



Tender No: MWCJL/IT/ITES/ISW/2008-09/T-10

TENDER

FOR

**Construction of
Water Supply System - Phase II
FOR Handicrafts & Light Engineering SEZ of
MWC JAIPUR**

September 2008

EMPLOYER : MAHINDRA WORLD CITY (JAIPUR) LIMITED, 411, NEEL
KANTH TOWERS# 1, BHAWANI SINGH ROAD, C-
SCHEME, JAIPUR-302001
PHONE : 0141-4007025-29; FAX: 0141-4007030

MAHINDRA WORLD CITY (JAIPUR) LIMITED, JAIPUR

**BID FOR CONSTRUCTION OF WATER SUPPLY SYSTEM FOR
HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II AT
MAHINDRA WORLD CITY, JAIPUR**

Tender No : MWCJL/IT /ITES/ISW/2008-09/T-10

Date of Issue : 10th September 2008

Tender Document issued to:

M/s

.....

.....

By

Mahindra World City (Jaipur) Limited

SEZ Project Office,

Vill & PO – Kalwara,

Tehsil- Sanganer, Dist-Jaipur -302029

Phone No: 09799299120/ 09929388805

Fax : 0141-4007030

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MAHINDRA WORLD CITY (JAIPUR) LIMITED, JAIPUR

BID NO: MWCJL/IT/ITES/ISW/2008-09/T-10

**NAME OF WORK : WATER SUPPLY SYSTEM FOR HANDICRAFTS AND
LIGHT ENGINEERING SEZ FOR PHASE II**

**PERIOD OF ISSUE OF BIDDING DOCUMENT : From: 10.09.2008 to 16.09.2008
Time: 10:00 Hours to 17:00 Hours**

**LAST DATE AND TIME FOR RECEIPT OF BIDS : Date: 22.09.2008
Time: 17:00 Hrs.**

INVITATION FOR BID
(IFB)

MAHINDRA WORLD CITY (JAIPUR) LIMITED, JAIPUR

INVITATIONS FOR BIDS (IFB)

Date: - 10th September 2008

Bid No:- MWC/JL/IT/ITES/ISW/2008-09/T-10

1. **MAHINDRA WORLD CITY (JAIPUR) LIMITED** is developing at MAHINDRA WORLD CITY, JAIPUR and invites item rate Bids for the below mentioned works from the selected Bidders.
2. Tender document can be downloaded from our web site www.mahindraworldcity.com/jaipur/Tenders.html,. Hard copies of the document can be taken from the below mentioned address by paying Rs. 2000/- in the form of Demand Draft/ Bankers cheque from Nationalized/ Scheduled bank..

Mahindra World City (Jaipur) Limited
SEZ Project Office,
Vill & PO - Kalwara
Tehsil – Sanganer, Dist - Jaipur -302029
Phone No: 09799299120/ 9929398805
Fax : 0141-4007030
3. Bids must be delivered to **Mahindra World City (Jaipur) Limited**, SEZ Project Office, Vill & PO Kalwara, Tehsil Sanganer, Dist- Jaipur -302029, on or before **17:00 Hours** on **22.09.2008** for Hard Copy submission. If the office happens to be closed on the date of receipt of the Bids as specified, the Bids will be received on the next working day at the same time and venue.
4. Other details can be seen in the Bidding documents.

TABLE - IFB 1

S. No.	Name of work	Cost of document (Rs.)	Earnest Money Deposit	Period of completion
1	Construction of WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II at MAHINDRA WORLD CITY, JAIPUR	2000.00 *	Rs One (1.0) lac to be deposited by lowest bidder before award of contract	Twelve (12) Months

*For those Parties who will take the hard copies of the document.

In case the bid document has been downloaded from website, the bid fee of Rs. 2000/- shall be paid by Demand draft/ Bankers cheque in favour of Mahindra world City (Jaipur) Ltd. Payable at Jaipur.

Seal of Office

SECTION 1: INSTRUCTIONS TO BIDDERS

(ITB)

Section 1: Instructions to Bidders

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A. General Instructions

1. Scope of Bid

- 1.1 **Mahindra World City (Jaipur) Limited** (MWCJL), (referred to as Employer in these documents) invite Bids for the **Construction of WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II at MAHINDRA WORLD CITY, JAIPUR** (as defined in these documents and referred to as "the Works") detailed in the table No.IFB-1.

2. One Bid per Bidder

- 2.1 Each Bidder shall submit only one Bid for one Contract.
2.2 Tender documents are not transferable

3. Cost of Bidding

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

4. Site visit

- 4.1 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

5. Contents of Bidding Documents

- 5.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 8 (if any)

Part - I	Invitation for Bids containing Sections as below.	
Sections	1	Instructions to Bidders
	2	Letter of Acceptance and Agreement form
	3	Conditions of Contract
	4	Contract Data
	5	Forms of Securities
Part - II	Specifications	
Part - III	Tender Drawings	
Part - IV	Price Part (SCHEDULE OF QUANTITIES)	

6. Clarification of Bidding Documents

- 6.1 The Employer has the sole discretion to short list Bidders and shall inform them in writing by Fax/e-mail. These short listed Bidders (shall be known as Bidder/Bidders hereinafter) requiring any clarification of the Bidding documents may notify the Employer by e-mail to jaipur tenders@mahindraworldcity.com or by Fax only. The Employer will respond to any request for clarification all such queries shall be made at least seven (07) days before date of submission of Bids as per **Clause 16**.

C. Preparation of Bids

7. Language of the Bid

- 7.1 All documents relating to the Bid shall be in the English language.

8. Documents comprising the Bid

- 8.1 The Bid submitted by the Bidder shall comprise the following:
- a) The SCHEDULE OF QUANTITIES wherein the Bidder shall fill in the rates; original plus one photocopy duly signed and stamped by the Bidder on each page.
 - b) Specifications and Drawing Volumes original plus one photocopy duly signed and stamped by the Bidder on each page.
 - c) any other materials required to be completed and submitted by bidders in accordance with these instructions

The Price Part (SOQ) under **Sections 5 of Sub-Clause 5.1** shall be filled in without exception.

9. Bid Prices

- 9.1 The quoted item rates shall be deemed inclusive of all costs for material, labour, plant, equipment, overhead, supervision, profit, preliminaries, all temporary works, night works, shift works, storage facility, security, working with site constraints, working with full compliance to all requirement, restrictions etc. from all relevant authorities, unless or otherwise specified in the tender document. All the taxes, duties, royalties, levies, VAT, Entry tax and income tax on the profit of the Contractor, service tax to be included in the quoted rates .
- 9.2 If at later stage any tax component is getting exempted by approval of notified SEZ, the same shall be passed to Mahindra world City Jaipur Ltd by the contractor.. The Contractor shall coordinate with on site Government Agencies to realise the SEZ Exemptions and Benefits and forward the same to the Client.
- 9.3 The item rate quoted by the Bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment on any account whatsoever.

10. Currencies of Bid and Payment

- 10.1 The rates and the prices given are in Indian Rupees.

11. Bid Validity

- 11.1 Bids shall remain valid for a period not less than 60 (sixty) days after the date for Bid submission specified in **Clause 16**. A Bid corrected by the Bidder as valid for a shorter period shall be rejected by the Employer as non-responsive.

12. Contract Price

The Contract Price will remain fixed during the extended period of validity, if any.

13. Bid Security

- 13.1 The Employer on his sole discretion will notify the Bidder (as per **Sub-Clause 6.1**) for negotiation. The Bidder shall furnish as a part of his Bid, a Bid security in the amount as shown in column 4 of the table IFB-1 or as notified by the Employer before participating in negotiations. The Bid security shall be in favour of **Mahindra World City (Jaipur) Limited** in the form of a Demand Draft or Banker's Cheque or Pay order payable at Jaipur.
- 13.2 The Bid Security of unsuccessful Bidders will be returned within 30 days of the end of the Bid validity period specified in **Sub-Clause 11.1**.

- 13.3 The Bid Security of the successful Bidder will be adjusted with Performance Security when the Bidder has signed the Agreement and furnished the required Performance Security.

14. Format and Signing of Bid

- 14.1 The Bidder shall prepare the Bid as specified in **Clause 8** in One(01) copy.
- 14.2 The Rate in the original and one duplicate copy of the Bid shall be typed or written in indelible ink and 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.
- 14.3 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 signed by the person or persons signing the Bid.

D. Submission of Bids

15. Sealing and Marking of Bids

- 15.1 The Bidder shall submit the original Bid in one sealed envelop marking as “**Bid for Construction of WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II at MAHINDRA WORLD CITY, JAIPUR**” at Mahindra World City, Jaipur”.

Financial Bid shall contain

Part – IV : SCHEDULE OF QUANTITIES wherein the Bidder shall fill in the unit rates in digits and words and each page duly signed and sealed.

- 15.2 The envelope shall be addressed to the Employer at the following address:

Mahindra World City (Jaipur) Limited
SEZ Project Office,
Vill & PO – Kalwara,
Tehsil- Sanganer, Dist-Jaipur -302029
Phone No: 09799299120/ 09929388805

16. Deadline for Submission of the Bids

- 16.1 Bids must be received by the Employer at the address specified above no later than **17:00** hours on **22nd September 2008**. In the event of the specified date for the submission of Bids declared a holiday for the Employer, the Bids will be received up to the appointed time on the next working day.
- 16.2 The Employer may extend the deadline for submission of Bids by issuing an amendment indicating the revised deadline.

E. Bid Opening and Evaluation

17. Process to Be Confidential

- 17.1 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.

18. Correction of Errors

- 18.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) Where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and
 - (b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.
- 18.2 The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount the Bid will be rejected.

19. Employer's Right to Accept any Variation

- 19.1 The Employer reserves the right to accept or reject any variation, deviation from the Bid document, or any alternative offer. Variations, deviations and alternative offers and other factors which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Bid evaluation.

F. Award of Contract

20. Award Criteria

- 20.1 The Employer will negotiate with the Bidder whose Bid has been determined to be substantially responsive to the Bidding documents. On completion of negotiations the Employer will award the Contract to the most suitable Bidder.

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

- 21.1 Notwithstanding **Clause 19**, the Employer reserves the right to accept or reject any Bid or part of the Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.

