pile formed within the ground by excavating or boring a pile within it with or without the use of a temporary casing and subsequently filling it with plain or reinforced concrete. When the casing is left permanently, it is termed as cased pile and when the casing is taken out, it is termed as uncased pile.  
In installing a bored pile, the sides of the borehole (when it does not stand by itself) it is required to be stabilized with the aid of a temporary casing or with the aid of drilling mud (bentonite) of suitable consistency. For marine situations, such piles are formed with permanent casing (liner).
- 14. Initial load test:**  
It is carried out on test pile(s) which is generally made for the purpose, with a view to determining the safe load and / or ultimate load capacity.
- 15. Routine (Check) load test:**  
It is carried out on a working pile with a view to determine displacement (settlement) corresponding to the allowable (working) load.

#### **SPACING OF PILES :**

- 16.** [ The centre to centre spacing of pile is considered from two aspects (viz).
- 17.** Practical aspect involving installing the piles and.
- 18.** The nature of the load transfer, ie by friction alone or by end bearing alone or by both to the soil and possible reduction in the bearing capacity or group of piles thereby. The choice of spacing is normally made on semi-empirical approach.]
- 19.** In case of piles founded on a very hard stratum and deriving their capacity mainly from end bearing the spacing will be governed by the competency of the end bearing strata. The minimum spacing in such cases shall be 2.5 times the diameter of the shaft.
- 20.** Piles deriving their bearing capacity mainly from friction shall be sufficiently apart to ensure that the zones of soil from which the piles derive their support do not overlap to such an extent that their bearing values are reduced. Generally, the spacing in such cases shall not be less than 3 times the diameter of the shaft.
- 21.** In the cases of loose sand or filling, closer spacing than in dense sand may be possible since displacement during the piling may be absorbed by the vertical and horizontal compaction of the strata. Minimum spacing in such strata may be twice the diameter of the shaft.

**Note:** In case of piles of non-circular cross section, diameter of the circumscribing circle shall be adopted.

**For “Driven” Cast-in-situ-Piles :**

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22. Piles shall be installed as accurately as possible according to design and drawings either vertically or to the specified batter. Greater care should be exercised in respect of installation of single piles or piles in two pile groups. As a guide for vertical piles, a deviation of 1.50 percent and for raker piles, a deviation of 4 percent should not normally be exceeded. Piles should not deviate more than 75 mm from their designed positions at the working level of the piling rig. In the case of a single pile in a column, positional tolerance should not be more than 50 mm. For piles to be cut off at a substantial depth, the design should provide for the worst combination of the above tolerance in position and inclination. In case of piles deviating beyond these limits and to such an extent that the resulting eccentricity cannot be taken care of by a redesign of the pile cap or pile-ties, the piles should be replaced or supplemented by one or more additional piles.
23. In a pile group, the sequence of installation of piles, shall normally be from centre to the periphery of the group or from one side to the other.
24. Sufficient time shall be allowed, when installing piles in a group, for the freshly poured concrete in a pile to set before installing adjacent piles.  
No pile should be less than 12 inches (30 cm) in diameter or side of a square.
25. In forming cast in situ-piles the joints of the piling forms and follower and the bearing of the piling form on its shoe or any driving rim shall be effectively sided in an approved manner so as to prevent subsoil water from gaining access into forms at any stage of driving or withdrawing the forms or when the concrete is being shunted into forms. If water sand or slush or any other impurity get into the forms at the stage of casting or driving the piles and if the water sand or slush or any other impurity cannot be removed to the satisfaction of the Superintending Engineer, the forms shall be pulled out and driven if so required at the tenderer's expense. If in withdrawing the form after casting the pile, it is found that cast in situ pile has been disturbed in any manner or either through the displacement of the reinforcement or pile as a whole or in part, the same shall be reported by the tenderers to Superintending Engineer, who shall decide whether the piles shall be rejected and a fresh pile will have to be driven in the same place with a new shoe and if this is considered impossible or difficult, fresh piles not less than two in number shall be driven in every case of such rejection, at such places as will ensure the centre of gravity of the originally proposed group of system of piles to remain undisturbed and the tenderer shall not be entitled to any payment on account of the rejected pile or of the extra piles required to preserve the center of gravity of the system of piles undisturbed, nor can payments be made for any consequential increase in the capping or beams and payment shall be made for one pile or if it were good pile.

**Pile Withdrawals :**

26. Following the founding of the piles at the correct depth, concrete sufficient for a length of one third pile depth shall be placed in the tube before the initial withdrawal. As soon as the skin friction between the earth and the tube has been broken withdrawal shall be stopped and the remainder of the concrete placed in the tube after which the withdrawal may proceed.
27. During the process of withdrawal the concrete shall be completed by raising and dropping the 3 tonnes hammer on top of the tube. The amount of drops and the rate of striking shall be applied when the pile tube, is at its maximum depth and during the pile tube withdrawal the drop may be reduced and the speed of the striking increased.
28. All concrete in the pile must be thoroughly completed in one operation throughout its length from pile shoe to top of pile, as soon as pile driving is completed. Piles shall not be left un-concreted after driving founding the casing in position at the end of day's work. Either the concreting should be carried out the same day or the pile casing stopped well above the founding depth say for 2 or 3 metres and driving continued next day.
29. **Records :**  
Observations made during the driving of each pile shall be recorded in the proforma enclosed. Number of piles driven and their respective length should be recorded and send to Executive Engineer's office every day. When the last blows for set are given on piles, the

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Exe. Engineer or his representative should be intimated to enable him to record the "set" observation made and recorded set each day shall be sent to the Exe. Engineer's office the following day.

A record shall be kept by the tenderer of the total penetration of every pile and the behavior of such pile during driving. Any deviation from the designed location, alignment or load carrying capacity of any pile shall be promptly reported to the Exe. Engineer / Superintending Engineer and adequate corrective measure reported to him. Such measures shall be taken after approval of the Exe. Engineer / Superintending Engineer. plans showing such deviations and corrective measures shall be filed with the department. On completion of the pile installation, all pile records together with other records such as additional boring or other subsoil information that were obtained during installation for the piles shall also be filed with the department.

30. The tenderer is to guarantee that each pile will sustain after the period of maturing safety without any undue deformation and settlement the proposed working load specified for the pile plus 50 percent over load. All piles shall be fit to carry the specified test load 28 days after placing of concreting in the pile.

31. In case the installation of piles shows a tendency to make the previously installed piles to have accurate level marks shall be put on all piles immediately after installation and all heaved piles shall be reinstated to the required resistance.

32. **Mixing :**

The concrete ingredients shall be mixed thoroughly in mixers designed so as to positively ensure uniform distribution of all the compound materials throughout the mass at the end of mixing period. The mixing of each 1-1/2 cu.m. and less shall continue for about 1-1/2 to 2 minutes for as found best in practice after all materials except the full amount of water are in the mixer.

33. The concrete in RCC items shall be proportioned by volume.

34. For all RCC items, the coarse aggregate will be of broken stone, passing through a screen with 20 mm square meshes and retained on a screen with 6 mm square mesh.

35. The reinforced concrete work shall comply in all respects with the Indian Standard specifications and practice.

36. Effective means shall be adopted to ensure the specified cover to the reinforcement rods, as per IS 2911 (Pt 1/ Sec. 1) 1979.

37. Where rods are lapped, the laps shall be of approved length in accordance with the IS 456 – 2000.

38. **Consolidation :**

Each layer of concrete shall be on worked to obtain concrete of maximum density. All concrete works except concrete for "cast-in-situ" piles shall be compacted by the use of the vibrator.

39. **Uniformity and Strength :**

To obtain a uniformity good quality of concrete test specimen shall be taken by the tenderer at his own cost on the days of concreting as and when required by the Exe. Engineer. These test specimens shall be standard cylinder 15cm diameter and 30 cm high. These tests cylinder shall be tested departmentally or at other approved laboratories and if these tests give strength less than those specified below, the Exe. Engineer shall have a right to penalise the tenderer by rejecting the work done

Minimum cylindrical strength requirements of RCC works

Mix	7 days	28 days
1:2:4	10 N/Sq.mm	15 N/Sq.mm
1:1½:3	13.5 N/Sq.mm	20 N/Sq.mm

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**40. Stresses :**

In no case shall the stress in the concrete under proposed working load exceed 50 kg/cm and 70 kg/cm, in the case of 1:2:4 and 1:1½:3 mix respectively, steel stresses shall not exceed 2300 kg/cm<sup>2</sup> in tension and 1900 kg/cm<sup>2</sup> in compression. When the stresses in concrete piles are reviewed, no consideration will be given for the effectiveness of reinforcement.

**41. For Bored-Cast-In-Situ Piles :**

No pile should be less than 12" (30 cm), in diameter or side of a square. The full depth of the boring in collapsible soil strata should be lined with temporary steel casings. Alternatively approved drilling mud suspension bentonite slurry of adequate specific gravity shall be used for the full depth of the bore, as boring proceeds, to prevent the sides of the bore hole from collapsing. Accordingly the piles shall be classified as

- (1) Lined, bored cast-in-situ piles
- (2) Partly lined bored cast-in-situ piles using drilling mud. In any case, a minimum length of one metre of temporary casing shall be inserted in each bored pile.

- 42.** The bottom of the bored hole shall be cleaned very carefully before commencing the concreting work. The cleaning of the hole must be ensured by careful operation of boring tool / and / or flushing of the drilling mud through the bottom of the hole. Flushing of the bore holes before concreting with fresh drilling fluid / mud is necessary. Sufficient pressure to flush the bored hole must be maintained, which shall be normally continue for required periods. After the borehole has been drilled to its final depth, fresh bentonite slurry shall be pumped through the chisel resting at the base of the hole, to remove completely all cuttings and other loose materials from the base of the hole. During this flushing the speed of the pump shall be increased to maintain additional high pressure. This flushing will normally be executed upto the required time say 15 minutes approximately depending upon the cleaning. After the hole has been thoroughly flushed, the chisel shall be removed for concreting.

**43. Control of Alignment :**

Piles shall be installed as accurately as possible as per the designs and drawings either vertically or specified batter. Greater care should be exercised in respect of installation of single piles or piles in two pile group. As a guide, for vertical piles, a deviation of 1.50 percent and for raker piles, a deviation of 4 percent should not be exceeded, piles should not deviate more than 75 mm or D/10 whichever is more in the case of piles having diameter more than 600mm from their designed position at the working level of the piling rig. In the case of single pile in a column, positional tolerance should not be more than 50 mm (100 mm, in case of piles having dia more than 600mm). In case of piles deviating beyond these limits and to such, an extent that the resulting eccentricity cannot be taken care of by a redesign of the pile caps or pile ties, the pile should be replaced or supplemented by one or more additional piles. In case of piles with non-circular cross sections "D" should be taken as the dimension of the pile along which the deviation is computed. In such cases the permissible deviation in each direction should be different depending upon the dimension of the pile along that direction.

**44. The specification for bentonite and bentonite slurry shall be under :**

- (a) Bentonite powder used for the work shall be tested for its liquid limit which shall be more than 300 percent and less than 450 percent. Sand content in bentonite shall be applied 7 percent (ie. passing through 15"5 Micron-Sieve in dry condition) Method of testing liquid limit shall be as per IS 2720 (pt. V) Clauses 3.4 and 3.5.1.
- (b) Bentonite solution shall be made by mixing it with fresh water using a pump for circulation. The density of the solution shall be about 1.12 depending upon the site conditions and the viscosity as tested by March Cons Method shall be approximately 35 seconds.
- (c) Consistency of the drilling mud suspension shall be controlled throughout the boring as well as concreting operations in order to keep the hole stabilized as well as to avoid concrete getting mixed up with thicker suspension of the mud.
- (d) The swelling index as measured by the swelled volume after 12 hours in abundant quantity of water shall be at least 2 times its dry volume.
- (e) The pH value of the bentonite solution shall be less than 11.5

45. Concreting operations should not be taken up when the specific gravity of bottom slurry is more than 1.12. Concreting shall be done by Tremie method.

46. During installation of bored cast-in-situ piles, the convenience of installation may be taken into account while determining the sequence of piling in a group.

**47. Tremie Method :**

In addition to the normal precautions to be taken in the Tremie concreting the following requirements are particularly applicable in Tremie concreting.