22. Notification of Award and Signing of Agreement

- 22.1 The Bidders whose Bid has been accepted will be issued Letter of Intent incorporating the final negotiated value of contract and major terms agreed mutually. Detailed work order comprising final negotiated item rates and detailed terms negotiated and agreed mutually shall be issued in due course alongwith form of agreement provided in bidding documents incorporating all agreements between parties.

23. Performance Security

- 23.1 Within 10 days of receipt of the Letter of Intent, the successful Bidder shall deliver to the Employer a Performance Security in any of the forms given below for an amount equivalent to 5 % of the Contract price.
- a bank guarantee in Employer's prescribed format.; or
 - Bank draft, in favour of **Mahindra World City (Jaipur) Limited** payable at **Jaipur**.
- 23.2 If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be from a Nationalised/Scheduled Bank acceptable to Employer and shall be in Employer's prescribed format.
- 23.3 Failure of the successful Bidder to comply with the requirements of **sub-Clause 23.1** shall constitute a breach of Contract, cause for annulment of the award and any such other remedy the Employer may take under the Contract, and the Employer may resort to awarding the Contract to any other Bidder, on sole discretion of Employer.

24 Corrupt or Fraudulent Practices

- 24.1 The Employer expects the Bidders, Suppliers, Contractors, and Consultants, observe the highest standard of ethics and integrity during the procurement and execution of such Contracts .Therefore, the Employer will reject the Bid and blacklist such Bidder, barring him from participation in future Bidding in the event he found indulged in any malpractice such as bribe, or other inducements to any person with a view to influence the placing of the Contract

SECTION-2

LETTER OF INTENT AND AGREEMENT FORM

Table of Forms:

- **LETTER OF INTENT**
- **AGREEMENT FORM**
- **WORK ORDER**

Letter of Intent
(Letterhead of the Employer)

To,
.....
.....

Dear Sirs,

This is to notify that your Bid and subsequent negotiations for the execution of **CONSTRUCTION OF WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II AT MAHINDRA WORLD CITY, JAIPUR** for the negotiated Contract Price of Rs..... (Rupees) is hereby accepted by Mahindra World City (Jaipur) Limited.

You are hereby requested to furnish Performance Security in the format attached herewith for an amount of Rs. within Ten (10) days, of receipt of this Letter Of Intent, valid up to 30 days and sign the Contract, failing which action as per Sub-Clause 23 of Instruction to Bidders shall be taken.

Thank you

Yours faithfully,

Head (Infra. & Dev.)

Mahindra World City (Jaipur) Limited
SEZ Project Office,
Vill & PO – Kalwara,
Tehsil- Sanganer, Dist-Jaipur -302029
Phone No: 09799299120/ 09929388805

Agreement Form

Agreement

This Agreement, made the _____ - 2008, between **Mahindra World City (Jaipur) Limited** (hereinafter called “the Employer”) of the one part and

_____[name and address of Contractor] (hereinafter called “the Contractor”) of the other part.

Whereas the Employer is desirous that the Contractor execute **CONSTRUCTION OF WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ FOR PHASE II AT MAHINDRA WORLD CITY, JAIPUR** (Bid No. MWCJL/IT /ITES/ISW/2008-09/T-10 (hereinafter called “the Works”) and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a Contract price of Rs. _____ (Rupees _____)

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall 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 Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the 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.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - i) Letter of Intent;
 - ii) Work order;
 - iii) Contractor’s Bid;
 - iv) Contract Data;
 - v) Conditions of Contract (including Special Conditions of Contract);
 - vi) Specifications;
 - vii) Drawings;
 - viii) SCHEDULE OF QUANTITIES and Rates; and
 - ix) Any other document listed in the Contract Data as forming part of the Contract.

In witness whereof the Parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of

_____ was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____

In the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____

SECTION 3: CONDITIONS OF CONTRACT

General Conditions of Contract

A. General

1. Definitions

- 1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

SCHEDULE OF QUANTITIES or SOQ means the priced and completed SCHEDULE OF QUANTITIES and rates forming part of the Contract.

The **Contract** is the Contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in **Clause 2.2** below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body who has been awarded the Works by the Employer.

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Work order and thereafter as adjusted in accordance with the provisions of the Contract.

Date of Commencement is the date as stated in the Letter of Intent from the Employer to the Contractor.

Days are calendar days; **months** are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Actual Completion Date.

The Employer is the Party who will employ the Contractor to carry out the Works.

Engineer in Charge shall be HEAD (Infrastructure & Development) of the Employer or person nominated by him.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer in Charge by issuing an extension of time.

The **Actual Completion Date** is the date on which the Engineer in Charges shall issue the Completion Certificate as per **Clause 33**

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Specification means the Specification of the Works referred in the Contract and any modification or addition made or approved by the Engineer in Charge in writing.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A **Variation** is a written instruction given by the Engineer in Charge which varies the Works.

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

Party and Parties is the Employer and the Contractor individually and the word Parties shall be construed accordingly

Relevant Authority shall mean all Parties which have jurisdiction on the works.

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 Engineer in Charge will provide instructions clarifying queries about the Conditions of Contract.
- 2.2 All Contract Documents, all correspondence and communications to be given, and all other documentation to be prepared and supplied under the Contract shall be written in **English**, and the Contract shall be construed and interpreted in accordance with that language.
- 2.3 If any of the Contract Documents, correspondence or communications are prepared in any language other than English then the English translation of such documents, correspondence or communications shall prevail in matters of interpretation.
- 2.4 The documents forming the Contract shall be as follows and their order of priority shall be interpreted in the given order
 - (i) Work order
 - (ii) Agreement
 - (iii) Letter of Intent.
 - (iv) Priced schedule of quantities
 - (v) Contract Data
 - (vi) Conditions of Contract including Special Conditions of Contract
 - (vii) Specifications
 - (viii) Drawings
 - (ix) Any other document listed in the contract data as forming part of the contract

3. Legal Construction.

Subject to provision of clause, the Work Order shall be in all aspect, construed and operated as Contract under Indian Contract Act 1872, and in accordance with Indian Laws enforce for the time being and is subject to the jurisdiction of the court, **Jaipur**.

4. Communications

Communications between Parties which are referred to in the conditions are effective only when given in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

5. Personnel

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

If the Engineer in Charge or Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or his work force the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

6. Insurance

6.1 Notwithstanding that the Contractor is to indemnify The Employer. The Contractor All Risks and Workmen's Compensation insurance policies to cover the whole project and without limiting the obligations, responsibilities, duties and/or liabilities of the Contractor, the Contractor shall effect at his own costs for others insurance policies deemed necessary in the joint names of The Employer and Contractor to cover the Contract works as given in Contracts Data.

7. Possession of the Site

7.1 The Employer shall give possession of the Site to the Contractor.

8. Instructions

8.1 The Contractor shall carry out all instructions of the Engineer in Charge which comply with the applicable laws where the Site is located.

9. Settlement of Dispute

If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of foregoing, any question regarding its existence, validity or termination or the execution of the works, whether during the process of works or after completion and whether before or after termination or breach of the Contract the Parties shall seek to resolve any such dispute or difference by referring the matter to Engineer in Charge. The Engineer in Charge will give its decision within fifteen (15) days of referring the dispute, either Party if not in Agreement with Engineer in Charge's decision, may within fifteen days of decision by the Engineer in Charge refer to the senior management of the Employer, who will give its decision within thirty (30) days of referring the dispute. Either Party if not in Agreement with senior management's decision, may refer to arbitration pursuant to **Clause no. 10** of General Conditions of Contract.

10. Procedure for Disputes Resolution

10.1 The Arbitration shall be conducted in accordance with the arbitration procedure stated below.

The procedure for arbitration will be as follows:

- (a) In case 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 arbitral tribunal shall consist of three (03) 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 thirty (30) days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Dispute Resolution (India).

- (b) If one of the Parties fails to appoint its arbitrator in pursuance of sub-Clause (a) and (b) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other Party, then the Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Dispute Resolution (India), both in cases of the Foreign Contractor as well as Indian Contractor, shall appoint the arbitrator. A certified copy of the order of the Indian Council of Arbitration /President of the Institution of Engineer in Charges (India)/The International Centre for Alternative Disputes Resolution (India), making such an appointment shall be furnished to each of the Parties.
- (c) Arbitration proceedings shall be at Jaipur, Rajasthan, India, and the language of the arbitration proceedings and that of all documents and communications between the Parties shall be English.
- (d) 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, the 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.
- (e) Where the value of the Contract is Rs.50 lacs and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by Agreement between the Parties; failing such Agreement, by the appointing authority, namely the Indian Council of Arbitration/President of the Institution of Engineers (India)/The International Centre for Alternative Disputes Resolution (India).
- (f) 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.

B. Time Control

11. Avoidance Of Delay

- 11.1 It is paramount that the Contractor shall constantly plan his work so as to most efficiently utilize all or any available part or parts of the site, any completed part or parts of another Contractor's works which is to be integrated into the Contract Works (if any), the available drawings and all others matters as are available to him, as well as his own resources in order to avoid or reduce any standstill and down time.
- 11.2 In event that the Contractor cannot commence or proceed with a particular part of the Contract Works as per the programme furnished to the Employer in accordance with **Clause 11.1**, for any reason whether attributed to the Contractor or not, the Contractor shall be obliged to reschedule and proceed with other parts of the Contract Works at no costs to the Employer to ensure that the completion date of the Contract Works will be met.
- 11.3 Should the Contractor fall behind any program submitted in accordance with Clause 11.2, due to any act, default, neglect or omission of the Contractor and requires over-time, night work or shift work and /or an increase of man power and/or construction plant to regain the scheduled progress (whether or not instructed by the Employer), the cost of such measures shall be borne by the Contractor.
- 11.4 Within the time stated in the Contract Data the Contractor shall submit to the Engineer in Charge for approval a Construction Program including Environmental Management Plan.
- 11.5 The Engineer in Charge's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Engineer in Charge again at any time. A revised Program is to show the effect of Variations.

12. Extension of the Intended Completion Date

- 12.1 **Time shall be of the essence with respect to the commencement and completion as per the key Contractual dates as mentioned in the Contract Data as Milestones for the execution and completion of the Contract Works as stated.**
- 12.2 The Contractor acknowledges that a high rate of working is required to achieve the Dates for Completion of the Contract Works and Contractor shall be deemed to have allowed for shift working, sufficient plant, labour, flood lighting and any or all other measures to achieve the same.
- 12.3 The Dates of Completion of the Contract Works may be extended by The Employer subject to compliance by the Contractor with **Clause 11** (Avoidance of Delay), by such period which reasonably reflects any delay in completion of the Contract Works which, notwithstanding due diligence and taking of all reasonable steps by the Contractor to avoid or reduce the delay as provided for in **Clause 11**, is caused:-
- a) By the occurrence of an event of Force Majeure;
 - b) By a delay in handing over of the Site or part of the Site by The Employer after the Dates for Commencement of the Contract Works;
 - c) Any variations requested by The Employer;
 - d) By other Contractors carrying out works not forming part of the works to be carried out under the Sub Contract, and employed by the Employer;
 - e) By an instruction to suspend the Contract Works issued by the Employer pursuant to this Contract provided that such suspension is not due to the fault of the Contractor;

- f) If the Employer has delayed in providing materials, drawings, instructions and/or approvals where Employer is to seek the approval, which have been requested by the Contractor in writing, and which request is neither too early nor too late for the timely completion of the Contract Works;

and which affects the Contract Works PROVIDED that such delays are not due to the Contractor. PROVIDED FURTHER THAT if, while the Contractor is continuing works during the period when liquidated and ascertained damages are being deducted, The Employer gives instruction or matters occur which would entitle the Contractor to an extension of time then The Employer shall assess and give the Contractor an extension of time and so notify the Contractor accordingly.

- 12.4 It shall be a condition precedent that the Contractor shall notify The Employer in writing of any factors and the relevant Contract provision (if any) which Contractor considers entitles Contractor to an extension of time together with a statement of :

- a. the reason why the delay in completion of the Contract Works is likely to result or has resulted;
- b. an estimate of the period by which the Contract Works are likely to be or had been delayed; and
- c. details of steps that the Contractor proposes to take to avoid or reduce the delay;

within seven (07) days of the commencement or occurrence of any such factor or such extension of this seven (07) days period as The Employer may allow.

- 12.5 The Contractor shall notify The Employer within fourteen (14) days of the cessation of the factors notified to The Employer under **sub-Clause 12.4**; to enable any provisions, that the Contractor may require to the proposed extended Date for Completion to be made as quickly as possible and such other particulars as shall be reasonably necessary to enable the Employer to properly consider the revision.

- 12.6 Without prejudice to any other grounds which do not entitle the Contractor to an extension of time, the Contractor shall not be entitled to extensions of time for delays resulting from weather conditions, or discrepancy in the Contract Documents, whether such events affect the Contract Works or not.

- 12.7 Notwithstanding the foregoing, the Employer shall not be obliged to take into account any circumstances that are not notified to The Employer in accordance with the periods referred to in **sub-Clause 12.3 and 12.4**.

- 12.8 The Employer shall as soon as is reasonably practical after receipt of the Contractor's notification furnished in accordance with the sub-Clause 11.3 determine and notify the Contractor in writing of any extension of time to which the Employer considers the Contractor is entitled under **Sub-Clause 12.4**.

- 12.9 For the avoidance of doubt, the Contractor had agreed NOT TO CLAIM for all costs, loss and /or expense suffered or incurred by reason of any extension of time granted by the Employer in accordance to Sub-Clause 11.4 herein except by reason of **sub-Clause 12.3 (b) 12.3 (d) 12.3 (f)**.

13. Force Majeure

- 13.1 Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the Party affected, and shall include the following:

- 13.1.1 War, hostilities or warlike operations (whether a state of war be declared or not), invasion, act of foreign enemy and civil war, rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts, confiscation, nationalization, mobilization, commandeering or requisition

by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority

13.1.2 Strike (other than strike by employees/staff/labour of Contractor or Sub-Contractor), sabotage, embargo, import restriction, epidemics, quarantine and plague.

13.1.3 Earthquake, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or nuclear or other natural disaster

14. Delays Ordered by the Engineer in Charge

14.1 The Engineer in Charge may instruct the Contractor to delay the start or progress of any activity within the Works.

C. Quality Control

15. Identifying Defects

- 15.1 The Engineer in Charge 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 Engineer in Charge may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer in Charge considers may have a Defect.
- 15.2 The Contractor shall permit the Employer's technical auditor to check the Contractor's work and notify the Engineer in Charge and Contractor of any defects that are found.

16. Tests

- 16.1 If the Engineer in Charge instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect all such test/tests shall be carried out by the Contractor at his own cost and shall be deemed to be included in the rates given by Contractor.

17. Correction of Defects

- 17.1 The Engineer in Charge 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.
- 17.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer in Charge's notice.

18. Uncorrected Defects

- 18.1 If the Contractor has not corrected a Defect within the time specified in the Engineer in Charge's notice, the Engineer in Charge will have the right to get the defect rectified by third party at risk & cost of the contractor, along with overheads.

D. Cost Control

19. SCHEDULE OF QUANTITIES

- 19.1 The SCHEDULE OF QUANTITIES shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.
- 19.2 The Schedule of Quantities is used to calculate the Contract Price. The Contractor Shall be paid for the actual quantities duly approved by the Engineer in Charge and the Contract Price shall be adjusted based on approved actual quantities of the Contract works as described in Schedule of Quantity for each item.
- 19.3 The rates set out in the Schedule of Quantity (SOQ) are fixed, firm and shall be inclusive of all costs and expenses.
- 19.3.1 Preliminaries works / costs such as site measurement, supervision, setting out, insurances, water, electricity/power, security/ watching, protection of public, working around and in connection with underground services, cables, pipes, etc. working/liaison with consultant engineers, Government and other Relevant Authorities etc.
- 19.3.2 All associated temporary and false works.
- 19.3.3 Preparation and maintenance of access and / or haul road, etc.
- 19.3.4 All tests, sampling, inspection, reports, opening up of works and related works (including testing on materials supply by Employer).
- 19.3.5 Material, labour, plant, equipment, machinery, tools and all related costs.
- 19.3.6 Shifts works, night works, overtime works, incentives, bonus, related labour employment costs etc.
- 19.3.7 Working with site constraints and conditions.
- 19.3.8 Liaison, including dealing and compliances with requirements, restrictions, etc. of all Relevant Authorities.
- 19.3.9 Overhead cost, profits, etc.
- 19.3.10 Protection and maintaining all Contract works and any thing affected by the Contract works until completion handing over.
- 19.3.11 Any other costs and / or expenses deemed necessary for the due execution and completion of the works.
- 19.4 The rates as contained in the SOQ shall be inclusive of all taxes, duties and royalties applicable in the State of Rajasthan from time to time. The Contractor accepts that all taxes on the Contract shall be to Contractor's account. Employer shall deduct Tax Deduction at Source (TDS) for such taxes at the rates fixed and revised by Relevant Authorities from each payment/bill due to Contractor. Employer shall issue TDS certificate in favour of Contractor for the TDS so recovered.
- 19.5 The rates as contained in the SOQ shall also be inclusive of all PF, ESI etc. and all other payment as per the statutory requirements. The Contractor shall produce proof of compliance of such requirement to Employer. In the event that the Contractor failed to produce such proof / paying such payment, Employer shall pay such payment direct (but is not obliged) to the Relevant Authorities and recovered the same from whatsoever monies due or to become due to the Contractor.

20.0 ALTERATIONS, ADDITIONS AND OMISSIONS

20.1 Variations

The Construction Manager shall have power:

- a) to make alteration in, omissions from, additions to, or substitutions for the original specifications, Drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and
- b) to omit a part of the Works in case of non availability of a portion of a Site or for any other reasons and the Contractor shall be bound to carry out the Works in accordance with any instruction given to him in writing signed by the Construction Manager and such alterations, omissions, additions or substituted work which the Contractor may be directed to do in the manner specified above on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.
- c) The time for completion of Works shall, in the event of any deviations resulting in additional cost over the tendered value sum being ordered, be extended, if requested by the Contractor, in the proportion, which the additional cost of the altered, additional or substituted work, bears to the original tendered value.

20.2 Valuation of Variations

Rates for such altered, additional or substituted work shall be determined by the Construction Manager as follows:

- (a) If the rate for which altered, additional or substituted item of work is specified in the Schedule of Quantities, the Contractor shall carry out the altered, additional or substituted items at the same rate. In the case of composite tenders, when two or more Schedules of Quantities may form part of the Contract, the applicable rate shall be taken from the schedule of quantities of that particular part in which the deviation is involved, failing that at lowest applicable rate for the same item of work in the other Schedules of Quantities.
- (b) If the rate for any altered, additional, or substituted item of work is not specified in the Schedules of Quantities, the rate for that item shall be derived from the rate for the nearest similar item specified therein. In case of composite tender where two or more schedule of quantities form part of the Contract, the rate shall be derived from the nearest similar item in the Schedules of Quantities of the particular part of the Works in which the deviation is involved failing that from the lowest of the nearest similar items in other Schedules of Quantities.
- (c) If the rate for any altered, additional or substituted item of work cannot be determined in the manner specified in sub-paras (a) & (b) above, the Contractor shall within 15 days of the date of receipt of the order to carry out the said work, inform the Construction Manager of the rate which he proposes to claim for such item of work, supported by analysis of the rate claimed, and the Construction Manager shall, within one month thereafter, after giving due consideration to the rate claimed by the Contractor, determine the rate on the basis of market rate(s). Rates of these items shall be decided by the Construction Manager before execution on the basis of rate analysis in both cases whether contractor submit the rate analysis or not. The rate analysis shall

be derived on the basis of CPWD rate analysis and if the item is not listed in CPWD rate analysis, labor factor will be decided by physical verification. The prevailing market rates for materials and minimum wages as decided by the government for labor rates shall be considered in the rate analysis. Contractor shall be paid 15% over material plus labor cost, towards profit, overhead and taxes etc. However, Construction Manager shall take approval from the Employer before finalization of rates and Employer's decision will be final and binding.