- (a) The concrete should be coherent, which in cement (not less than 370 kg/m<sup>3</sup> and of slump not, less than 150mm.
- (b) When concreting is carried out under water, a temporary casing shall be installed to the full depth of the borehole or 2 metres into non-collapsible stratum, so that fragments of ground cannot drop from the sides of the hole into the concrete as it is placed. The temporary casing may not be required except near the top when concreting is done under drilling mud.
- (c) The hopper and Tremie should be a closed system embedded in the placed concrete, through which water cannot pass.
- (d) The tremie should be large enough with due regard to the size of the aggregate. For 20mm aggregate, the tremie pipe should be of diameter not less than 200 mm; aggregate more than 20mm shall not be used.
- (e) The first charge of concrete shall be filled up in the hopper after plugging the control hole of the hopper with a steel plug or plate. The plug is pulled up after the hopper is filled so that the entire concrete in the hopper will be charged in the bore hole the plug should not be left within the concrete.
- (f) The tremie pipe should always penetrate well into the concrete with an adequate margin with safety against accidental withdrawal of pipe is surged to discharge the concrete.
- (g) The pile should be concreted wholly by tremie and the method of deposition should not be changed part way up the pile to prevent the laitance from being entrapped within the pile.
- (h) All tremie tubes should be scrupulously cleaned after use.  
Normally concreting of the pile should be uninterrupted. In the exceptional case of interruption of concreting but which can be resumed within one or two hours, the tremie shall not be taken out of the concrete. Instead, it shall be raised and lowered slowly from time to time to prevent the concrete around the tremie from setting. Concreting should be resumed by introducing a little richer concrete with a slump of about 280 mm for easy displacement of the partly set concrete. If the concreting cannot be resumed before final set of concrete already placed, the pile so cast, may be rejected.

In case of withdrawal of tremie out of the concrete either accidentally or to remove a choke in the tremie, the tremie may be reintroduced in the following manner to prevent in pregation of laitance of scum lying on the top of concrete already deposited in the box. The tremie shall be gently lowered on to the old concrete with little penetration initially. A warmiculite plug should be introduced in the tremie. Fresh concrete of slump between 150mm and 175m shall be filled in the tremie which will push the plug forward and emerge out of the tremie displacing the laitance or scum. The tremie will be pushed further making fresh concrete sweep away laitance / scum on its way. When tremie is burried by about 60 cm to 100 cm concreting may be resumed.

**48. Records**

Observations made during driving of each pile shall be recorded in the proforma enclosed. Number of piles bored and their respective lengths should be recorded and sent to the Executive Engineer every day, When the pile boring is finished for every pile, it should be intimated to the Executive Engineer or his representative so as to enable him to recorded "set" observation.

**49. For both "driven" and "bored" cast-in-situ piles :**

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Tenderers must satisfy themselves by careful inspection of the plans, examination of the actual sites and of the levels obtaining at the sites about the amount of levelling involved.

- 50.** Tenderers shall furnish the following design features for the pile foundation offered by them after careful examination of the borechells. Laboratory test results on soil samples plans schedule of column loads for the buildings and specifications and tender conditions furnished in the tender document.
- (a) The type of pile foundation proposed by them,
  - (b) A layout of piles showing the single piles, pile groups, category of the piles, total number, working load of proposed piles, mix design in each category of the pile, etc.
  - (c) Plan and cross section of pile proposed showing the reinforcement details plan and section of typical pile caps, section of typical grade beam etc.
  - (d) A statement showing the number of piles adopted, pile capacity, working load actually allowed on each pile.
  - (e) Breakup details for the quantities of various item adopted in the respective tender.
- 51.** The tenderer may be required to substantiate his claim for the proposed working load of each category of pile by a test carried but on a trial pile at his cost at site of work before the award of contract. This includes the cost of pile driving also and his test may be an initial load test or a routine load test at the discretion of the departmental officer.
- 52.** In case the working load proposed in the tender cannot be achieved, additional piles and increased size of pile caps as determined by the Superintending Engineer will have to be installed. The cost of the additional piles and any consequential increase in RCC cappings and grade beams will have to be borne by the tenderer.
- 53.** The mode of measurements for the piles shall be from the tip of the pile shoe to the bottom of the respective pile caps. The tenderers are requested to state the method of piling and concreting proposed by them i.e. by volume basis or by weigh batcher.
- 54.** The roots, of trees, etc. if met with during the pile driving has to be removed by the tenderers at their cost.
- 55.** As the area available for depositing excavated earth at the site is limited, the tenderer should make his own arrangements to remove the surplus earth in such a manner that under the circumstances should progress of work in the particular building or in any part of either building within the site is held up due to accumulation of surplus earth.
- 56.** The tenderer should ensure before arranging for the conveyance of earth from site of work that sufficient quantity of the earth for filling in sides of foundations and basement is retained in the site and no extra payment will be made if due to the neglect of the tenderer, earth has got to be brought from outside at a later date.  
The rate for excavation shall include all necessary shoring, bailing and pumping water found necessary fro the execution of the work.
- 57.** The rate should also include for carting away surplus earth to anywhere within the site and within the purview of standard specification, ie., lead of 10 metres and a lift of 2 metres as may be directed by the Superintending Engineer.
- 58.** The Superintending Engineer will supply details of column dowels bars to be provided in pile caps and the rods will be delivered at the section stores at site of work. The position of dowel bars for each RCC column shall wholly agree with the position of respective RCC columns as indicated in drawings supplied by the Superintending Engineer.
- 59.** The tenderer shall water, ram and thoroughly consolidate the bottom of all excavations at his cost before the construction of the foundation or other work is commenced.

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60. A 75 mm of plain cement concrete 1:4:8 (one cement, four sand and eight hard broken granite stone jelly 40 mm gauge), shall be provided under all pile caps and grade beams and may project 150mm all round beyond the caps and beams.
61. All caps and beams shall be cast so as to have a few construction joints as possible, provision shall therefore be made for casting caps and beams is not less than 8 1/2 cu.m. per day of 8 hours continuous operation. Normal setting cement conforming to I.S alone shall be used for RC caps and beams and for cast in situ piles.
62. The design calculations for safe load on pile offered by the tenderer shall be in accordance with the relevant formulae as per IS 2911 (Part 1 / Section 1 / Section 2) – 1979 and part IV of 1985 and consistent with the soil characteristics and soil parameters furnished in the tender.  
**Note:** Design calculations adopting dynamic pile formulae, when the sub-soil is clayey and when the hard stratum is soft rock is not relevant.
63. Reinforcement proposed for the pile shall be proportional to the size of pile offered so that the reinforcement are not flimsy and does not drift out of position during concreting of piles. Tenderer shall also work out the structural capacity of the pile offered to substantiate the safe load proposed on pile. The stresses adopted for concrete and steel bars shall be in accordance with the IS 456 – 2000 and IS 2911 (Part 1 / Section 1) 1979 and part IV of 1985.
64. Tenderer shall adopt provisions in IS 2911 (Part 1 Section 1/ Section 2), 1979 in the design calculation for pile caps. The depth of as pervious line pile cap adopted should be proportionate to the size of pile offered.
65. The design details for grade beams shall be in accordance with the provisions in IS 2911 (PL III) 1980.
66. When a pile is a group, designed for a certain safe load is found, during or after execution, to fall just short of the load required to be carried by it, an overload upto 10 percent of the pile capacity may be allowed on each pile. The total overloading on the group should not be more than 10 percent of the capacity of the group nor more than 40 percent of the allowable load on a single pile. This is subject to the increase of the load on any pile not exceeding 10 percent of its capacity. This overloading of pile will, however, not be acceptable in the initial stages at the time of submitting his tender.
67. The reinforcement and cover and all other details relating to this will be governed by provision in IS 2911 (Part 1 Section 2, 1979) and as per the directions of the Superintending Engineer / Executive Engineer during execution.
68. The tenderer will conduct loading tests for any particular pile or piles selected by the Superintending Engineer. The test load specified above should be put on a test cap over the pile unaided by another support.
69. The load test on a pile shall not be carried out earlier than 28 days form the time of casting the pile.
70. The tenderer shall himself arrange for the necessary equipments for the application of loads, etc. in the load test and shall remove the same after the test. All the equipments, sand bags, etc. should also be removed from the site after the test is completed to the satisfaction of the Executive Engineer. Rates for testing shall include this and department will not incur any expenditure for supplying or transporting the loads etc.
71. Before any load test is made, the proposed testing equipments, instruments, loading structures to be used for making the load test shall be got approved by the Superintending Engineer.

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72. The pressure gauge will be got calibrated from a recognized institution and the calibration chart produced to the Superintending Engineer before commencement of test.
73. The arrangement of loading platform etc. shall conform to the specifications and drawing enclosed to tender documents.
74. The floor of test pit shall be 15 cm. clear below the bottom of pile cap and filling with soil bottom of pile cap should not be done.
75. The top of the pile cap shall be finished even and smooth and true to plane.
76. The dial gauges used shall be of metric units enabling direct reading of settlement in millimeters and shall be fitted to the datum bars with magnetic bases. The dial gauges should have a range upto 15 mm at least.
77. The datum bars shall be of suitable structural section, (preferable channel section) and should be built in position into masonry or concrete at a distance 5d (five times the stem diameter of the pile) from face to the pile. The datum bars, if used as angles, or any other structural sections, should be straight for the full length. They may be stiffened with cross plates if necessary to keep straightness.
78. The loading platform should be kept at least 1.50 m above G.L. to have sufficient headroom to move about the static load on the platform should be 175 percent working load in the case of routine test and 225 percent working load in the case of initial test.  
The test load may be applied by means of an appropriate capacity hydraulic jack with pressure gauge or load gauge with remote control pump, reacting against rolled steel joints (or) suitable load frame obtaining reaction from the following:-
  - (a) Kentledge heavier than the required test load placed on a platform supported clear of the test pile. An existing structure of adequate weight and suitable construction may serve as kentledge. The centre of gravity of that Kentledge should generally be on that side of the pile and the load applied by the jack should also be coaxial in the pile.
79. The test loads shall be applied in increments of about 20 percent of working load of pile as per design.
80. Settlements shall be recorded with preferably four dial gauges (placed equidistance around the pile) of 0.02 mm sensitivity.
81. Each stage of loading shall be maintained till the rate of movement of the pile top is not more than 0.10 mm per hour in sandy soils and 0.02 mm per hour in case of clayey soils and hard strata or a maximum of 2 hours whichever is greater. For this purpose, the type of soil met with at pile tip shall be considered. The designed safe load should be maintained for 24 hours and settlements should be observed every hour during this period.
82. For each increment, application of load shall be as smooth as possible. Time and settlement observation should be made at the commencement and completion of each increment. Settlement observation shall be continued when each increment load is kept constant at about 15 minutes intervals.
83. Each load increment on the pile will be maintained by operating the jack pumps as required and even if the pressure falls down in the course of testing it will be restored by jacking to the required level.
84. The loading shall be continued upto twice the safe load (working load) designed for the pile or the load at which the total displacement of pile top / cap equals the appropriate value of settlement specified below in the case of initial load test.

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- 85.** The loading shall be continued upto 1 1/2 times the safe load (working load) designed for the pile or the load at which the total displacement of pile top / cap equals the appropriate value of settlement specified below in the case of routine load test/routine cyclic load test.
- 86.** The routine load test shall be cyclic load test.
- 87.** The load on the pile should be removed stage by stage releasing the pressure steadily after completion of the test and rebound observations made for two hours.
- 88.** The assessment of safe load on the pile will be computed as follows in the case of "driven" cast-in-situ piles and bored cast-in-situ piles;
- (a) Two thirds of the final load at which the total settlement attains a value of 12 mm ; unless it is specified that a total settlement different from 12 mm is permissible in a given case on the basis of nature and type of structure. In the latter case, the safe load shall be the corresponding load to actual total settlement permissible.
  - (b) Fifty percent of the final load at which the total settlement equals to 10 percent of the pile diameter in case of uniform diameter of piles and 7.50 percent of bulk diameter in case of under-reamed piles.
- 89.** The observation readings of load test and the load displacement curve for the test shall be sent in triplicate to the Executive Engineer, in the prescribed proforma appended.
- 90.** The rates quoted shall include charges for such items of work as the following and shall be for the finished work in situ and shall include all contingent expenses including of taxes or import duties etc.
- a) Marking and setting at the work : The tenderers shall carryout the same with theodolite and dumpy level and get it checked by the Exe. Engineer. The instruments required for accurate alignment should be procured by themselves.
  - b) Provision of rods, stakes, ropes, concrete and masonry pillars for concrete lines, level and labour required in setting out the work.
  - c) Provision of all necessary scaffoldings, centering and labour and appliances for transporting the hoisting and pile driving machinery and appurtenances inclusive of preparation of road, and paths and for their transports.
  - d) Provision of sheds to keep materials under cover.
  - e) Payment for water and electricity charges, required for the construction, load test, etc.
  - f) Arrangements for protecting work during inclement weather.
  - g) Supply of clean pure water required for work and workmen from any source of water supply. Include for all charges of laying pipes, etc., and supply of water from the corporation mains for works and workman.
  - h) Disposal as may be directed of all rubbish superfluous materials and debris as they accumulate.
  - i) Thoroughly clearing the whole of the work and work site in a clear and orderly condition.
  - j) Allow for all necessary haulage and transport of earth from cutting to banking.
  - k) Allow for hire tools and plant and test loads required for tests of piles and materials thereof inclusive of all labour and incidental charges.
  - l) Allow for carriage expenses including all leads, lifts, loading, unloading and stacking to the satisfaction of the Exe. Engineer.
  - m) Include for periodical test expense of materials and all inclusive charges that may be levied by the Superintending Engineer's to whom samples of materials used on the work will be sent up @ the Superintending Engineer's discretion, periodically for test purposes. The opinion of the Superintending Engineer on the results of the tests as above conducted shall be final and binding on the tenderer.
  - n) Allow for all cost of excavation and running the necessary timber steel form or combination of both and pumping water wherever necessary.
  - o) Watering R.C. Caps and slabs for a period of three weeks from laying of each and other necessary incidental charges.
  - p) Allow for cutting off piles to an even level surfaces the top of the piles to project 50mm into the beams and caps and also for all cutting wastes or wreckage, etc.
  - q) Allow in rate for providing necessary arrangements to enable observations of pile driving, land tests, etc.,

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- r) Allow for the cost of binding wire for which no extra rate will be allowed.
- s) Providing in case of cast-in-situ, piles for sealing the bearing of the piling form its shoes, as also at the joints of the followers and form with gunnies or homp or pulley or in any suitable and approved manner to prevent the subsoil water or any impurity from gaining access into the forms at any strata or driving the form.
- t) The tenderer should arrange for their own mixer and mixer driver.