20.3 Extent of Variations

- a) Quoted rates for all items shall be firm, fixed and binding on the Contractor irrespective of any variations of quantities of individual items stated therein up to $\pm 50\%$ variation of Contract value as a whole.
- b) The amount due to price variation on account of escalation if payable in terms of Contract shall not be included in the payment of work done covered under Schedule of Quantities and prices for the purpose of working out the overall deviation limit of $\pm 50\%$ on the Contract value.
- c) For variations beyond +50% (fifty percent) of Contract value, the rates for individual items contributing to the variations in quantities beyond + 60% will be worked out on the basis of the rate analysis to be finally approved by the Owner. Market rates shall be determined by a committee comprising representatives of Employer and Construction Manager. The rates for the above items will be applicable only for the quantities beyond + 60% variation of the individual items.

21. Terms of Payment

- 21.1 The Employer shall pay the Contractor for work done in accordance with the Contract, approved, accepted, and verified by the Engineer in Charge for these works.
- 21.2 The quantities paid in Interim Payment certificates shall be provisional quantities and subject to final assessment based on the re-measurement of work properly done on site or from approved construction drawings whichever is applicable.
- 21.3 Amount properly due to the Contractor shall be paid within twenty (20) days upon Contractor's submission of monthly invoice for works completed; which are subject to verification by the Employer authorized representative on the work done pursuant to the approved construction drawings. The Contractor shall submit details and proper statement of claims detailing the works completed according the Schedules of Quantities. Upon receiving detail and proper statement from the Contractor, the Employer shall verify the details stated in the statement and issue the payment certificate to the Contractor.

22. Tax

- 22.1 The rates quoted by the Contractor shall be deemed to be exclusive of taxes which are exempted under SEZ Act 2005 and inclusive of all taxes which are not exempted that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

23. Currencies

- 23.1 All payments shall be made in Indian Rupees.

24. Retention

- 24.1 Retention Money at the rate of 5 % of the value of work done for each running bill will be deducted until the actual completion of whole work, up to a maximum of 5% of Contract Price.
- 24.2 Retention money shall be refunded within 30 days after discharge of defect liability period.
- 24.3 No retention sum shall be deducted from interim progress payment subject to the submission of an unconditional bank guarantee at the time of award of work against the retention money equivalent to 5 % of the Contract Price which would valid up to 30 days after discharge of defect liability period.

25. Supply of Material

25.1 The Employer shall supply following material for incorporation into permanent works on reconciliation basis, free of cost. Wastage at a rate of 3% will be permitted for reinforcement steel only. For quantity of consumption in excess of allowed values, deduction will be effected from the Contractor's bill at current market price or Employer's average purchase price plus 25% whichever is higher.

Sr. No.	Material	Allowed Wastage	Remark	Supply Location
1	Steel Reinforcement	3%	In form of scrap & to be returned to MWCJL	Ex-Site
2	Cement	Nil	-	Ex-Site
3	DI pipes with rubber gasket	Nil	-	Ex-Site

However, the Employer reserves the right to supply any other material / materials also and the Contractor acknowledges that such supply of material shall affect his rates quoted in Schedules of Quantities.

- 25.2. The materials provided/supplied by the Employer shall continue to rest with the Contractor till the works are handed over to the Employer. The Contractor shall not utilize such supplied material or deal with them in any manner whatsoever except for use in execution of permanent works under this Contract.
- 25.3 The Contractor shall submit his material requirement schedule to the Employer minimum four (04) weeks in advance or as advised at the time of commencement of works. The Contractor shall submit bar bending schedule and quantity calculation to Employer prior to the supply of material along with the material requisition.
- 25.4 All material supplied to the Contractor shall be unloaded and safely and properly stored by the Contractor at his own cost and risk. The Employer in any event shall not be responsible for any loss, damage, theft, pilferage etc.
- 25.5 The Contractor shall maintain a proper account of all such material and shall submit returns and documents of consumption. The Contractor shall submit a statement with each running bill to Employer reconciling the quantity of material drawn from Employer and quantities consumed.
- 25.6 In case of steel of cut lengths of bars below the following size shall be ranked as wastage. Cut bars higher lengths shall be treated as prime steel:
- i) bars of 16 mm dia and above dia – 4 m long
 - ii) bars of below 16 mm dia – 2 m long

Rolling margin shall be established for every lot of steel and for every diameter between the Engineer in Charge and the Contractor.

- 25.7 The free issue steel shall be used in the works as per the Scope Of Works pursuant to **Clause 2** of Special Conditions Of Contract. 3% wastage in the form of scrap steel shall be allowed to the Contractor. The scrap steel shall be returned to the Employer
- 25.8 For reconciliation purpose, the consumption of any material (supplied by the Employer) shall be calculated based on CPWD consumption co-efficient, however for mix design materials coefficient derived from the approved mix design shall be taken into account.
- 25.9 The empty cement bags (95% of the total consumption) shall be returned to the employer, failing which the penalty at the rate of Rs. 2/- per bag shall be recovered from the contractor's bill (s).

28 Liquidated Damages

- 28.1 If the contractor fails to complete the works by the date of completion as stated in the Tender or within extended time as per agreed project baseline schedule, the Owner shall withhold a sum calculated at the rate of 0.5 % of the total contract value per week (or part thereof) of delay as liquidated damages for the period during which the said work shall so remain or have remained in-complete. The owner may deduct such damages from any money's otherwise payable to the contractor under this contract, up to a maximum of 5.0 % of the total contract value after which Owner will have right to terminate the contract and claim for compensation from contractor for the financial losses on account of delay of project. The contractor admits that the loss shall always be caused if there is failure on its part.
- 28.2 The delay shall be assessed based on average delay over all due milestones. Reconciliation statement for Project Tracking giving detail of delay, duly verified by Engineer-in-Charge / project manager shall be submitted alongwith monthly running bills.
- 28.3 The Liquidated Damages imposed for not achieving intermediate milestone shall be subjected to refund/adjustment in case of Contractor achieve the final Milestone with the period as stipulated in the Contract.
- 28.4 Time shall be of the essence with respect to the commencement and completion as per the key Contractual dates for the execution and completion of the Contract Works as stated in Contract Data, and payment or deduction of liquidated damages shall not relieve the Contractor from his obligation to complete the work as per agreed construction program and milestones or from any other of the Contractor's obligations and liabilities under the Contract.**

29 Bonus

- 29.1 For early completion of Contract before the stipulated date of completion or such later date as authorized by the Employer, incentive shall be paid to the Contractor at 0.25% of the Contract price per week of early completion, subject to a maximum of 2.5% of Contract price. This incentive shall be applicable in cases where completion of work before scheduled dates lead to tangible benefits.

30. Advance Payment

- 30.1 Employer shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The guarantee shall remain effective until the recoupment of advances, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor.
- 30.2 The Contractor is to use the advance payment only to pay for Equipment, Plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other relevant documents to the Engineer in Charge.

- 30.3 The advance payment shall be recovered by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance (mobilization and equipment only) payment or its repayment in assessing valuations of work done, Variations, price adjustments or Liquidated Damages.

31. Performance Security

- 31.1 The Performance Security in the form of unconditional bank guarantee shall be provided to the Employer no later than the date specified in the Letter of Intent and shall be issued in an amount equal to 5% of Contract Price from a Nationalised or Scheduled bank in the Employer's prescribed format the Performance Security shall be valid until a date 30 days from the date of expiry of Actual Date of Completion.

32. Defect Liability and Cost of Repairs

- 32.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Actual Date of Completion and the end of the Defects Liability Periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions. The Contractor shall be responsible to make good at his own expense any defect which may develop within the period mentioned as Defect Liability Period in the Contract Data. The Employer shall give the Contractor a notice in writing about the defects and the Contractor shall repair the defect in maximum of seven (07) days. If the Contractor fails to repair/remove the defect, the Employer may execute the work by himself and deduct the expense towards the work from any monies due to the Contractor. The Employer shall have the right to appropriate all or part of the Retention Money towards the expense in repairing the defects.

E. Finishing the Contract

33. Completion

33.1 After completion of the work, the Contractor will serve a written notice to the Engineer in Charge to this effect. The Engineer in Charge upon receipt of this notice shall conduct a complete joint survey of the work within seven (07) days and prepare a defects list jointly. The defects pointed out by the Engineer in Charge or his nominee would be rectified by the Contractor within fourteen (14) days and thereafter acceptance report be signed jointly by the Contractor, Engineer in Charge and the Employer. And a '**Completion Certificate**' shall be issued to Contractor by Employer.

34. Taking Over

34.1 The Employer shall take over the Site and the Works within seven days of the Engineer in Charge issuing a certificate of Completion.

35. As Built Drawings

35.1 The Contractor shall supply "As Built" Drawings by the dates stated in the Contract Data.

35.2 If the Contractor does not supply the As Built drawings by the dates stated in the Contract Data, or they do not receive the Engineer in Charge's approval, the Engineer in Charge shall withhold the amount stated in the Contract Data from payments due to the Contractor.

36. Termination Of Contract

36.1 Due to any default by the Contractor, the Employer shall be entitled to terminate the Contractor's employment under the Contract by giving one (01) week advanced notice in writing by stating the reason. The date after seven (07) days from the date of issuance of the Termination Notice shall hence be defined as "Date of Termination". The Contractor will be paid for all works duly and properly completed up to the Date of Termination but shall not be entitled to anticipated profit or any consequential or indirect loss or damage and shall hold harmless and indemnify the Employer against Contractor's Contractors/suppliers or third parties arising from termination under this Clause.

36.2 The Contractor had agreed in the event of delay in progress or non-achievement of the Milestone Dates, The Employer shall reserve the sole discretion right in deploying its own plant and machinery or engaging third Party to speed up the Contractor's works and the Contractor's Contract shall be terminated with written notice at any point of time without any compensation or claims to be paid to the Contractor. All additional / extra cost incurred by The Employer shall be charged to the Contractor due to such event.

37. Payment upon Termination

37.1 Full payment to Contractor's workers, Contractors, suppliers and third parties engaged by the Contractor for any portion of the Contract works shall be paid in full by the Contractor and thereafter must be removed from site on or before the Date of Termination. If the Contractor failed to make full payment to these workers, Contractors, suppliers and third parties and/or remove them from site on the Date of Termination, then the Employer will carry out such duties on behalf of the Contractor. The Employer will recover all cost incurred due to the performing of such duties on behalf of the Contractor by making deduction from amount/s due to the Contractor or by any other process.

38. Release from Performance

38.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Employer 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 commitment was made.

F. Special Conditions of Contract

1. General

The Contractor is advised to note that the following Special Conditions are part of the Contract and he will not have any right to claim at any time for delays or for expenditure incurred by him in fulfilling the following special conditions.

2. Scope of Works

2.1 The Contract Works shall comprise of but not be limited to:-

2.1.1 Contract for the Construction, Completion, and Testing of WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ works for Phase II of MAHINDRA WORLD CITY, JAIPUR at Jaipur.

2.1.2 Demarcation of routes of the related services and periphery of the plots with the help of Total Station machine with fixing points in the field after calculating the co-ordinates from the layout plan.

All the above shall be as per issued relevant drawings, Specifications, terms & conditions and other relevant National and International Standard Specifications and good engineering practices, safety measures as required all as per agreed construction methodology in consultation and coordination with and under the inspection of the Employer's personnel / design consultants.

2.2 All the Contract Works shall be executed in full compliance with the Specifications of the Contract and all requirements and always to the satisfaction of the Employer.

2.3 The Contractor shall be deemed to have inspected, tested and examined the site and surroundings and to have satisfied himself as to all the conditions, factors and risks which can be reasonably obtained or inferred from the inspections, tests and examinations that may influence or affect the progress and cost of Contract Works.

2.4 The Contractor acknowledge that he understands the Special Economic Zone (SEZ) rules and regulation as per SEZ Act 2005 and he further acknowledge that he will abide all the rules and regulations of SEZ Act, laws related to custom duties, notified area and all other related things affecting the Contract works directly or indirectly and shall not make any claim in any account whatsoever related to SEZ acts, rules and regulations.

2.5 The Contractor shall resolve local constraints and problems, liaise, seek, and obtain any consent, permit, license, approval, etc. from all Relevant Authorities including paying all fees, charges, levies, etc all at his own cost.

2.6 Clearing all debris and disposing to location approved by Municipal authorities during progress of Contract works and before and after the dates of Completion.

2.7 All temporary works, haul/access WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ that are necessary for the proper and due completion of the Contract Works.

2.0 Measurements

The payable quantity (ies) against the executed work shall be determined on the basis, quantity certified wherein certification conducted jointly by the Contractor and the Owner. Work accepted and certified by the Owner will only be paid for as specified and payments shall be at the same rates.

3. Subcontract or Subletting of Works

3.1 Sub-Letting:

- 3.1.1** No part of the Contract shall be sublet without the written permission of the Employer nor shall transfers be made by the 'Power of Attorney' authorizing others to carryout the work or receive payment on behalf of the Contractor.

3.2 Sub-Contract:

- 3.2.1** The Contractor is not permitted to subcontract any part of his works in this Contract without prior approval in writing from the Employer.
- 3.2.2** In any case, whether any part of the works is subcontracted or not; the principal liabilities of the works shall lie with the Contractor.

4. Tender Drawings

The drawings issued with these Tender Documents are Tender Drawings. Tender Drawings are prepared in such detail as are necessary to give a comprehensive idea of the works. The good for construction drawings will be issued during the construction stage based on the requirements as per the construction program submitted by the Contractor as per General Condition of Contract Clause 10.

5. Contract Drawings

- 5.1** The Engineer in Charge shall issue free of charge three sets of Contract Drawings, approved for construction, to the Contractor. Additional copies as and when required shall be supplied by the Engineer in Charge and costs shall be reimbursed by the Contractor.
- 5.2** The Engineer in Charge may from time to time during the course of the Contract issue the Contractor with revised Contract drawings and the Contractor shall ensure that all superseded drawings are removed from site and replaced by revised Contract Drawings.
- 5.3** The Contractor shall ensure that a complete up to-date list of drawing is maintained at site. All Contract Drawings shall be properly filed and indexed for ready reference.
- 5.4** The Contractor shall ensure that only the valid up to-date Contract Drawings are used for preparation of Working Drawings, setting out, construction, etc. shall be carried out as per valid Contract Drawings.
- 5.5** Working Drawings shall include shop and fabrication drawings for cross sections, bar bending schedules etc. as required by the Engineer in Charge.
- 5.6** The privilege of the authorship and ownership of drawing and designs of the building remains with Engineer in Charge. Drawings and design prepared by their Consultants shall be used only for the purpose specified in the Contract and all drawings issued shall be returned To Engineer in Charge after completion of works.

6. Additional Work

Any additional works, instructed during the Contract Period and within the Contract Amount, will be paid as per Schedule of Quantity rates and it shall not be considered as a cause for the Contractor to claim for delay, incurred overhead, mobilization etc.

7. Protection of the Works during Contract Period

It is clearly understood that any damage occurring to the Works (completed or under execution) is the Contractors responsibility and no claims will be entertained by the Employer since the matter shall be covered by the relevant Insurances.

8. Discrepancies in alignment

Discrepancies in alignment and levels etc. noticed during construction and/or on completion shall be rectified (including affected works executed by other Contractors) by the Contractor at his own cost and risk, Engineer in Charge's approval does not relieve the Contractor of his responsibilities.

9. Temporary Power and Water Supply

All costs, both for power supply and temporary installations and Power and Water required for construction and labour shall be borne by the Contractor.

10. Contractor's Facilities

10.1 Site Offices of the Contractor

The successful Tenderer is to provide and maintain a site office at a location approved by the Engineer in Charge, within 15 days from the date of issue of Notice to Proceed.

11. Safety on Site

Measures to ensure safety of workers and plant at site shall be taken by the Contractor. Excavations shall be protected by barriers and lighting shall be provided at night. Motorable access to the site and within the site shall be maintained during the construction period. The Contractor shall designate a Safety Officer who will be in charge of all Safety Measures. The cost of all safety equipments and the cost of providing a safety officer at site would be deemed to be included in various Items of the SCHEDULE OF QUANTITIES and Rates. The Contractor will prepare a safety manual and submit for Engineer in Charge's approval before the commencement of work. Entire safety arrangement shall comply relevant safety norms and applicable IS codes in entire execution process.

12. As Built Drawings

The Contractor shall prepare As Built Drawings both in hard copy and in digital format.

The drawings shall be prepared for any given section of the work as soon as the work for that particular section is completed. Preparation of As Built Drawings shall keep pace with the work and shall not be left over towards the end of the project. Three (03) hard copies and one soft copy of all drawings shall be submitted.

No separate payment will be made for the preparation of As-Built Drawings; Cost of preparation of As Built Drawing is deemed to be included in all other priced bill items.

13. 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 Engineer in Charge 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 other information as the Engineer in Charge may require. The Contractor shall ensure that there will not be any child labour.

The Contractor shall provide, or ensure that there is provided such number of suitable persons as adequate and appropriate in the circumstances for rendering first aid to his people if they are injured or become ill at work: and for this purpose a person shall not be suitable unless he has undergone:

Such training and has such qualifications as the Health and Safety Executive may approve for the time being in respect of that case of the class of case,

14. Housekeeping & Sanitation

- a) At the work site, an adequate supply of potable water must be provided, as well as clean drinking water dispensers. Potable water for clean up must be provided.

15. Drinking water

- b) In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.
- c) Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where such drinking water shall be stored.
- d) Every water supply or storage shall be at a distance of not less than 50 feet from any latrine drain or any other source of pollution.

16. Washing facilities:

- a) In every work place adequate and suitable facilities for washing shall be provided and maintained for the use of Contract labour employee therein
- b) Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition.

17. Latrines and Urinals

- a) Latrines shall be provided in every work place in adequate numbers.
- b) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times
- c) The Contractor shall at his own expense, carry out all instructions issued to him by the Engineer in Charge-in-charge to effect proper disposal of night soil and other conservancy work in respect of the Contractor's workmen or employees of the site. The Contractor shall be responsible for payment of any charges which may be levied by the municipal or cantonment authority for execution of such on behalf.

18. Canteens:

- a) In every work place where the work regarding the employment of Contract labour is likely to continue for six months and where in Contract labour numbering 100 or more are ordinarily employed an adequate canteen shall be provided by the Contractor for the use of such labour.
- b) The canteen shall be maintained by the Contractor in an efficient manner.

19. Contractor's Other Obligations

- 19.1 All safety training and skill development of Contractor's workers and operators shall be carried out either by the Contractor or the Employer and all costs related to such training shall be borne by the Contractor.
- 19.2 The Contractor shall obtain all necessary approvals/ permission from the Relevant Authorities including where necessary securing the presence of the Relevant Authorities or their representative to inspect and supervise the operations in connection with the Contract Works. The Contractor shall bear all costs, fees, charges etc so imposed for the attendance of the Relevant Authorities or their representatives.
- 19.3 The Contractor shall be responsible for any damage caused by any work carried out by Contractor to the existing services and utilities whether shown or not shown in the drawings from whatsoever cause arising thereof and shall make good to its original condition at his own costs and expense to the satisfaction of the Employer.
- 19.4 Upon completion of the Contract Works the Contractor shall remove and clear all debris, waste and/or any excess materials, construction plant, and temporary works from the site and shall do all things to clear up the site which shall include any cleaning where instructed by the Employer to other areas affected by the Contract Works. During the Contract period the Contractor shall ensure that the site is kept clean and in proper order and free from rubbish, waste or debris and Contractor shall do all things necessary to prevent any damage to or