### **C. CONCRETE FOR STRUCTURES**

#### **1. Description :**

Concrete for structures shall consist of an approval Portland cement, a fine aggregate, a coarse aggregate and water, mixed in the proportions specified.

#### **2. Materials :**

All materials shall conform to the requirement of the relevant specifications as set forth below :

Ordinary Portland Cement	Clause 4
Water	Clause 4
Fine aggregate	Clause 1
Coarse Aggregate	Clause 4
Bitumen for water proofing	I.S. 73
Expansion joint filler	I.S. 1838
Covers for curing and protecting concrete	Clause 4

**Note :** Only ordinary Portland cement shall be used in the work. If for any reason the tenderer desires to use high early strength cement, he shall obtain the written permission of the Superintending Engineer to use it.

#### **3. Equipment :**

All equipment, tools and machinery used in performing the work shall be of approved design, and shall be maintained in a satisfactory working condition.

- (a) Mixer : The mixer shall be of approved design and shall have a rated capacity of not less than 0.2m<sup>3</sup> (7 cft.) of mixed concrete.
- (b) Boxes shall be of strong construction and provided with handle for convenient lifting and loading the mixer. The boxes shall be of such size that it should be possible to measure out the requisite quantity of aggregate in whole boxes or by multiples thereof. Each box shall be provided with a straight edge for striking off after filling.
- (c) Additional Equipment : The tenderer shall provide all small tools and other equipment necessary to complete the work in accordance with the specification.

#### **4. Staging and centering :**

The tenderer shall submit detailed plans for staging and centering for examination by the Superintending Engineer. If such plans are not satisfactory to the Superintending Engineer, the tenderer shall make such changes in them as may be required, but it is understood that the Superintending Engineer' concurrence in the use of the plans as submitted or corrected shall in no way relieve the tenderer of responsibility of obtaining satisfactory results.

For calculating the strength of staging or centering a weight of 2400kg/m<sup>3</sup> (150 lbs/c.ft) shall be assumed for green concrete. The tenderer shall make allowance for the deflection of forms and for shrinkage and settlement of staging or centering in addition to the allowance of dead loads, deflection and camber, as shown upon the plans.

The Superintending Engineer may require the tenderer to use screw jacks hard wood wedges to take up any settlement in staging or centering either before or during the placing of concrete. All staging and false work shall be build on foundations of sufficient strength to carry the load without the appreciable deformation on stable soils like stiff clay and sand spread footings are used and shall be of size to be determined by the load to be supported. In other locations, the false work shall be supported on piles. The piles shall be spaced and driven to support the required

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loads without settlement, staging and centering will be considered as a part of the work and no extra compensation will be allowed.

**5. Forms :**

The tenderer shall submit detailed plans of form work for examination by the Superintending Engineer. In designing forms concrete shall be treated as fluid weighing 2400 kg/m<sup>3</sup> (150 lbs/c.ft.) and in addition a live load of 245 kg/m<sup>2</sup> (50 lbs/s.ft.) on horizontal projection of surface shall be used. Forms shall be so designed and constructed, that they may be removed without injury to the concrete blocks and bracing shall be removed with the forms and in no case shall any portions of the wood forms be left in the concrete. The forms shall be so constructed, set and maintained that the finished concrete shall be of the form and dimension shown on the plans and true to the line and grade.

Form shall be filleted and all sharp corners should be given a be well in case of all projection such as girders, copings etc., sufficient to ensure the easy removal. Special attention must be paid to ties and bracing and when the forms appear to be insufficiently braced or unsatisfactorily built either before or during the placing of concrete, the work shall be suspended until the defects have been corrected without any additional compensation.

The forms shall be printed with a colourless oil or some other satisfactory means taken to prevent the concrete from adhering to that. The forms shall be thoroughly drenched with water immediately before the concrete is placed in them. Forms used a second time shall be thoroughly cleaned and shall be free from bulge, splits, or warps. All forms shall be mortar tight and rigidly braced to prevent distortion due to pressure of the concrete and other loads incidental to construction. In the case of compaction of concrete by vibration external and internal the forms shall be as designed as to withstand the effect of vibration.

The foregoing specifications for forms shall also apply to steel forms. The sheets used shall be of such thickness that tile forms will remain true to shape. All bolts and reet heads shall be counter sunk, clamps, pins or other connecting devices shall be designed to hold the forms rigidly together, and to allow removal without injury to the concrete. Steel forms which do not permit a smooth surface or live up properly shall not be used. Special care shall be exercised to keep steel forms free from rust, grease or other foreign matter which would discolour the concrete. No compensation will be allow for forms, price for concrete shall include the price for forms.

**6. Removal of Staging, Centering and Forms :**

All forms shall be removed in a careful workman like manner. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own weight.

No super-imposed load either dead or live shall be allowed upon the bridge within the period fro which the false work is required to remain in place. Forms may be removed from the vertical surface after 24 hours provided however that in no case shall the forms be removed until the concrete is sufficiently set so that it is self supporting.

The time for removal of staging, centering and forms, shall be as follows :

Centering under beams	28 days
Floor Slab	10 to 14 days
Columns unloaded	4 to 7 days

At the discretion of the Superintending Engineer, the tenderer may be required to leave them in place for a longer period of time and no compensation shall be paid to the tenderer.

**7. Classes of Concrete :**

Unless otherwise stipulated concrete shall be of ordinary grade.

**8. Proportioning and Mixing :**

The approximate proportions necessary to produce concrete have in the required work ability and strength using the aggregates from the sources designated will be furnished in the tender documents, it being expressly understand that this information is only for the convenience or

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the tenderer. After the award of the contract the proportions, that is, the field mix determined by the laboratory for the particular aggregates approved by the Superintending Engineer shall govern.

- (a) **Minimum Compressive Strength** : Concrete shall be made of materials accepted for the project, of the proportions designated by the Superintending Engineer and in accordance with the requirements hereinafter set forth. The proportions shall be based on laboratory tests and shall be such that they will produce durable concrete of satisfactory plasticity and workability and which will attain compressive strength specified below or other values that may be stipulated for a particular work using ordinary Portland cement.
- (b) **Minimum Cement Content** : The minimum cement content shall not be less than 16 bags of 50.8kg per 2.83m<sup>3</sup> (1 cwtper 100 c.ft) or ordinary grade concrete of 1:2:4 mix. Substitute mixes designed by the tenderer will not be accepted. The strength of the concrete will be determined by the Superintending Engineer by testing at least, one test specimen prepared at the site of the work each day concrete is placed, except when additional test specimens are required to obtain result upon which to base the removal of the forms or the opening of the structure of traffic. The test specimens shall be standard cylinders 6 diameter by 12, height and shall be made from concrete taken from the mixes in actual use. The tenderer shall transport the specimens from the site of the works to the laboratory. During transportation the specimens shall be embedded in straw, burlap, or other acceptable material in a manner meeting with the approval of the Superintending Engineer so as to protect them from injury or damage. Testing will be done departmentally. The tenderer shall furnish the concrete and forms used in making tests of the cement, materials and equipment necessary for proper transportation and curing, and labour incidental to the preparation, storage, the cost of all the above shall be included in the contract unit price for concrete. If the test results reveal that any specimen does not conform to the specified strength requirements, the Superintending Engineer shall have authority to reject the corresponding work and all other portions, structurally connected with it.
- (a) **Water Content** : The quantity of water used in the mix shall be the minimum to permit proper compaction and surface finishing of the concrete. The amount of water to be added to each batch will be adjusted by the Superintending Engineer to maintain as nearly as practicable a slump of 50mm to 100mm (2" to 4") for normal reinforced concrete sections normally compacted or heavily reinforced sections compacted with vibratory equipment and slump of 100mm to 175mm (4" to 7") for sections with congested reinforcement not suitable for vibration. The total free water in each batch shall not exceed the volumes given below :

Mix	Minimum cylinder strength requirements 28 days and 7 days optional 0.070 3kg/cm <sup>2</sup> (lbs/sq.in)			Modular Ratio
	Preliminary Tests		Work Test	
	Days 28		Days 7	
1:2:4 Ordinary	2700	1800	1200	15
1:2:4 High Grade	3420	2280	1520	15
1:1:1 / 2:3 Ordinary	3060	2040	1360	15
1:1:1:1 / 2:3 High Grade For 75mm (3") Slump	3960	2640	1760	15
Maximum size of aggregate	12.5mm	20mm (3/4")	25mm (1")	37.5mm

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	(1/2")			(1 1/2")
Water in 0.4536 kg/2.83m <sup>3</sup> (lbs / 100 c.ft)	1,333	1,241	1,204	1,122
Water in 454 litres / 0.028 m <sup>3</sup> (imperial gallons / c.ft)	1.33	1.24	1.2	1.12

**Note :** To obtain 25mm (1") increase or decrease in slump, increase or decrease the water content by 3 percent.

Subject to the maximum water content set forth above, satisfactory plasticity and workability shall be obtained by suitable adjustment in the proportion of coarse aggregate to fine aggregate taking care not to exceed the specified water cement ration. In case it is found that there is no other course, but to exceed the water content, the cement content shall be increased so as to maintain the water cement ration at the minimum value specified.

During construction, the Superintending Engineer shall determine the amount of free moisture and the absorption of the aggregate as often may be necessary and suitable allowances shall be made for these to ensure reasonable control of batching.

- (d) **Consistency :** The consistency shall be determined by making trial mixes with dried aggregate such that the concrete shall be sufficiently workable to enable it to be well consolidated to be worked into the corners of shuttering and around the reinforcement to give the specified surface finish. The slump shall not exceed throughout the whole batch of concrete made with same material, mixed in the same proportions as the trial mixes and used in those parts of the works as directed.

The slump of the trial mix of approved consistency shall be measured using the slump cones at least 5 times a day. The tenderer shall furnish the concrete necessary for the test.

- (e) **Price Adjustment :** In case satisfactory plasticity and workability are not secured using the proportion originally designated by the Superintending Engineer, he may after such proportions as he may deem necessary. If such alternations changes theoretical cement factor originally fixed at the laboratory and if the cost of the cement is included in the unit price of concrete, payment will be adjusted for or against the tenderer in whatever amount the total cost of the cement has been increased or decreased. The amount of such increased or decrease shall be calculated from the theoretical cement factor determined by the laboratory. No such price adjustments for the variations in gradations of aggregate mixture shall be allowed.

- (f) **Batching and Mixing :** The location and preparation of the sites for the stock piling of aggregates the maximum size of stock piles and the method adopted to prevent segregation of coarse and fine material shall be subject to the approval of the Superintending Engineer. Each separate size of coarse aggregates shall be stock piled separately.

The aggregate shall be handled from the stock piles to the batching plant in such a manner as to secure a typical grading of the material. Aggregates that have become mixed with earth or foreign material shall be used only after washing and cleaning. All washed aggregates shall be stocked for draining at least 12 hours before being batched.

After determining the proportions of ingredients for the field mix, the fine aggregate and each separated size of coarse aggregate shall be proportioned and placed into the hopper of the mixer along with necessary quantity of cement. Cement shall be measured by the bag per by weight. At batching or mixing of materials as far as possible shall be on the basis of one or more whole bags of cement. The Superintending Engineer may permit the use of fractional bags of cement in a manner meeting with the approval. Water may be measured either by volume or by weight.

The contents of the hopper shall then be emptied into the drum of the approved mixer taking care to prevent possible loss of cement by being blown away in high wind. The aggregate and the cement shall be thoroughly mixed in the mixer for a

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period of not less than one minute during which time the drum shall make not less than 16, not more than 20 revolutions per minute. The water shall be introduced in a uniform manner during the first 15 seconds of the mixing period. The mixing time may be extended if necessary to obtain thorough mixing and uniform consistency. Any concrete mixed less than the specified mixing time shall be rejected and disposed off by the tenderer at his expense.

The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch. The skip and throat of the drum shall be kept free of accumulation. The volume of material mixed per batch shall not exceed the manufacture's rated capacity of the drum.

The mixer shall be placed as close to the part of the structure being concreted as possible. The concrete shall be mixed only in the quantity required for immediate use. In volume batching suitable allowance shall be made for the bulking of fine aggregate due to the presence of water. For this purpose the bulking shall be determined as directed by the Superintending Engineer. When hand mixing is authorized it shall be done with 10% increase in cement content on a watertight platform and in such a manner as to ensure a uniform distribution of the materials through the mass. Mixing shall be continued until all the stone particles are thoroughly covered and a homogenous mixture of the required consistency is obtained. Hand mixed batches shall be of volume to take in one bag of cement only. No extra cost will be paid for this 10% cement.

#### **D. Handling and Placing :**

Concrete which has remained mixed without reaching its final position longer than 30 minutes or which has developed initial set shall not be used. Retempering concrete by adding water or by other means will not be permitted. No mixture containing lumps of hardened concrete shall be used.

- (a) **General :** The tenderer shall notify the Superintending Engineer of all proposed deposit of concrete sufficiently in advance thereof to permit the S.E. to inspect the forms, reinforcement, and casting preparations before concrete is placed. The operation of depositing and compacting concrete shall be conducted so as to form a compact, dense impervious artificial stone of uniform texture which shall show smooth faces on all exposed faces. The method and manner of placing concrete shall be such as to avoid segregation or separation of the aggregate or the displacement of the reinforcement. If any section of concrete is found to be defective, it shall be removed or repaired as directed by the Superintending Engineer without additional compensation. Concrete shall be placed in continuous layers of thickness as directed by the S.E. not more than one hour shall elapse between the placing of successive layers of concrete in any portion of the structure. Each layer shall be placed and compacted before the preceding batch has taken initial set, to prevent injury to the green concrete and avoid surfaces of separation between the batches. Placing of concrete shall be so regulated the pressures caused by the concrete shall not exceed those used in the design of the forms.

Special care shall be taken to fill each part of the forms by depositing concrete directly as near the final position as possible, to work the coarse aggregate back from the face and to force the concrete under and around the reinforcement bars, without displacing them. All faces shall be well puddled and the mortarflush to the surface of the forms by continuous working with concrete spading implements. In the cases in which difficulty is encountered in puddling the concrete adjacent to the forms, because of reinforcement, shape of forms or any other condition, the concrete mix may be altered by reducing the amount of coarse aggregate. Immediately following the discontinuance of placing concrete all accumulation of mortar splashed upon the reinforcement steely and the surface of the forms shall be removed. Dried mortar chips and dust shall not be puddle into the unset concrete. After the concrete has taken the initial set care shall be exercised to avoid jarring of forms or placing any strain on the ends of projecting reinforcement.

All concrete shall be placed and finished during day light. Whenever it is necessary to continue the mixing, placing or finishing of concrete after the day light hours, the site of the work, shall be sufficiently lighted so that all operations are plainly visible for inspection and with the approval of the Superintending Engineer.

- (b) **Placing Large Volumes of Concrete :** Each monolithic section shall be placed in one continuous operation. Whenever the volume is too great to be place in one continuous

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operation, the work shall be sub-divided as shown in the plan or as directed by the Superintending Engineer. In general the order of construction or sequence of the work will be as indicated on the plans.

- (c) **Bonding New and Old work** : When new concrete is to be placed in contact with the old concrete or with concrete that has already reached its final set, the surface of the old concrete shall be thoroughly cleaned of all laitance, dirt or other foreign materials, then roughened and thoroughly drenched with water until saturated and covered with a coating of mortar or neat cement throughout against which new concrete shall be placed by the cement covering taking the initial set. Care shall be taken to tighten the forms against the face of the old concrete and to thoroughly compact the fresh concrete when placed so as to ensure a good bond.

#### **E. Placing concrete in Footings :**

- (a) **General** : The concrete should be placed in the air rather than under water whenever possible.
- (b) **Placing Concrete in Footings** : No concrete shall be placed in footing until the depth and character of the foundation material have been inspected and approved by the Superintending Engineer. Suitable wood or metal forms shall be used to enclose all footing concrete.

Concrete shall be placed in footing dewatered and dried. That is, the water shall be kept out of the trenches while the concrete is being placed therein. If conditions are such that it is necessary to operate the pumps while placing the concrete, the seepage water must be conducted to a sump at a pump in take in such a manner as not to flow over the freshly posited concrete. Great care must be used to prevent from pumping cement out of the concrete with the water.

If unusual or unforeseen conditions are encountered the Superintending Engineer may permit the placing of concrete under water.

When footing can be so placed forms may be omitted and the entire excavation filled with concrete to the top of the footings, and no payment shall be made for concrete placed outside the footing dimensions shown on the plans.

In wet or soft foundations care shall be taken to prevent dirty mud, or other foreign materials from becoming mixed with concrete which is being placed in the footing.

#### **F. Mechanical Vibration :**

Concrete during and immediately after depositing shall be thoroughly compacted; unless otherwise provided, the compaction shall be done by mechanical vibration to the following requirements.

The concrete shall be compacted by means of a mechanical vibrator operated within the mass of concrete when required by the Superintending Engineer vibration shall be supplemented by hand spading. The concrete shall be spaded by hand in all covers and angles of the forms, and along from the faces while it is being vibrated. The concrete shall be vibrated with a frequency of not less than 3,500 impulses per minute. The vibration shall be of sufficient intensity and duration to cause flow or settlement into place and complete compaction. Over vibration shall be avoided.

The mechanical vibrator shall be : of a type and design approved by the Superintending Engineer. IT shall be adequately powered and capable of transmitting vibration of the required frequency to the concrete. A sufficient number of mechanical vibrators shall be provided on the job so that each batch may be thoroughly compacted immediately after placing and that there will be no delay in placing and compacting ensuring batches. The vibrator shall be applied to the concrete, immediately after depositing and so manipulated that the concrete is reduced to a uniform plastic mass thoroughly compacted. It shall be thoroughly compacted around the reinforcement and worked into the corners and angles of the forms. The forms of the reinforcement shall not be vibrated. Concrete shall be placed in layers of uniform thickness not exceeding 300mm (12") and the apparatus so operated in the vibrating element does not penetrate through the layer of the fresh concrete and disturb the partially hardened concrete in lower layers. Vibrators shall not be pushed into or withdrawn from the mass of concrete too rapidly. The water content of the concrete shall be

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the minimum necessary to produce uniformly dense concrete free from aggregate pockets or honeycombing.

#### **G. Surface Finish :**

Immediately following the removal of forms all cavities produced by the removal of form ties and all other hooks and depressions honeycomb spots, broken edges of corners and other defect, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered smoothly with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry a consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in of all holes. Surfaces which have been pointed shall be kept moist for a period of 24 hours.

All construction and expansion joints in the completed work shall be left carefully tooled and free of all mortar and concrete. Expansion joint filler shall be left exposed for its full length with clean and free edges. After the pointing is completed and the concrete hardened, all fins and irregularities shall be removed neatly by chipping and finished by using carborundum brick to produce a smooth finish. Entire surface after finishing shall present a smooth surface free from water pockets, air bubbles and other honeycomb spots. All such work shall considered incidental to the placing of concrete.

#### **H. Joints – Sliding and Friction Joints :**

When sliding joints are called for on the plans, the surface of the supporting concrete shall be trowelled to a smooth and shall be covered with the required thickness of the bituminous materials or otherwise treated as specified on the plans or as directed by Superintending Engineer.

The plates, angles or other structural shapes shall be accurately shaped, at the shop to conform to the section of the concrete floor. All precautions shall be taken in placing the joints to keep them in correct position during the placing of the concrete. Opening at expansion joints shall be that designated on the plans at normal temperature, and care shall be taken to avoid impairment of the clearance in any manner. The details of the expansion joints shall be as shown in the drawings.

#### **I. Protection and curing of concrete :**

Concrete which has been placed shall be protected against any vibration, jarring or other movement which might injure it before it has reached its final set. Other precautions to ensure the development of strength shall be taken as the Superintending Engineer may direct

Concrete floor slabs and the exposed or surfaces of contract subject to rapid drying shall be protected from the direct rays of the sun and newly placed concrete shall be protected from rain by means of tarpaulin.

Concrete surface exposed or surfaces from which forms have been removed shall be protected by covering as soon as possible with canvas, straw, burlap, and / or other satisfactory materials, or if the surfaces are not covered they shall be kept moist by flushing or sprinkling. Curing shall be continued for a period of not less than 14 days after placing the concrete.

#### **J. Method of Measurement :**

The quantities of the several items which constitute completed and accepted structure will be measured for payment according to the provisions of the contract for these items and in terms of the units provided therein for such item.

Only accepted work will be measured for payment and computation of the quantities thereof will be based on the dimensions shown in the plans ordered in writing by the Superintending Engineer.

All concrete except hand rail concrete conforming to the plans and specifications accepted and placed as directed shall be measured in cubic foot in place; individual quantities shall be worked out to the nearest 0.0028m<sup>3</sup> (1/10c.ft) and the total of each set of measurement shall be rounded correct to the nearest m<sup>3</sup> (cft). No measurements or other allowances will be made for work or material for forms, false work, bracing, or other incidental necessary to complete the work as required

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and no measurement or other allowances shall be made for concrete, placed for the convenience of the tenderer, greater dimensions than those shown on the plans. No deduction shall be made for the volume of the concrete displaced by the embedded steel reinforcement, drain pipes and downfall pipes, expansion joints (bituminous or metallic) and similar items.

#### **K. Basis of Payment :**

- (a) **General :** The several quantities, measured as provided above will be paid for at the contract unit price such as deck slab, tee beams, kerbs, columns, etc., constituting the structure and listed in the contract. These contract unit prices shall be payment in full for furnishing hauling and placing all materials and for furnishing all labour, equipment, tools, an incidentals necessary to complete the work as specified. Concrete for hand rails will be paid for as provided under separate clause.
- (b) **False work and Centering :** The cost of false work an centering complete in place including materials, tools, equipment, labour and work incidental thereto, shall be included under price for concrete and no additional payment will be made therefore. The price for concrete shall also include the cost of any working plant for false work as required by Superintending Engineer.
- (c) **Forms :** the cost of forms, complete in place, including materials, tools equipment, labour and all work incidental to the erection and maintenance. In proper condition until the concrete is poured and hardened and their removal shall be included in the unit prices of concrete for which they are build and no other payment will be made therefore.
- (d) **Curing and Protecting Concrete :** The cost of curing concrete and protecting concrete poured including all materials, tools, equipment, labour and all work incidental thereto shall be included in the unit price of concrete and no other payment will be made therefore.
- (e) **Structural and Expansion Joints :** The cost of steel reinforcements, downfall pipes, drainage, pipes, expansion joints and other steel structurals shall be paid for separately.
- (f) **Finishing Concrete Surfaces :** The cost of finishing all concrete surfaces including labour, tools, equipment and all work incidental thereto shall be included in the unit price for the class of concrete rate.