- pollution or the creation of any health or environmental hazard at or around or adjacent to the Site.
- 19.5 The Contractor shall defend (if requested to), save harmless and indemnify the Employer against all claims, demands, interest, penalties, proceedings, damages, loss, costs, charges and expenses arising out of or in connection with any failure, neglect or omission, by the Contractor to perform his obligations under the Contract or any damage to property (including the Contract Works) or injury to person (whether resulting in death or not) caused or contributed by the Contractor and/or his servants or agents or independent Contractors appointed by the Employer to carry out works on behalf of Contractor (whether or not such claims, losses and/or damages have been insured by the Employer). In addition, this indemnity shall include all legal costs incurred by the Employer as a consequence of such claim, demand or proceeding being made.
- 19.6 The Contractor shall, subject to this Contract and other obligations imposed by law, execute the Contract Works and provide all labour, materials, construction equipment and all things necessary and incidental for the Contract Works to the satisfaction of the Employer and / or the Relevant Authorities.
- 19.7 The Contractor shall bear all payments and other related costs on his own in connection with the execution and completion of additional, rectification, etc, works due to or caused by any act, default, neglect or omission by the Contractor. This shall also include the employment of consulting Engineer in Charges, professional experts and such other personnel as may be necessary for such works.
- 19.8 The Contractor acknowledges that he will not have any objection in re-structuring the Contract with respect to material and labour in order to realize the exemptions and benefits granted by the Government whenever required, and he will pass on such benefits to the Employer.
- 19.9 The Contractor accepts that in the event of supply of any material from Employers side pursuant to **Clause 25 (Supply Of Material)**. The Item rate quoted by the Contractor shall be re-calculated and the Contractor will not make any claim whatsoever in account of material part of the rates (including all profits, overheads, taxes etc. all) quoted by him in the Schedule of Quantities.
- 19.10 The Contractor has to Operate & Maintain all the plants & equipment, if Installed, for the period of 6 months from the certified date of commissioning. The contractor shall be bound to rectify all the defects or replacement of the equipment (s) within the guarantee period as mentioned in the Guarantee Card. The Contractor will train the Employer's staff to operate & maintain the equipment/ plant and will submit the copy of operation & maintenance manuals of the concerned equipment/plant to the Employer. All the spares & tools for the defect liability period shall be arranged by the contractor at his own cost.
- 19.11 The contractor has to submit the project quality plan for the work..

G. SAFETY MANUAL

CHAPTER 01

1.0. THE MAIN CONTRACTOR.

1.1. RELATIONSHIP WITH THE CLIENT.

A close relationship and continuous interaction must be maintained with the client by the Project Manager of the main or managing contractor. The client does have specific safety and health requirements to be observed and co-operation with his contractor, throughout the contract is essential. The prospective main contractors are given information on which to base their tenders and at the Tender Stage; the prospective contractors are expected to understand fully the Scope and Design Intent of these provisions.

1.2. Selection of sub contractors.

Management contractors should select sub or works contractors, using the same criteria of practical safety policy. Again, it must be ensured that the terms of contracts include adequate provision for safe working and for specified safety and health items.

1.3. Planning.

Detailed planning should take the following matters into account

- Know hazardous operations, e.g., use of cranes and site transport, steel erection, excavation and false work, scaffolding, roof work, demolition, asbestos removal, etc.
- Requirement for plant and equipment to ensure safe working, or ease of handling.
- The sequence of work and its phasing between contractors, to minimise the possibility of one contractor placing another contractor's men at risk. Where appropriate, the segregation of contractors should be considered.
- The need to provide information, instruction and appropriate training, both on general site safety and on hazards specific in the site. The latter could range from restricted zones, permit-to-work systems and lifting operation, to the wearing of safety helmets.
- The need for fire precautions and emergency procedures.
- The need for environmental monitoring and health surveillance.
- Site security and foreseeable risks to the public, including the need for directional and warning signs
- Safe access across the site for persons, vehicles and plant. Thought should be given to arrangements for keeping the site tidy, accommodation for site staff, welfare, first aid and other facilities
- The provision of safe places of work at different stages of the job, including the provision of scaffolding for a number of sub or works contractors.

1.4. Control.

Sub and works contractors should be briefed about the safety policy and site rules of the main contractor at an initial safety meeting. Decisions on all other matters affecting safety and health should be laid down so that the responsibilities of all parties are made clear before contractors start work. Such matters should include.

- Appropriate precautions and work methods for identified hazards or hazardous work.
- Necessary plant and equipment and arrangements for its provision, maintenance use and inspection.

- The question of trade union or other workforce safety representation and the need for a joint safety committee.
- Arrangements for some form of induction training for new-starters on site.
- Arrangements for any specialist training.
- Arrangements for promulgating safety and health information, e.g. on site notice boards.

It is important that such safety and health arrangements are reviewed at the first project meeting, where the site management can set the tone for the conduct of work by resolving, at an early stage, any difficulties which may arise.

1.5 Co-ordination.

The Project Manager, appointed by the main contractor, must be totally responsible for compliance with health and safety code. He must appoint a Chief Safety Officer and form a Safety Committee along with operatives from sub vendors. This Safety Committee will be Chaired by the Client's representative and sit twice a week and report to the Project Controller. The Project Manager must take suitable arrangements to ensure the effective co-ordination of the work of all contractors on site. He should ensure that he is kept informed on a day to day basis, of progress and problems which arise. Clear lines of communication should be set up between each contractor and the Safety Officer of the Main Contractor. Operatives must also know whom to contact over safety and health matters requiring action or a decision. Such effective co-ordination will be enhanced by ensuring that 'safety and health' figures prominently on the agenda of regular project meetings. Safety Committee's weekly report must be submitted to the Project Controller in every Project Meeting.

1.6 Monitoring.

Arrangements must be made for safety and health monitoring of the site on a regular basis. This will include, not only ensuring the safety of such items as scaffolding excavations and plant but also environmental matter such as hazardous dust fume noise etc. In all cases, the Project Manager should ensure that daily site inspections are carried out, by Safety Officer, more in depth inspections being done periodically by visiting safety advisers. It may be necessary for arrangements to be made for specialist occupational health and hygiene advice. The Check List for daily inspection is given in the following Chapters.

1.7 Records.

The Contractor should ensure that all statutory notifications, examinations and inspections are carried out. A copy of all the documents should be submitted to the Engineer-in-charge for his record.

1.8 Standards.

The following standards shall be followed, unless more onerous provisions have been specified in the Safety Provisions given in this Code.

IS: 3696 (Part I) - 1966 Safety code for scaffolds and ladders: Part I Scaffolds

IS: 3696 (Part II) - 1966 Safety code for scaffolds and ladders: Part II Ladders

IS: 3764-1966- Safety code for excavation work.

IS: 4082-1977- Recommendations on stacking and storage of construction materials at site (first revision)

IS: 4130-1976- Safety code for demolition of buildings (first revision)

IS: 4912-1978 -Safety requirements for floor and wall openings, railings and toe boards (first revision)

IS: 5121-1969- Safety code for piling and other deep foundations

IS: 5916-1970- Safety code for constructions involving use of hot bituminous materials.

IS: 7205-1974- Safety code for erection of structural steel work.

IS: 7969-1975- Safety code for handling and storage of building materials.

IS: 8989-1978- Safety code for erection of concrete framed structures.

1.9 Non Compliance of Safety and Health Provisions:

The Compliance of the Safety and Health provisions are of utmost important to the Client. The prospective contractors must note that the client will take a serious view of any non compliance report of Safety Committee. Based on Safety Committee's report, the Client has a right to order stoppage of work till rectification is carried out to the satisfaction of the Safety Committee and all stoppages on this account will be at the entire risk , costs and consequences of the Contractor.

CHAPTER 2.0

2.0 CONTRACTOR'S SAFETY INSPECTION CHECKS LIST.

Contractor _____ **Contract No.** _____
Project _____
Location _____
Type of Work _____
Date _____ **Checked By** _____

Sr	ITEM	STATUS	(Inspector) REMARKS
3.0	ACCIDENT PREVENTION ORGANISATION.		
3.1	Trained First Aid Person		
3.2	First Aid Kit.		
3.3	Safety Material Posted.		
3.4	Emergency Phone # Posted.		
4.0	HOUSEKEEPING & SANITATION		
4.1	General neatness of working areas.		
4.2	Regular disposal of waste and trash.		
4.3	Passageways and walkways clear.		
4.4	Adequate lighting		
4.5	Projecting nails removed.		
4.6	Oil and grease removed.		
4.7	Waste containers provided and used.		
4.8	Sanitary facilities adequate and clean.		
4.9	Drinking water tested and approved.		
4.10	Adequate supply of water.		
4.11	Drinking cups, Clean Dispensers.		
5.0	FIRE PREVENTION.		
5.1	Fire extinguishers identified, checked, lighted.		
5.2	Hydrants clear access to public thoroughfare open.		
5.3	Good housekeeping.		
5.4	NO SMOKING posted and enforced where needed.		
6.0	PERSONAL PROTECTION.		
6.1	Hard-hats		
6.2	Noise Level Exposure.		
6.3	Eye Protection.		
6.4	Safety Lines & Belts.		
6.5	Life Jackets.		
7.0	ELECTRICAL INSTALLATION.		
7.1	Adequate well insulated wiring.		
7.2	Fuses & GFI provided.		
7.3	Fire hazards checked.		
7.4	Electrical dangers posted.		

Sr	ITEM	STATUS	REMARKS
8.0	HAND & POWER TOOLS		
8.1	Tools and cords in good condition.		
8.2	Proper grounding.		
8.3	All mechanical safeguards in use.		
8.4	Tools neatly stored when not in use.		
8.5	Right tool being used for the job at hand.		
8.6	Wiring properly installed.		
8.7	Enough men used to handle material.		
9.0	LADDERS.		
9.1	Stock ladders in good condition.		
9.2	Stock ladders not spliced.		
9.3	Properly secured, top and bottom.		
9.4	Side rails on fixed ladders extend above top landing.		
9.5	Built-up ladders constructed of sound materials.		
9.6	Rungs not over 12 inches on centre.		
9.7	Stepladders fully open when in use.		
9.8	Metal ladders not used around electrical hazards.		
9.9	Proper maintenance and storage.		
10.0	SCAFFOLDING.		
10.1	All structural members adequate for use.		
10.2	All connections adequate		
10.3	Safe tie-in to structure.		
10.4	Ladders and working areas free of debris, snow, ice, grease.		
10.5	Proper footings provided.		
10.6	Passerby protected from falling objects.		
10.7	Supports plumb, adequate cross bracing provided.		
10.8	Guard rails and toe boards in place.		
10.9	Scaffold machines in working order.		
10.10	Ropes and cables in good condition.		
11.0	HOISTS, CRANES & DERRICKS.		
11.1	Inspect cables and sheaves.		
11.2	Check slings and chains, hooks and eyes.		
11.3	Equipment firmly supported.		
11.4	Outriggers used if needed.		
11.5	Power lines inactivated, removed, or at safe distance.		
11.6	Proper loading for capacity at lifting radius.		
11.7	All equipment properly lubricated and maintained.		
11.8	Signalmen where needed.		
12.0	MOTOR VEHICLES.		
12.1	Brakes, lights, warning devices operative.		
12.2	Weight limits and load sizes controlled.		
12.3	Personnel carried in safe manner.		
13.0	BARRICADES.		
13.1	Floor openings planked over or barricaded.		
13.2	Roadways and sidewalks effectively protected.		
13.3	Adequate lighting provided.		
13.4	Traffic controlled.		

Sr.	ITEM	STATUS	REMARKS
14.0	HANDLING & STORAGE OF MATERIALS.		
14.1	Neat storage area, clear passageway.		
14.2	Stacks on firm footings, not too high.		
14.3	Men picking up loads, correctly.		
14.4	Materials protected from heat and moisture.		
14.5	Protection against falling into hoppers and bins.		
14.6	Dust protection observed.		
15.0	EXCAVATION & SHORING.		
15.1	Shoring of adjacent structures		
15.2	Shoring and sheathing as needed for soil and depth		
15.3	Public and sidewalks supported and protected.		
15.4	Materials not too close to the edge of excavation.		
15.5	Lighting at night.		
15.6	Water controlled.		
15.7	Equipment at safe distance from edge.		
16.0	CONCRETE CONSTRUCTION.		
16.1	Forms properly installed and braced.		
16.2	Adequate shoring, plumbed and cross braced.		
16.3	Shoring remains in place until strength is attained.		
16.4	Proper curing period and procedures.		
16.5	Check heating devices.		
16.6	Adequate runways.		
16.7	Protection from cement dust.		
16.8	Hard-hats, safety shoes, shirts covering skin.		
16.9	Nails and stripped form material removed from area.		
17.0	MASONRY.		
17.1	Proper scaffolding.		
17.2	Masonry saws properly equipped, dust protection provided.		
17.3	Safe hoisting equipment.		

CHAPTER 3.0

3.0 ACCIDENT PREVENTION ORGANISATION.

3.1 Trained First Aid Person

A contractor shall provide, or ensure that there is provided, such number of suitable persons as is adequate and appropriate in the circumstances for rendering first aid to his employees if they are injured or become ill at work: and for this purpose a person shall not be suitable unless he has undergone –

- a) Such training and has such qualifications as the Health and Safety Executive may approve for the time being in respect of that case of the class of case, and
- b) Such additional training, if any, as may be appropriate in the circumstances of that case.

In practice, (a) refers to a trained first aider and (b) to an occupational first aider. In addition, a person who holds a current first aid certificate issued by registered medical association or Indian Red Cross Society will be classed as a “Suitable Person” for the purposes of Regulation.

For most sites, the contractor should ensure that at least one first aider is normally present when the number of employees at work is between 50 and 150, there should be at least one additional first aider for every 150 or so should ensure that sufficient first aiders are appointed to provide adequate coverage for each shift. Provisions for medical care must be made available by the contractor for every employee covered by the regulations. In the absence of infirmaries, clinics, or hospitals in proximity to the work site, properly trained and certified first aid personnel must be available, and first aid supplies must be provided by the contractor. Appropriate equipment for transportation of injured personnel to a physician or hospital must be provided for.

3.2. First Aid Kit

Regardless of the number of employees there must be at least one first-aid box on site. Every first aider and occupational first aider should have easy access to first-aid equipment, and provision should be made for every employee to have reasonably rapid access to first aid. Each box should be placed in a clearly identified and readily accessible location, and contain a sufficient quantity of suitable first-aid materials and nothing else. Boxes and kits should be checked frequently to ensure they are fully stocked and all items are in a usable condition. Sufficient quantities of each item should always be available in every first aid box or cabinet.

Sr.No	Item	Numbers of Employees.				
		1-5	6-10	11-50	100	150
1	Guidance Card individually wrapped.	1	1	1	1	1
2.	Sterile adhesive dressings.	10	20	40	40	40
3.	Sterile eye pads with attachment.	1	2	4	6	8
4	Triangular bandages	1	2	4	6	8
5	Sterile coverings for serious wounds (where applicable)	1	2	4	6	8
6	Safety pins.	6	6	12	12	12
7	Medium sized sterile un medicated dressings.	3	6	8	10	12

Sr.No	Item	Numbers of Employees.				
8	Large sterile un medicated dressings	1	2	4	6	10
9	Extra Large sterile un medicated dressings.	1	2	4	6	8
10	Sterile water or saline in 300 ml disposable containers, where tap water is unavailable.	1	1	3	6	6

The first-aid box or cupboard should protect the contents from dampness and dust and be clearly marked with a white cross on green background.

3.2.1 First - Aid Rooms.

Where there is 250 or more person at work on site, a suitably staffed and equipped first-aid room should be provided. In addition, where there is a large (over 150) number of employees divided into several dispersed working groups, or the location of the site makes access to places of treatment outside it difficult, the contractor should consider whether a centralised first-aid room may be needed.

A first aid room should:

- a) Be under the charge of an occupational first aider in most circumstances; names and locations of all first aiders should be displayed.
- b) Be readily available and used only for the rendering of first aid
- c) Be clearly identified and of sufficient size to allow access for a stretcher, wheelchair, etc. and to hold a couch with space for people to work around it
- d) Contain in addition to the previously mentioned first aid materials ; a sink with hot and cold running water, drinking water, paper towels, impermeable work surfaces, clean garments for use by first aiders and occupational first aider's clinical thermometer a couch with pillow and blankets frequently cleaned
- e) Be heated, lighted, ventilated and cleaned regularly
- f) Be designed so that immediate contact can be made with the person on call, e.g. radio, siren, and a telephone link if feasible. It should be stressed that a sufficient number of first - aid boxes must be provided for any work area which is not within easy reach of the first aid room.

3.3 Emergency Phone # Posted.

Project Name _____ Project No. _____

The following are the business telephone numbers where project key personnel can be reached at all times. In addition, the emergency telephone numbers of other vital agencies are listed:

	BUSINESS	RESIDENCE
CLIENTS PROJECT CONTROLLER		
CHIEF PROJECT MANAGER		
SAFETY OFFICER (CONTRACTOR).		
OTHER EMERGENCY TELEPHONE NUMBERS		
FIRE		
AMBULANCE		
DOCTOR		
HOSPITAL		
POLICE		
GAS COMPANY		
ELECTRIC COMPANY		
WATER COMPANY		
TELEPHONE COMPANY		
INSURANCE CARRIER		
OTHER		
OTHER		
OTHER		

CHAPTER 4.0

4.0 HOUSEKEEPING & SANITATION

At the work site, an adequate supply of potable water must be provided, as well as clean drinking water dispensers. Potable water for cleanup must be provided. Where non potable water is used for industrial or fire fighting purposes it must be identified by appropriate signs.

CHAPTER 5.0

5.0 **FIRE PREVENTION.**

Electrical wiring equipment for heating, light, or power purposes must be installed in compliance with the requirements. Internal combustion engine-powered equipment must be located with exhausts well away from combustible materials. Smoking is to be prohibited in the vicinity of fire hazards, and such areas must be conspicuously posted. Care shall be taken properly to ground nozzles, hoses, or steam lines used in hazardous tankage or vessels.

In location of temporary buildings and yard storage, appropriate care shall be taken for proper separation to preclude an accumulation of fire potential. The contractor is responsible for maintaining the entire area, but particularly storage areas, free from accumulation of unnecessary combustible materials.

Site Fire Check List

1. Are safe ashtrays provided where smoking is permitted?
2. Are heaters properly guarded?
3. Are wet clothes kept clear of heaters?
4. Are portable heaters secure from being knocked over?
5. Is all temporary wiring well supported and protected?
6. Are any circuit's overloads?
7. Are all flammable liquids, gas cylinders and flammable materials separately and properly stored?
8. Are all gas appliances fitted with control taps?
9. Is rubbish being "burned in proper fashion"?
10. Is all flame cutting and welding taking place with proper precautions?
11. Are all blowlamps and blowtorches being used correctly?
12. Do all night watchmen and security patrols know the fire routines?

Preventing the spread of fire

1. Is waste accumulating in hoist shafts, under butts, in odd corners?
2. Are separate metal waste containers supplied for each of the following: oily rags, paint rags, paint scrapings, waste flammable liquids, wood shavings and off cuts?
3. Is all waste regularly cleared?
4. Are all huts safely sited?

Means of escape

1. Are all gangways, stairs and platforms free from obstruction?
2. Does everyone know what to do in emergency?
3. Is fire drill practised, and is there a system to ensure that all persons have evacuated the area?

Fire Fighting

1. Have all extinguishers been checked and / or recharged?
Are they clearly identified and easily accessible? Are operatives trained in their use

CHAPTER 6.0

6.0 **PERSONAL PROTECTION.**

Workers are often reluctant to use protection equipment. Such items should not only be suitable for their purpose but also be as comfortable as possible and acceptable to the workers concerned. Only then can efforts to ensure that equipment is worn or used prove successful.

All necessary personal safety equipment as considered adequate by the Engineer-in-charge shall be available for use of persons employed on the site and maintained in a condition suitable for immediate use; and the contractor shall take adequate steps to ensure proper use of equipment by those concerned.

- a) Workers employed on mixing asphaltic materials, cement and lime mortars / concrete shall be provided with protective footwear and protective gloves.
- b) Those engaged in handling any material which is injurious to eyes shall be provided with protective goggles.
- c) Those engaged in welding works shall be provided with welder's protective eye-shields.
- d) Stone workers are employed in sewers and manholes, which are in use, the contractor shall ensure that man-holes cover are opened and manholes are ventilated at least for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.
- e) The contractor shall not employ men below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting, the following precautions shall be taken :-
 - i) No paint containing lead or lead products shall be used except in the form of paste or ready.
 - ii) Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scraped.
 - iii) Overalls shall be supplied by the contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

CHAPTER 7.0

7.0 **ELECTRICAL INSTALLATION.**

Contact of plant with un insulated overhead electric cables (over 200 volts) or electrical discharge due to plant coming into close proximity.