#### **L. REINFORCED CONCRETE STRUCTURE**

1. **General :**  
Provisions of this section shall apply to all types of RCC structures. Concrete structures and such other parts as are of concrete, shall be built in conformity with the lines, grades dimension, details and design indicated therefore on the plans, and in accordance with the pertinent specifications for all works necessary to complete the bridges structures designated in the proposal. This clause should be read along with Clause 4-16.
2. **Materials :**  
The materials to be furnished and used shall conform to the requirement set forth in the specifications for the several parts of the complete structure. Specific reference to the important items are as follows :  
Concrete for structures : Clause C shall apply  
Reinforcement Bars : Clause shall apply.
3. **Construction Methods :**
  - (a) **General Requirements :** The construction method used shall be in accordance with the requirements set forth in the specifications for the several parts of the completed structures.
  - (b) **False work and Forms :** Shall conform to Clause 4-16
  - (c) **Placing concrete in slab superstructure :** The entire span shall be placed in one continuous operation except as otherwise ordered by the Superintending Engineer.
  - (d) **Placing Concrete in Girders :** Concrete, preferably, shall be deposited by beginning at the central span and working from the centre towards the ends. IN sloping girders, pouring shall being at the one end of the structure that is, lower end and proceed upwards. Concrete in girders shall be deposited uniformly for the full length of the girder and brought by evenly in horizontal layers.  
Concrete girder haunches less than 915mm (3") in height shall be placed at the same time as that in the girder stem. Whenever a haunch has a vertical height of 915mm

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(3") or more, the haunch and the girder shall be placed in successive stages, first upto the lower side of the haunch, second to the lower side of the girder and third to completion.

Concrete in Tee Beam or deck girder spans may be placed in one continuous operation or may be placed in two separate operations, each of which shall be continuous, first to the top of the girder stem, and second to completion. In the latter case, the bond between stem and slab shall be secured by means of suitable shear keys in the top of the girder stem.

- (e) **Placing Concrete in Columns :** Concrete in columns shall be placed in one continuous operation unless otherwise direct. Unless otherwise permitted by the Superintending Engineer no concrete shall be placed in the superstructure until the column forms have been stripped sufficiently to determine the character of the concrete in the column , the load of the superstructure shall not be allowed to come upon the bents until they have been in place at least 14 days, unless otherwise permitted by the Superintending Engineer.
- (f) **Kerbs and Railings :** Solid panelled railing shall be placed the day after the concrete in the floor has been laid. Kerbs and concrete railing other than the solid paneled type shall not be placed until the false work for that superstructure until has been removed.
- (g) For all other items of work the concreting shall be done as directed by the Superintending Engineer.

#### **M. Construction Method :**

- (a) **Spreading and Compacting :-** The earth filling in the embankment shall be moistened and theatrical (Gravel) shall be spread upon it uniformly to the specified depth and in special layers by an approved method, but no material shall be dumped in piles on the embankment and spread there from. The material shall be dragged with a long base drag or other leveling device so as to secure uniform distribution and eliminate all unevenness. The grade shall be checked by means of a set of three boning rods, the crown shall be checked with a set of three camber boards and fish-line following the method explained in Clause 4-191-5(c).

The material shall be uniformly moistened in quantities just sufficient in secure to specified compaction and rolled to such compaction with an approved roller. Rolling shall commence at the edge of each course and progress towards the centre. Under no circumstances shall the centre of any such course shall be rolled first. During compaction care shall be taken to maintain a smooth and uniform surface and crown as shown on the plans, and the finished surface shall confirm to the line grade and cross-section shown on the plans or directed by the Superintending Engineer. During rolling the surface shall be frequently checked and all irregularities shall be corrected by loosening the material and removing on adding material and re-establishing smooth uniform firm surface.

Work on each course shall be performed in a similar manner as mentioned above. No additional layer shall be placed upon a course until it has been thoroughly compacted and sufficiently dried.

- (b) **Testing :-** On completion, the surface shall be tested by means of a ten feet straight edge laid parallel to the centre line of the road, and there shall be no depression visible below the straight edge, 12.5mm (half-an inch) or more in depth.

#### **N. Joining the Old and New surfaces:**

During construction the tenderer shall take all precautions to ensure a smooth and shock free junction between the old and new surfaces.

#### **O. Method of Measurement:**

Supplying, spreading and consolidation of materials will be measured by are in sq.m. (sq.feet) in length being taken along the centre line of the soling and the width along the line at right angles to the centre line. The thickness will be measured by taking difference of levels.

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**P. Basis of Payment:**

Supplying, spreading and consolidation of materials as measured above will be paid for at the contract unit price for same which price shall include the cost, conveyance and stacking of materials and shall include full compensation for spreading, watering, rolling, finishing and all incidental work and for furnishing at labour, tools, paint and equipment for the proper execution of the work.

**Q. PLASTERING WITH CEMENT MORTAR**

**1 Method:** All joints in the masonry shall be raked out at least 20mm (3/4") deep. The walls shall be washed with fresh water and thoroughly wetted for six hours or as directed by the Superintending Engineer before plastering is commenced.

The plaster shall then be laid on with some what more than the required thickness and leveled with a flat wooden rule. The finished thickness shall be sufficient to cover by 12mm (1/2") the surface of the wall in brick masonry. The plaster shall be well pressed into the joint and the surface rubbed smooth after floating it with a thick coat of pure Portland Cement. The proportion of cement and sand shall be one cement and three sand, the mortar conforming to the specification stated below:-

The mortar shall consist of Portland cement and sand each complying with its respective specification mixed in the proportions of one cement and three sand.

Portland cement shall be measured by weight, 40.8 kg (90 pounds) being taken as 0 (:1e and in suitable –sized measuring boxes. They shall be spread on a clean dry platform in layers one over the other and mixed dry three times over.

Water is to be added to the mixtures, only when the mortar is required for use, and then only is sufficient quantity to make the material not profuse enough to drown the cement. All cement mortar to which water has been added, shall be finally deposited in place before initial set begins.

If the mortar has become set or hardened before being used, it shall be rejected and removed from the work spot.

The plastering shall be kept constantly watered for three weeks to avoid possibility of the cracking of plaster, the tenderer should in all cases obtain instructions regarding the size of the strips or squares to be laid in one operation and complete adjoining trips on different days. Should the mortar crack or perish through neglect of watering or for other fault of the tenderer, the work shall be removed and redone at the tenderer's expense, or should the tenderer fail to water the work to the satisfaction of the Superintending Engineer the letter may supply the requisite men to water the work properly and charge the cost to the tenderer.

**2 Measurement and Payment**

The plastering shall be measured in m<sup>2</sup> (square feet) of the surface plastered. Plastering will be paid for at the contract unit price which shall include the cost, conveyance and storing of materials and shall include full compensation for all operations described in the specification, mixing, mortar, plastering, curing and for furnishing all labour, tools necessary for the proper execution of the work.

**R. WELDING****1. Scope:-**

The specification applies to the design and construction of welds made by the metal arc process.

**2. Materials:-**

Reinforcing bars shall conform to Clause 4-9, electrodes used to strength welds shall conform to the requirements of Class 'A' electrode in 1.5.814-1957.

**3. Forms of Butt-Joints:**

Butt-Joints shall unless otherwise agreed to by the Engineer, be made in one of the following forms:

- a. Double 'V Butt-joint
  - b. Single bevel Joint
- Reinforcement of Butt-weld:-

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- (i) Butt-welds shall be build up so that the thickness of the reinforcement at the centre of the weld is not less than 10% the size of the butt-weld subject to a maximum of 3mm (1/8").
- (ii) Where a flush surface is required, the but-weld shall be first build up and then dressed flush.

#### **4. Size of Electrode:-**

The maximum gauge of the electrode is 10mm (3/8") diameter for 20mm (3/4") and above diameter bars.

##### **Workmanship**

- (a) Welds should be made in the flat position.
- (b) Arc length, voltage, and amperage shall be suited to the diameter of the material, type of groove and other circumstances attending the work.
- (c) The surfaces to be welded and the surrounding materials for a distance of at least 12.5mm (1/2") shall be freed from scale, dirt, greese, paint, heavy rust and other surface deposit.
- (d) Rods to be welded shall be held in correct positions by clamps or other suitable devices until welding has been completed.
- (e) Fusion faces may be cut by shearing, chipping, machining or machine gas cutting. Edges shall be left free of slag.
- (f) Each time the work is started, the electrode travel shall be delayed until base metal fusion at the starting point is assured. At the completion of a run, the electrode travel shall be delayed sufficiently to fill arc crater.  
After every interruption of the arc except at completion of the run, the arc shall be restarted ahead of the previous deposit and moved back to fill the crater; or such alternative technic shall be used as will equally well ensure complete filling of the crater, complete fusion between the new old deposit and the base metal at the point of junction, and complete resultant continuity weld.
- (g) Exposed faces of welds shall be made reasonably smooth and regular shall conform as closely as practicable to design requirements and shall not at any place be inside the intended cross sections.
- (h) Welds showing slag inclusions, porosity or lack of proper penetration shall be cut out and re-welded.
- (i) Finished welds and the adjacent parts shall be protected with clean boiled linseed oil after all slag has been removed.

#### **S. Safety Precautions:-**

##### **This applies in case of site welding**

- (a) Operators of welding and cutting equipment shall be protected from the rays of the arc flame by gloves and by helmets, hand shield, or goggles equipped with suitable filter lenses.
- (b) Suitable protection against the rays of the arc shall be maintained by the tenderer when arc welding operations might be viewed with harmful range by persons other than the welding operators and supervisors.
- (c) Welding shelter should be provided to protect welders and the parts to be welded from the weather.

##### **Superintending Engineer Inspection**

- (a) The Engineer shall have free access to the work at all reasonable times and facilities shall be provided so that during the course of welding he may be able to inspect any layer of weld metal.
- (b) The Superintending Engineer shall be notified in advance of any welding operations.
- (c) The tenderer shall furnish the superintending Engineer with copies of any welding operations.

Plant:- The welding plant and equipment shall be best of the type of modern design and to the approval of the Superintending Engineer Either direct or alternating current (but not both kinds) may be used, through out the whole of the work. An ammeter shall be provided to each arc so situated that the Superintending Engineer can check easily the current being used by the operator.

#### **T. Test**

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As soon as welders are employed they shall be required to make a joint in bars and the finished welds (including sufficient lengths of bars on each side) shall be cut out and tested to destruction in a tensile testing machine. If the welded joint on testing develops the full strength of the bar, the welding technic may be deemed satisfactory and the welder competent for the job. Otherwise the welds is to be rejected and the welder is not to be employed.

## **U. CEMENT WASH**

### **1. Materials:**

- (1) Cement
- (2) Slaked lime
- (3) Powdered Glue
- (4) Plaster of Paris
- (5) Alum

### **2. Preparation and mixing:**

The cement wash should be prepared as follows:- First take dry materials consisting of 75% of Portland Cement, 10% each of slaked lime and powered glue size, 3% of plaster of paris and 2% of alum. First place the cement in a pile and mix just sufficient water with it to bring it to a thick paste and keep it stirred with a stick. In a separate vessel mix the lime and plaster together with cement mortar to somewhat thinner consistency. When thoroughly mixed with, add this to the cement and stir the two mixtures very thoroughly together.

In the meantime, melt the glue size with hot water and then pour this solution into the other ingredients. Finally dissolve the alum and add that taking care to mix the whole well together when this has been done, regulate the consistency of the wash by the addition of clean cold water and the best guide is to say that it would be of the thickness of fairly rich Cream.

At the same time, a very important point to watch is to see that no greater quantity of cement wash should be made up at one time that can be used within half an hour. If desired, this need only apply to the cement mixture as the other ingredients may be made up in bulk if required. Then if fresh quantities of cement wash are made up from time to time as they are required, the other proportion of the necessary ingredients may be added from a large quantity and thus a better uniform and more reliable wash should result.

### **3. Application:**

Immediately before applying the cement wash to a surface, the wall should be washed down with plenty of water two coats should be applied at intervals of 24 hours. As soon as the cement wash has dried up the surface should be kept damp by sprinkling water on it at least 7 days.

### **4. Measurement and payment:**

The cement wash shall be measured in m<sup>2</sup> (sq.feet) of the surface to which the wash is given. Cement wash will be paid by the contract unit price which shall include the cost, conveyance, storing of materials and shall include full compensation for all operations described in the specifications, mixing, curing, etc., and for furnishing all labour, tools, necessary for the proper execution of the work.

## **V. HIGH GRADE CONCRETE**

- (1) It shall be controlled concrete
- (2) The mix of the ingredients shall be decided at the time of execution of the work to arrive at the densest concrete.
- (3) The minimum strength of the concrete as specified shall be obtained.
- (4) Preliminary tests shall be made prior to commencement of the work.
- (5) Daily and whenever the materials or the mix, is changed, atleast two cylinders shall be tested, and in addition at least one consistence test carried out.
- (6) The minimum cement content shall be as per the mix adopted.

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- (7) The concrete shall be mixed for a period of not less than two minutes in the mixer, This should be read along with Clause 4-16.

#### **W. SPECIAL CONDITIONS FOR FABRICATION OF STRUCTURAL STEEL WORK**

1. **General:**  
All the steel tested or untested required for the fabrication of a structural steel work will be supplied to the tenderer.
2. **Price variation:**  
Price variation due to any cause whatsoever for any material viz., steel, bolts, and nuts, red lead, electrodes, etc., will not be allowed and the tenderer should include all these factors, while quoting a firm rate.
3. **Design and Drawings:**  
Before actual fabrication is started, detailed working drawings should be furnished by the Tenderer to the Superintending Engineer,....., Department, Corporation of Chennai for approval where section specified in the drawings are not readily available the use of alternative sections for fabrications will be considered and the alternate sections will be allowed to the firm payment to the Tenderer will be based on the Total weight of steel work done.
4. **Fabrication and payment:**  
The fabrication of the steel work will be to I.R.S Specification No.B.3/61 or B.1/62 as the case may be (for steel structures and bridges girders)
5. **Calculation of Weight of Fabricated Steel:**  
The weight of material for which payment has to be made for fabrication erection shall be that which actually enters into the process of fabrication and forms an integral part of steel work as fabricated. In computing the weight of finished steel, no deductions will be made for rivet holes or bolt holes, skew cuts, knoteches etc. and the overall length of the members used in actual fabrication will be taken into account. This will also apply to gussets, which will be paid on the dimensions of the smallest enclosing rectangle. In computing the weight of fabricated steel 3 percent extra will be added to cover the weight of bolts, nuts, etc. and no payment beyond this will be made.
6. **Holding down bolts,** nuts and washes as well as anchor channels or plates will be paid for by their actual weight at the same rate applicable to fabricated steel, other bolts, rivets etc to be used for fabrication on the site connections will be supplied by the tenderer in accordance with the approved drawings without extra payment beyond the 3% admissible as per clause 5 above. Any weight over and above the admissible 3% should therefore be taken into account by the tenderers in quoting their rates.
7. **No additional payments** will be made for joint in structural steel work beyond payment indicated in clause 5 above.
8. **Shop paints:**  
The fabricated steel shall be given one shop coat of paint with red oxide. This will be also be included in the quotation submitted by the Tenderers and no extra will be paid.
9. **Rivetted or Welded Constructions:-**  
Tenderers are to quote for welded construction:-  
**Welded Designs:-**  
In the case of welded designs the following directions shall be observed.  
Shop welding should be adopted wherever possible in fabricating components and sub-members.  
Suitable jibs and fixture should be used both in the field as well as in the shop to avoid distortions during fabrications and erection.  
Components which are mass fabricated in the shops should be proved in the master templates.

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Suitable facilities shall be provided for the inspection of the work during the progress by inspecting officers.

- 10. For contract involving fabrication and erection**, the tenderer shall be responsible for the transportation from the tenderers work to the site of erection, loading the materials and stacking them at the site of work besides being

Responsible for any damages occurring in transit and while keeping them stacked till the materials are erected by him and work is finally accepted by the Corporation.

- 11. Variations and Weight :-**

The weight furnished in the schedule is only approximate and liable to vary based on final approved drawings

#### **X. EARTH WORK EXCAVATION**

Shall conform to T.N.B.P. No. 23 and S.S.R.B. No. 304-02 and 301-02.

Earth work excavating and depositing on bank with initial lead of 10 meters and initial life of 2 meters as per specification. No extra payment will be made for removing the masonry, concrete or any other material met with either at the surface or below at the surface within the specified depth during excavation. Necessary precaution not to damage the underground cables, etc., shall be taken by the tenderer and necessary supports such as strutting, planking, shoring etc., are to be given for which no extra payment will be made.

#### **Y-1 SAND FILLING**

Sand from PWD notified quarries and shall be filled, watered, rammed suitably as may be directed during the execution.

#### **Y -2 LEAN CEMENT CONCRETE 1 :5:10**

- (a) **Coarse Aggregate:-** The coarse aggregate shall consist of blue granite metal of 25 m.m. and 12 mm I.S.S./I.R.C. in 66 2/3% and 33 1/3% proportions respectively. The material should conform generally to T.N.B.P. No. 5A. The aggregate shall be from Pallavaram Quarry.
- (b) **Fine Aggregate:-** The fine aggregate shall be clean river sand free from clay, vegetation or other decayed matter, etc., and free from dust and dirt and shall conform to T.N.B.P. No.7. The river sand should be quarried from palar river in Timmavaram village in Chengalpattu Taluk.
- (c) **Cement:-** Good quality Portland cement shall be used vide T.N.B.P. No. 10 and S.S.R.B. 211.
- (d) **Water:-** All water used in mixing or curing shall be clean and free from oil, salt, or acid vegetable or other substance injurious to finished products and shall conform to S.S.R.B. 212.
- (e) **Concrete Mixing and Placing:-** The concrete shall be machine mixed and vibrated to the satisfaction of the Exe. Engineer or his representative. The water cement ratio shall be maintained as directed by the Exe. Engineer. The work in general shall conform to S.S.R.B.XII and T.N.B.P. 28. If however hand mixing is permitted the tenderer shall use 10% extra cement for which no extra payment will be made.

#### **Z. LAYING AND JOINTING S.W. PIPES**

For conduits the stone ware pipes of 150mm and 250 internal diameter required for the work shall be according to MDSS No. 107 and S.W. pipes shall be laid to proper alignment and level and joining the same by inserting spun yarn in the socket and pointing with cement as per MDSS No.110. The S.W. pipes shall be laid in trenches excavated and refilled with sea sand. These pipes shall be inserted through brick retaining walls at the edges and middle of the trenches consisting of stock

Brick work in cement mortar 1:6 over a bed of brick jelly concrete in lime mortar 1:2:5 for which items payment will be made on unit basis for the measured quantities.

**Note:-** The specifications given above may not be taken as complete but shall be read together with the relevant clauses of CSRB, in the absence of the relevant clause in the SSRB, the relevant clause of MDSS shall be applicable.

### Section XI

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**LIST OF REPUTED RMC PLANT COMPANIES (APPROVED AND AUTHORISED BY GREATER CHENNAI CORPORATION)**

<b>Sl.No</b>	<b>Name of R.M.C. Supplier</b>	<b>Location</b>
1)	M/S I J M Concrete Products PVT LTD.	Avadi Road, Senneerkuppam Village.
2)	M/S Ultra Tech Cement LTD CRMC Division	No: 67, Pallikuppam Road, Noombal Village, Thiruverkadu.
3)	M/S Ultra Tech Cement LTD CRMC Division	No: 51, Nemili Village, Valarpuram post, Sriperumbudur Taluk
4)	M/S Ultra Tech Cement LTD CRMC Division	No: 5/17 B, Dr – Abdul kalam Salai, Vandalur, Kelambakkam Road, Pudupakkam Village.
5)	M/S Ultra Tech Cement LTD CRMC Division	Periyapanicherry Village, Kundrathur Panchayat Union, Sriperumbudur Taluk
6)	M/S Lafarge Aggregates and Concrete India (P) LTD.	No: 32/13,46/3, Opposite to Poonamallee RTO Office, Poonamallee Bye Pass Road, Poonamallee Village & TK, Chennai – 600 056.
7)	M/S Lafarge Aggregates and Concrete India (P) LTD.	No. 142, Developed Plot Industrial Estate, Perungudi, Chennai – 600 096
8)	M/S Lafarge Aggregates and Concrete India (P) LTD.	No : 268/11, Kazhipattur Village, Padur (PO), Kanchipuram District – 603 103.
9)	M/S Lafarge Aggregates and Concrete India (P) LTD.	Valayakarunai Village, Oragadam, Sriperumbudur Taluk
10)	RMC Ready Mix India	Senneerkuppam Village, Poonamallee Taluk, Thiruvallur District
11)	M/S ACC Ltd	Thirumudivakkam Village, Chennai – 600 044.
12)	M/S ACC Ltd	Kazhipattur village, OMR – II Kanchipuram District
13)	M/S ACC Limited	Poonamallee Village, Chennai – 600 056
14)	M/S RayMix Concrete India Pvt Ltd	Sakthi garden, Senneerkuppam Village, Poonamallee Taluk, Chennai – 600 056
15)	M/S VELAVAN CONCRETE	Poonamallee Bye Pass Road, Senneerkuppam, Village, Chennai – 600 056
16)	M/S RMC Ready Mix (India)	Kazhipattur Village, OMR, Chennai - 603103
17)	M/S RMC Ready Mix (India)	No: 4,5,6 & 7, Stephenson Road, Perambur, Chennai – 600 012.
18)	R.S Ready Mix Concrete India Pvt Ltd	Thiruneermalai Village, Near Tambaram, Kancheepuram District
19)	M/S TRISHUL Concrete Product LTD	Poonamallee Bye Pass Road, Chennai 600 056.
20)	M/S RDC Concrete India PVT LTD	No: 2/129, Avadi Road, Senneerkuppam Village, Poonamallee Taluk, Chennai – 600 056

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<b>RESTORATION AND REJUVENATION WORKS OF ALAPAKKAM LAKE IN ZONE -XI, DIVISION 146 IN GREATER CHENNAI CORPORATION, PACKAGE - 13</b>					
Sl. No.	Description of work	Quantity	Rate (Rs.)	Unit	Amount (Rs.)
	<b>De-silting Work</b>				
1	Dewatering the excavated trenches and pools of water in the trenches by using 3Hp to 7HP pumps and other devices including disposing off water to safe distance as directed by the Engineer in charge including cost of machinery, fuel, crew charges and transportation etc. complete.	1000	222.35	Hr	222350.00
2	Earthwork in all soils except Hard Rock requiring blasting conveying for formation of bund with a lead of 12Km deploying earth moving machineries and tipper in layers of 15cm thick including benching formation of bunds braking clods sectioning and extra watering and consolidation by power roller including hire charge etc., complying with standard specification and as directed by Departmental Officers.	68970	153.19	cu.m	10565514.30
3	Carting away the surplus earth/debris to a lead of 12km.including Loading, unloading and dumping in the Corporation Land as directed during execution	3491.5	185.66	cu.m	648231.89
	Construction of Compound wall with see through Grill as per Adyar river Design				
4	Clearing the site: Cutting and clearing jule flora jungle with uprooting.	4225.00	6.49	Sqm	27420.25
5	Earthwork excavation and depositing on bank with initial lead of 10 metres and initial lift 2.00m in hard stiff clay stiff black cotton, hard red earth, shales, Muram, gravel, stoney earth and earth mixed with small size boulders S.S. 20-B.(excluding timbering and bailing out sub-soil water) as per P.W.D. standard schedule of rates for Chennai City. The rate includes refilling with excavated soils (other than sand) complying with standard specifications for filling in foundations and basement	1586.00	160.82	Cum	255060.52
6	Carting away the surplus earth/debris to a lead of 12km.including Loading, unloading and dumping in the Corporation Land as directed during execution.	1189.50	185.66	Cum	220842.57
7	Refilling with excavated earth in regular layers of 15cm thickeach including carefully ramming watering consolidating etc. complete for foundation and basement.	396.50	28.05	Cum	11121.83
8	Providing and laying Quarry Rubbish from approved Quarry including cost and conveyance of all materials to work site, all labour for spreading watering, compacting etc., complete	423.00	408.04	Cum	172600.92

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9	Plain cement concrete using 20mm ISS HSB metal including cost of metal and conveyance charges and including all labour charges and all other incidental charges etc complete as per standard specification 1:3:6 (1 Cement : 3 Coarse sand : 6 Graded stone aggregate 40 mm nominal size)	212.00	4933.00	Cum	1045796.00
10	Supplying and placing of Ready Mix M25 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and down graded machine broken granite stone jelly including transportation and pumping excluding cost of centering and shuttering and reinforcement but including curing, finishing etc as directed by departmental officers	624.00	7684.00	Cum	4794816.00
11	Supplying and placing of Ready Mix M30 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and down graded machine broken granite stone jelly including transportation Vibration charges and pumping excluding cost of centering and shuttering and reinforcement but including curing, finishing etc as directed by departmental officers	44.00	7726.00	Cum	339944.00
12	Supplying and erecting centering for sides and soffits including supports and strutting upto 3m high for plane surface such as RCC slab, rectangular beams, 'TEE' or 'L' beams, lintels, bed blocks, staircase waists and landing slabs, landing beams, canopy, etc., with all cross bracings using mild steel sheets of a size 90x60cm x 3.175mm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (Country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 7.5cm centre to centre etc., complete	1775.00	717.93	Sqm	1274325.75
13	Supplying and erecting shuttering including necessary supports for plane surface in foundation and basement for RCC column footings, lintol blocks, plinth beam, staircase steps, critical steps, critical piers etc. using mild steel sheets of size 90x60cm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre etc. complete.. for Grade beam	1827.00	632.24	Sqm	1155102.48

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14	BORED PILE 450 mm Dia Providing and installing Bored cast-in-situ reinforced cement Concrete pile of specified diametre and length below the pile cap in RMC M25 concrete to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including Bentonite solution machinery charges labour charges etc., all complete. (Length of pile for payment shall be measured from bottom pile to the bottom of pile cap).	2716.00	2028.00	R/M	5508048.00
15	Supplying fabrication and placing in position Ribbed Tor Steel Fe 500 for all reinforced cement concrete works as per the design given including cost of steel, binding wire, etc. complete complying with standard specification.	203452.00	71.00	Kg	14445092.00
16	Providing fusion bonded epoxy coating not less than 175 micron thickness and upto 300 micron to reinforcement of all diameters as per IS 13620/1993 including testing of coating at plant. The cost is inclusive of cost on account of careful handling, PVC coated binding wires, touchup material supplied by coating agency, repair work, loading, unloading and strengthening of bent rods etc., complete as per specification and as directed by the Engineer in charge (inclusive of taxes)	206.24	10800.00	MT	2227402.80
17	Brickwork with FLYASH BRICKS of size 230mmx110mmx70mm in C.M 1:3(1 cement and 3 river sand) including curing etc. complete for walls upto basement, (upto 1m high above GL)	277.00	6251.00	Cum	1731527.00
18	Plastering with Cement Mortar 1:3(One Cement and three sand) 20mm thick with Water proofing compound @2% rate by weight of cement including neat finishing, curing, etc. complete in all floors complying with standard specification.	3121.00	280.04	Sqm	874004.84
19	Painting two coats with Apex exterior grade emulsion of first class quality paint and of approved colour over a priming coat, including thorough scrapping, clean removal of dirt, etc complete and including necessary plaster of paris, putty, wherever required	3121.00	184.22	Sqm	574950.62
20	Supplying and fixing M.S.Grills for OSR Land/Parks compound wall of design using 25 x 10mm MS flats for outerframe Horizontally & vertically. The inner vertical grills shall be 10x 10mm square rods at the spacing of 96mm c/c. The inner horizontal grills shall be 25 x 10mm MS flats adjoining 10 x 10mm square rods both sides at the spacing of 290mm c/c. The horizontal anchoring to wall shall be 20 x 5mm. The vertical anchoring shall be 25 x 10mm. The arrows with vertical shall be 20 x 5mm. (Sketch enclosed) and also as directed	2789.00	1575.00	Sqm	4392675.00
21	Supply and fixing of grill gate	12.00	2100.00	Sqm	25200.00

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	<b>Bund formation and Revetment</b>				
22	Earthwork in all soils except Hard Rock requiring blasting conveying for formation of bund with a lead of 12Km deploying earth moving machineries and tipper in layers of 15cm thick including benching formation of bunds braking clods sectioning and extra watering and consolidation by power roller including hire charge etc., complying with standard specification and as directed by Departmental Officers.	13500	153.19	cu.m	2068065.00
23	Earth work excavation for foundation in all kinds soils in varying depths including dismantling any masonry or roots met within foundation and shoring with planks, baling water if necessary and filling the sides with excavated earth including clearing and levelling site etc., complete with an initial lead of 10m.and lift of 2m	615.00	170.17	cu.m	104654.55
24	Supplying stone dust and filling in regular layers of 15cm thick including watering, consolidating etc. complete for foundation, basement, etc..	2875	408.04	cu.m	1173115.00
25	Supplying and placing of Ready Mix M20 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and downgraded machine broken granite stone jelly including transportation pumping and Vibration charges excluding cost of centering and shuttering and reinforcement but including curing, finishing etc as directed by departmental officers.	350	7339.00	cu.m	2568650.00
26	Supplying and erecting shuttering including necessary supports for plane surface in foundation and basement for RCC column footings, pintol blocks, plinth beam, staircase steps, critical steps, critical piers,etc.,using mild steel sheets of size 90 x 60 cm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre etc. complete.	1530	789.72	sq.m	1208271.60
27	Random rubble masonry work in cement mortar 1:4 including fixing of bond stone wherever necessary including curing, etc., complete.	750.00	4260	sq.m	3194989.35

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28	Providing grouted rough stone apron or revetment 30cm thick including supply of rough stone to proper shape and size , laying in position and packing properly grouting to 23cm deep with stone jelly concrete in CC1:3:6 using 20mm ISS size BG metal and pointing the top portion of the apron or revetment to 75mm deep with C.M. 1:3 including finishing to proper slope level curing etc complete.	1750.00	3250.05	m	5687595.63
<b>Surplus Main Course</b>					
29	Earth work excavation for foundation in all kinds soils in varying depths including dismantling any masonry or roots met within foundation and shoring with planks, baling water if necessary and filling the sides with excavated earth including clearing and levelling site etc., complete with an initial lead of 10m. and lift of 2m	1170.00	170.17	cu.m	199098.90
30	Supplying stone dust and filling in regular layers of 15cm thick including watering, consolidating etc. complete for foundation, basement, etc..	75.00	408.04	cu.m	30603.00
31	Cement Concrete 1:4:8 (M.7.5) (One Cement Four Sand and Eight Aggregate) using 40mm Size HBG stone jelly including dewatering of found necessary and laid in laying of not more than 15Cm thick mixing curing etc., complete and as directed by the departmental officers.	75.00	4313.00	cu.m	323475.00
32	Supplying and placing of Ready Mix M20 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and down ratio using 20mm and down graded machine broken granite stone jelly including transportation , pumping and Vibration charges excluding cost of centering and shuttering and reinforcement but including curing, finishing etc as directed by departmental officers.	480.00	7339.00	cu.m	3522720.00

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33	Supplying and erecting shuttering including necessary supports for plane surface in foundation and basement for RCC column footings, pinto blocks, plinth beam, staircase steps, critical steps, critical piers, etc., using mild steel sheets of size 90 x 60 cm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre etc. complete.	1620.00	789.72	sq.m	1279346.40
34	Supplying and erecting centering for sides and soffits including supports and shuttering upto 3m high or plane surface such as side slabs of RCC boxing and similar vertical RCC slab, etc., with all cross racings using mild steel sheets of size 90x60cm and 10gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre ., complete.	360.00	861.51	Sqm	310143.60
35	Supplying and fabricating RTS / TMT STEEL rods including cutting, bending hooks, cranking, fabricating, assembling and laying in exact position, tying with soft steel wire 16 gauge ,etc., complete conforming to BIS std.	48000.00	71.00	kg	3408000.00
<b>Construction of Dhobi Ghat</b>					
36	Earth work excavation for foundation in all kinds soils in varying depths including dismantling any masonry or roots met within foundation and shoring with planks, baling water if necessary and filling the sides with excavated earth including clearing and levelling site etc., complete with an initial lead of 10m. and lift of 2m	1000.00	170.17	cu.m	170170.00
37	Supplying stone dust and filling in regular layers of 15cm thick including watering, consolidating etc. complete for foundation, basement, etc..	100.00	408.04	cu.m	40805.22
38	Cement Concrete 1:4:8 (M.7.5) (One Cement Four Sand and Eight Aggregate) using 40mm Size HBG stone jelly including dewatering of found necessary and laid in laying of not more than 15Cm thick mixing curing etc., complete and as directed by the departmental officers.	100.00	4313.00	cu.m	431312.94

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39	Supplying and placing of Ready Mix M20 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and downgraded machine broken granite stone jelly including transportation pumping and Vibration charges excluding cost of centering and shuttering and reinforcement but including curing, finishing etc as directed by departmental officers.	115.00	7339.00	cu.m	844014.36
40	Supplying and erecting shuttering including necessary supports for plane surface in foundation and basement for RCC column footings, pinto blocks, plinth beam, staircase steps, critical steps, critical piers,etc.,using mild steel sheets of size 90 x 60 cm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre etc. complete.	80.00	789.72	sq.m	63177.60
<b>Solar Street Lights</b>					
41	Solar Street LightsSupply, erection, testing & commissioning of Solar LED Light, 4.5 meters height Pole with following accessories: (i) LED Lamp: High power White Light Emitting Diode, Light output: 24 Watts with PIR detection, Lumens: 3000 Lumens, work mode: Motion sensor / dimming / full power, 33% on bright on run mode, 100 % bright on PIR detection, Working life: more than 50,000 Hrs, Constant light output minimum 20 Lux.(iii) Solar PV module: 50W Poly / Mono crystalline with 25 years warranty along with Li-ion Battery bank (Two Night backup) along with overcharging Protection and 5 years warranty; Duty cycle: Dusk to Dawn with automatic On/Off operation.(iii) Enclosure: Aluminium Alloy with IP 65 protection with all in one solar street light model, working temperature: -25 deg Celsius to 65 deg. Celsius.(iv) Pole: Pole: GI pole with hot dip galvanized (76.10mm OD x 3.65mm Thick x 4500mm Length) height with all mounting accessories including bracket, base plate, foundation bolts complete, etc., (v) Civil works including earth excavation, concrete for foundation, levelling, conveying to the site and fixing wherever necessary etc., complete with demonstration to the office in charge of the site.	100.00	21500.00	Nos.	2150000.00

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	Watchman cum Pump room				
42	Earth work excavation for foundation in all kinds soils in varying depths including dismantling any masonry or roots met within foundation and shoring with planks, baling water if necessary and filling the sides with excavated earth including clearing and levelling site etc., complete with an initial lead of 10m.and lift of 2m	10	170.17	cu.m	1700.85
43	Supplying stone dust and filling in regular layers of 15cm thick including watering, consolidating etc. complete for foundation, basement, etc..	2	408.04	cu.m	816.69
44	Cement Concrete 1:4:8 (M.7.5) (One Cement Four Sand and Eight Aggregate) using 40mm Size HBG stone jelly including dewatering of found necessary and laid in laying of not more than 15Cm thick mixing curing etc., complete and as directed by the departmental officers.	3	4313.00	cu.m	12939.00
45	Supplying and placing of Ready Mix M20 Graded of Concrete confirming to IS 456/2000 for Reinforcement Cement Concrete Structural elements under controlled water cement ratio using 20mm and down ratio using 20mm and down graded machine broken granite stone jelly including transportation , pumping and Vibration charges excluding cost of centering and shuttering and reinforcement but including curing, finishing etc. as directed by departmental officers.	6	7339.00	cu.m	44034.00
46	Supplying and erecting shuttering including necessary supports for plane surface in foundation and basement for RCC column footings, pin tool blocks, plinth beam, staircase steps, critical steps, critical piers,etc.,using mild steel sheets of size 90 x 60 cm and 10 gauge stiffened with welded mild steel angles of size 25x25x3mm for boarding laid over silver Oak (country wood) joists of size 10x6.5cm spaced at about 90cm centre to centre and supported by casuarina props of 10 to 13cm dia spaced at 75cm centre to centre etc., complete.	53	789.72	sq.m	41855.16
47	Supplying and fabricating RTS / TMT STEEL rods including cutting, bending hooks, cranking, fabricating, assembling and laying in exact position,tyeing with soft steel wire 16 gauge ,etc., complete conforming to BIS std.	590	71.00	kg	41890.00

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48	Brick work with second class bricks (9"x4 3/8" x 2 3/4") in C.M.1:5 (1 cement and 5 river sand) including curing,etc...,complete for 23cm thick walls upto basement (upto 1m high above G.L.).	10	5968.00	cu.m	59680.00
49	Best Indian Teak Wood paneled door shutter for single leaf door. The shutter shall be 40mm thick with moulded panels in 20mm thick planks inclusive of 3 Nos.butt hinges 125mm long, furniture iron fittings,1No.of jappened hooks and eyes 200mm long and 6mm thick and iron pad lock 15cm long including fixing in position,etc.,complete..	5	4471.00	cu.m	22355.00
50	Solid panel PVC door without frame Solid PVC door shutters using 15mm MS sq. tubes for top, lock and bottom rails. The steel tubes shall be covered with 5 mm thick solid PVC sheets. Shutter using 5mm thick solid PVC sheet for panelling shall rigidly fixed in position including necessary furniture and fittings. The over all size of styles shall be 50mmx30mm. The over all size of top rail, lock rail and bottom rail shall be 75mm x 30 mm. including labour charges etc., complete. as per ISI standard.	2	2980.00	sq.m	5960.00
51	Best Indian T.W. glazed louvered ventilators with frames of 75x60mm all-round center etc.,fixed with 4 nos of iron hold fasts. The glass panes of 595gms .louvers fixed to the frames inclined at 45 degree including fixing in position,etc., complete.(ISI STD)	0.5	5532.00	sq.m	2766.00
52	Plastering with cement mortar 1:4 (1 cement and 4 river sand)12mm thick including curing, etc., complete.	95	256.87	sq.m	24402.65
53	Paving the flooring with first quality plain CERAMIC TILES of all colours of size 305mmx305mmx6mm set in C.M.1:3,12mm thick including pointing with white cement,labour,materials,etc., (ISI.std)	2	732.05	sq.m	1464.10
54	Providing dadoo work for the sides of wall, with colour mosaic chips (other than grey colour mosaic chips) of approved colour and quality with necessary caves of the same material at the junction of walls to a finished thickness of 10mm laid in situ with the same colour cement with suitable border 75mm wide including a base plastering in C.M.1:4 12mm thick made rough with zigzag lining including rubbing and polishing the dadoo surface to glossy finish etc.,complete.(ISI STD)	15	794.66	sq.m	11919.90

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55	Providing and fixing in position vertically marblestone of size 105cmx60 cm depth 1.8cm partition in the urinals with Raj Nagar marble stone of white hard, dense homogenous colour without cracks, and fissures of size (3.0+2.0)5'height thickness varies from 18 to 20mm including making grew in the wall and pointing and packing with cement mortar 1:3 polishing, finishing on both sides etc., as directed at site. Providing and laying first quality Verified tiles of all colours of size 605mmx605mmx9.6mm in cm 1:3, 12mm thick including pointing with white cement. Labour, Materials, etc. (Relevant ISI std)	6	1763.00	sq.m	10578.00
56	Roofing with best Mangalore tiles set in Lime Mortar 1:2 ( 1limeand 2 river sand) over flat tiles of size 15cmx15cmx12mm and including teak reepers,etc...,complete.(ISI STD)	7	1140.35	sq.m	7982.45
57	Colour washing two coats with supercem or snowcem or any other approved cement based (with relevant ISI STD) colour washing over new plastered walls by brush with silvery grey or any other approved colour as may be directed during execution. The surface must be free from dust, oil, etc., Loose materials and dust must be removed by brushing and washing before applying the cement based colour wash the surface shall be saturated with clean water. The mixed cement based colour wash shall pass through a fine wire mesh sieve before applying by brush, curing, etc., complete as directed during execution.	95	90.19	sq.m	8568.05
<b>Water supply and Sanitary Arrangements</b>					
58	Boring using power rig 125mm dia upto hard formation and boring 100mm dia below this in rock formation. The entire column to be cleaned at site as directed including hire charges for the power rig for drilling the bore as described above both upto hard formation and then in rock formation (including the cost of fuel charges, transporting to and from the power rig etc.,complete.) including flushing the bore using compressor for a minimum time of 12 hours etc.,complete providing the danger lights during night time etc.,complete as directed during execution.	15.00	1343.10	R/M	20146.50
59	Supplying and lowering PVC pipe 125mm dia plain casing pipe of 6kg/sq.cm. ISI Std.	10.00	331.00	R/M	3310.00

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60	Supplying and lowering PVC pipe 125mm dia slotted casing pipe of 6kg/sq.cm. ISI Std.	5.00	350.00	R/M	1750.00
61	Supplying and Jointing 40mm dia P.V.C pipe.including cutting,threading and jointing with necessary specials fixing towall withclamps and screws including making holes in the wall or drilling holes in roof and making good the wall or roof after fixing with necessaryscaffolding etc.,complete	12.00	181.78	R/M	2181.36
62	Supplying & Jointing 25mm dia PVC pipe.including cutting, threading and jointing with necessary specials fixing to wall with clamps and screws including making holes in the wall or drilling holes in roof and making good the wall or roof after fixing with necessary scaffolding etc.,complete	24.00	132.04	R/M	3168.96
63	Supplying & Jointing 20mm dia PVC pipe.including cutting, threading and jointing with necessary specials fixing to wall with clamps and screws including making holes in the wall or drilling holes in roof and making good the wall or roof after fixing with necessary scaffolding,etc.,complete.	6.00	116.74	R/M	700.44
64	Supplying and erecting SINTEX or approved equivalent make HDPE plastic vertical cylindrical 500 Litre water storage tank, strickly adhreing ISI standard as per ISI mark 12701 (Latest revision) including all taxes and freight charges within Corpn.City Limit.	1.00	4300.00	Nos.	4300.00
65	Supplying and fixing P.V.C. pipe 110mm dia rain water down fallpipe as per ISI standard (I.S.4985)including P.V.C.Bends without door arrangements, shoes, gratings with F.I.Clamps 40mmx20mm of suitable size fixed to wooden plugs embedded in walls in cementmortar 1:3 (1 cement and 3 M-sand including cutting holes inwalls and making good the same after fixing the plugs,etc.complete as directed by the Engineer in charge.	6.00	328.55	R/M	1971.30
66	Supplying and fixing 25mm dia wheel valve.	1.00	529.00	Nos.	529.00
67	Supplying and fixing 40mm dia wheel valve.	1.00	884.00	Nos.	884.00

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68	Supplying and fixing white glazed earthen ware wash basin of size 55x40cm of approved make with a pair of G.I.brackets, 15mm dia C.P.Pillar tap, 32mm C.P.waste fittings with rubber plugs and C.P.chain 32mm, 75cm long P.V.C.waste pipe with necessary union solder joint 90cm long with 15mm lead and brass connections with brass nuts and 15mm dia G.M.wheel valve and giving necessary connection, etc., complete including cost of white lead, teakwood plug, screws, rubber washers including painting two coats of approved make and colour paint over etc., complete. (wash basin should be got approved by the Buildings Engineer before use on works).	1.00	2707.00	Nos.	2707.00
69	Construction of inspection chamber of size 60x60x90cm with necessary earth work excavation 40mm size brick jelly concrete in C.M.1:4:10 (1 cement, 4 M-sand and 10 broken brick jelly) stock brick work in C.M.1:6 (1 cement and 6 M-sand) for 23cm thick wall, benching, channelling and plastering, interior, exterior and top with C.M.1:3 (1 cement and 3 M-sand), 12mm thick and providing 7.5cm thick RCC loose slab covering in CC 1:2:4 (1 cement and 2 M-sand and 4 blue granite broken stone jelly of 12mm to 20mm size) with necessary reinforcement and arrangements to lift for cleaning purpose, etc., complete.	1.00	8545.00	Nos.	8545.00
	Electrical works				
70	Wiring with 2x 1.5 sqmm (22 / 0.3 ) PVC insulated single core unsheathed copper conductor cable of 1100V grade in suitable PVC rigid pipe on wall and ceiling with PVC accessories and with TW switch box and 5A F.T. switch with painting of suitable colour with continuous earth wire connection of 14 SWG TC wire for open PVC light point / Fan point (For Electronic regulator)	4.00	1596.00	Point	6384.00
71	Supply and fixing of surface mount patty type 1 x 36 watt T.L fitting complete with electronic ballast with TW round blocks on wall or ceiling with flu tube with PVC unsheathed Copper leads from terminals to the fitting.	1.00	393.40	Nos.	393.40

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72	Wiring with 2x4 sqmm(56/0.3) PVC insulated SCunsheathed Cu.Conductor cable of 1100V grade insuitable PVC rigid pipe on wall and ceiling with PVCaccessories with 150mm x100mm x113mm TWswitch box in flush with wall with 3mm thick hylesheet cover for 15 A 3 pin flush type non inter lockingCS socket with painting of suitable colour withcontinuous earth wire connection of 14 SWG TC wirefor open PVC power plug point.	1.00	1166.00	Point	1166.00
73	Supply & Fixing of 48" sweep size CEILING FAN of 5 Star Rated with double ball bearing , down rod, canopy complete set (with out speed regulator) ( ON EXISTING CLAMP WITH 300 MM DOWN PIPE )	1.00	1727.30	Nos.	1727.30
74	Supply and fixing of 3 Nos. 5Amps (3 Pin and 2 Pin) combined flush type wall socket with control switches concealed in suitable TW Box covered with Hylem sheet in flush with wall with earth connection (For Computer Plug Socket)	2.00	467.00	Nos.	934.00
75	Supply and run of 2 of 4sqmm (56/0.3) PVC insulated SC unsheathed Cu.Conductor of 1100V Grade in suitable open PVC rigid pipe on wall and ceiling with continuous earth wire connection of 14 SWG TC wire with painting of suitable colour	15.00	161.00	R/M	2415.00
76	Cost of KIOSK pillar box	1.00	21200.00	Nos.	21200.00
77	Cost of Erection of KIOSK pillar box	1.00	4235.00	Nos.	4235.00
78	SUPPLY OF 63 AMP / 3Phase Analogue single dial AUTOMATIC STREET LIGHTING ON / OFF CONTROLLING TIMER UNITS as per departmental specification	1.00	14600.00	Nos.	14600.00
79	FIXING OF ABOVE 63 AMP / 3Phase Analogue AUTOMATIC STREET LIGHTING ON / OFF CONTROLLING TIMER UNITS as per departmental specification	1.00	850.00	Nos.	850.00

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80	Supply and fixing of TNEB Meter Board suitable for 3 Phases 63A service connection made up of suitable angle iron frame work of size 2 feet x 1 1/2 feet using angle iron of size 1 1/2" x 1 1/2" x 1/4" rigidly fixed on wall covered with hylem sheet of size 2 feet x 1/2 feet of 6mm thickness with necessary bolts and nuts supports and supply and fixing of 3 Nos 63A fuse units (500V) 1 No. Neutral link, copper earth flat of size 1" x 1/4" with inter connection of EB meter to fuse units by 7/16 PVC insulated copper wire with earth connection complete	1.00	3643.00	Set	3643.00
81	FRP Deluxe Bench Made of stainless Steel pipe with 1 inch Foundation Rods Seats made of mould plastic.	10	10225.00	Nos	102250.00
82	Multi Function Gym Butterfly	5	48000.00	Nos	240000.00
83	Swing 2 Seater	5	16750.00	Nos	83750.00
84	Spiral Slide	5	83000.00	Nos	415000.00
85	Roller Slide	5	42900.00	Nos	214500.00
86	FRP Swing	5	14000.00	Nos	70000.00
87	FRP Arch Ses saw	5	21000.00	Nos	105000.00
	Grass strip & Lawn				
88	Refilling the excavated earth after breaking clods and mixing with sludge or manure in the ratio of 8:1 (8 parts of stacked volume of earth after reduction by 20% : one part of stacked volume of sludge or manure after reduction by 8%), flooding with water, filling with earth if necessary, watering and finally fine dressing, leveling etc. including stacking and disposal of materials declared unserviceable and surplus earth by spreading and leveling as directed, within a lead of 50m lift up to 1.5 m complete	1700	750.00	Cum	1275000.00
89	Making lawns including ploughing and breaking of clod, removal of rubbish, dressing and supplying doobs grass roots and planting at 15 cm apart, including supplying and spreading of farm yard manure at rate of 0.18 cum per 100 sqm.	1700	42.90	Sqm	72930.00
90	Grassing with 'Doobs' grass including watering and maintenance of the lawn for 30 days or more till the grass forms a thick lawn free from weeds and fit for moving including supplying good earth if needed. For In rows 7.5 cm apart in either direction	1700	39.60	Sqm	67320.00
91	Stainless Steel Handrail 900mm high Providing an...lead, lift, etc. as directed by Engineer in-charge.	1700	5716.80	R/M	9718560.00
92	supply and planting of Terminalia arjuna (NEER Maruthu)	100	435.65	No	43565.00
93	supply and planting of pongamia pinnata (Pungam)	100	461.25	No	46125.00
94	supply and planting of ficus religiosa (Arasa)	100	410.00	No	41000.00

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	maram)				
95	supply and planting of sterculia foetida	100	384.40	No	38440.00
96	supply and planting of Acacia auriculiformis	100	375.00	No	37500.00
97	Digging of pits 60 x60x60	108	170.17	Cum	18378.36
98	Supply and stacking of red erath	27	1836.00	Cum	49572.00
99	Supply and stacking of river sand	27	1295.02	Cum	34965.54
100	Supply of well decomposed farm yard maure	27	1660.00	Cum	44820.00
101	Mixing charges of Red earth,sand ,Manure	108	75.70	Cum	8175.60
102	supply and fixing of retro reflective sign borad	2	15290.00	Nos.	30580.00
103	Hume pipe 600 mm dia	121	3036.60	Rm	367428.60
104	Side walls in RCC M20	108	7339.00	Cum	792612.00
105	Providing of WEIR arrangement	2.00	500000.00	Nos.	1000000.00
				Work Value in Rs.	<b>94614360.13</b>
				GST 12%	<b>11353723.22</b>
				Work Value with GST	<b>105968083.35</b>

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