Electrical short circuit or overload causing explosion or fire resulting in stoppage of plant involved for more than 24 hours and which might have caused injury.

General Guidelines Electrical

1. Provide earth leakage protection (ELCB of 20mA) on every socket outlet and lighting circuits.
2. Use separate 15 A socket outlets also multi sockets are not to be used.
3. All socket outlets shall be shuttered type.
4. All wiring shall be properly colour coded.

Phase	-	Red / Yellow / Blue
Neutral	-	Black
Earth	-	Green.

5. Wiring shall be done only in rigid metal conduits. PVC and metal flexible are not to be used.
6. Fuses are not to be used. Only circuit breakers to be used.
7. Lighting protection as per IS: 2309 to be provided.

CHAPTER 8.0

8.0 **HAND & POWER TOOLS**

Hand and power tools must be maintained in a safe condition, whether furnished by the contractor or by the employee. When power-operated tools are designed to accommodate guards, they must be equipped with appropriate guards when in use. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains and other moving parts of equipment must be guarded if the parts are exposed to contact by employees.

All hand-held power tools must be equipped with a constant pressure switch that shuts off when the pressure is released. Electric power-operated tools shall be of the approved double insulated type, or grounded in accordance with good electrical practice. Pneumatic power tools must be secured to the hose or whip by positive means. Safety clips or retainers must be maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

Pneumatically driven nails, staplers, and similar equipment provided with automatic fastener feed that operate at more than 100 psi pressure at the tool must have safety devices on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in direct contact with the work surface.

Hoses shall not be used for hoisting or lowering tools, and hoses exceeding ½-in inside diameter must have a safety shutoff at the source of supply to reduce pressure in case of a hose failure.

All fuel-powered tools must be stopped while being refuelled, serviced, or maintained.

Only trained employees may be allowed to operate a powder-actuated tool. Such tools must be tested each day before loading to see that the safety devices are in proper working condition, in accordance with manufacturer's recommended test procedure. Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employee, and hands shall be kept clear of the open barrelled end. Fasteners shall not be driven into very hard or brittle materials such as cast iron, glass block, face brick, hardened steel, or hollow tile. For driving into materials that are easily penetrated, appropriate backing must be available to prevent the pin fastener from passing completely through.

All employees using abrasive wheels must use eye protection, and other tools must be operated using appropriate personal safety equipment.

CHAPTER 9.0

9.0 **LADDERS**

Use of Ladders and Folding Step-Ladders.

- This regulation applies to all ladders and pairs of steps but not roof ladders and crawling boards.
- **Ladders must :**
 - a) **Be fixed near the top if practicable, or near the bottom if not: if suspended they must be secure,**
 - b) **Be placed (except when suspended) on a firm level base; they must not stand on loose packing (e.g. bricks),**
 - c) Be intermediately secured, where necessary, to prevent swaying and sagging, and
 - d) Be supported, or suspended, equally on each stile.
- If a ladder, standing on the ground, cannot be fixed to prevent slipping, then someone must hold it at the base when it is being used.
- A ladder which is not more than 3 m in length, need not be fixed or footed, provided it is securely placed so as to prevent it from slipping or falling. This exemption does not apply to ladders which are used as a means of communication between one working place and another, or to suspended ladders.
- Ladder must :
 - a) Extend at least 1.05 m above any landing place beyond the highest rung from which a person may be working, or have a nearby handhold of equivalent height.
 - b) Be placed so that there is space behind each rung for proper foothold (e.g. no rung should coincide with a scaffold tube).

CHAPTER 10.0

10.0 SCAFFOLDING

Collapse of any scaffold or part of a substantial part of the scaffold falling or overturning; also collapse or part collapse of the suspension arrangements of a slung or suspended scaffold, causing the platform or cradle to fall more than 5m.

10.1. Provision of Scaffolds, ETC.

Scaffolds must be provided for all work which cannot be safely done from the ground or part of the building.

Ladders, properly secured, can be used - but only for light work which can be done with one hand.

10.2. Supervision of Work and Inspection of Material.

Scaffolds must be erected, altered, or dismantled only under competent supervision and, as far as possible, by experienced persons. All scaffolding materials must be inspected before use to check that they are up to standard.

10.3. Construction and Material.

Sufficient sound material must be provided for a scaffold to be strong enough and stable enough for the job.

Wherever timber is used for any kind of scaffolding purpose, it must be of the right type for the job, be free from back and must not be painted so that any defects are hidden.

Scaffold tubes and fittings must not be bent, distorted or unduly rusty.

10.4. Defective Material

- Scaffold tubes, couplers or fittings that are bent unduly rusty or distorted should be rejected.
- **Timber with dangerous splits and knots should always be rejected.**
- Ropes and lashings showing signs of chafing through wear, or of being corroded, should be rejected.
- All scaffold components must be properly stored when not in use and kept separately from all other building materials.

10.5. Maintenance of Scaffolds.

Scaffolding must be kept in good order and every effort made to prevent the accidental displacement of any part.

10.6. Partly Erected or Dismantled Scaffolds.

In any scaffold is either partly erected (or partly dismantled), but nevertheless is still capable of being used to some extent, it must have a bold warning notice fixed, or all access blocked off or barred, at the point beyond which it cannot be safely used.

10.7. Standards or Uprights, Ledgers and Putlogs.

- Scaffold standards should be vertical and spaced closely enough for the intended use of the scaffold.
- Base plates must be used. Timber sole plates should also be used to distribute the load from the standard over a wider area, as well as to offset possible local subsidence.
- Ledgers must be level and fixed to standards with right-angle couplers.
- Putlogs and transoms must be firmly fixed to ledgers or standards.

The flattened end of the putlog must be pushed right into the wall to provide maximum support.

- Putlogs and transoms should be spaced according to the expected load and the thickness of the boards to be used in the platform.

In normal use, putlogs and transoms should be spaced so that the spans of scaffold boards should not be greater than:

- 32 mm boards : 1 m
- 38 mm boards : 1.50 m
- 50 mm boards : 4.60 m

10.8. Ladders used in Scaffolds

- Ladders used as uprights must be :
 - a) Strong enough for the load,
 - b) Equally supported on each stile, and
 - c) Secured to prevent slipping.
- Ladders are only to be used to support a scaffold platform when the work is light, e.g. painting.

10.9. Stability of Scaffolds

- All scaffolds must be :
 - a) On a solid, even base; or suspended from a sound structure.
 - b) Braced to prevent failure, and
 - c) Tied to the building or structure unless specially designed to be completely independent.
- Any building or structure which supports a scaffold must be strong enough to carry the scaffold and its load.
- Mobile scaffolds must :
 - a) Be stable, weighted at the base if necessary.
 - b) Be used only on a flat, level surface.
 - c) have the wheels locked to prevent movement whilst being used for work, and

- d) Be pushed, or pulled only at the base when being moved.
- Scaffolds must not be built on loose bricks, drain pipes, chimney pots, etc. Bricks or blocks can be used to support a platform no higher than 600 mm from the ground or floor.

10.10. Slung Scaffolds

- a) Be strong enough,
b) **Be properly secured to be overhead anchor-ages and to be platform frame,**
c) Be spaced so as to keep the platform stable,
d) Be vertical, and
e) Be kept taut.
- No rope other than wire rope may be used for suspension.
- Packing must be used to prevent damage to suspension ropes or chains at any point where sharp or rough - edged protrusions could cause chafing.
- The platform must be secured to prevent swaying whilst in use.

10.11. Cantilever, Jib, Figure and Bracket Scaffolds.

Cantilever or jib scaffolds must be anchored to a structure which is strong enough to carry the total load. Outriggers must be long enough and strong enough and the scaffold must be braced to ensure stability.

Figure or bracket scaffolds supported by dogs or spikes must not be used if there is any danger of these pulling out of the brickwork or stone-work.

10.12. Support for Scaffolds, etc.

No part of the building may be used to support scaffolding unless it is strong enough to do so. Unless gutters have been designed as walkways and are strong enough to bear the weight, they must not be used to support scaffolding or ladders.

10.13. Suspended Scaffolds (Not Power Operated)

- The ropes, winches, blocks and tackle must be strong enough and correctly rigged. A safe anchorage for the suspension must be provided.
- Winches or similar lifting devices must :
 - a) Have brakes which apply when the operating lever is released, and
 - b) Be protected from the weather, falling dirt, etc.
- Outriggers must :
 - a) Be long enough and strong enough,
 - b) Be horizontal (light cradles are excepted),
 - c) Have stops at their outer ends (light cradles excepted)
 - d) Be tied down or properly counterweighted at the tail, and
 - e) Be close enough together to support the rails and scaffolds properly.
- Counterweights Must :
 - a) Be bolted or securely attached to the outriggers, and
 - b) Be at least three times the overturning moment or load.
- Platforms must be hung clear of the building or face of the structure.
- Runways must :

- a) Be strong enough and in good condition,
- b) Have stops at each, and
- c) Be bolted or tied securely to their supports.

- Suspension ropes or chains must :
 - a) Be properly secured, both overhead and to the frame of the platform, and
 - b) Be kept taut.

- Winches must :
 - a) Have at least two full turns of rope on the drum when the platform is in its lowest position, and
 - b) Be marked with the length of rope on the drum.

- Suspended scaffolds and associated equipment must be maintained in good condition. Platforms must be prevented from tipping or swaying whilst in use.
- Steel wire rope must be used for the suspension of all platforms other than lightweight cradles.

Lightweight cradles may be suspended by fibre ropes and pulley blocks which should not be more than 3.20 m apart. (only ropes recommended by manufacturers for this purpose should be used).

- Platforms of suspended scaffold must :
 - a) Be close boarded,
 - b) Be at least 430 mm wide on lightweight cradles.
be at least 600 mm wide on all other types, if used only for workmen, or
be at least 800 mm wide, if used for workmen and materials, and
 - c) Never be used to carry another higher platform.

Platforms should be as close as possible to the face of the building, but where persons sit on the edge of the platform to carry out their work, then the distance between platform and building can be up to 300 mm.

10.14. Boatswain's Chairs Cages, Skips etc. (Not Power Operated)

- Hand-operated boatswain's chairs, skips etc. must :
 - a) Be well constructed, strong enough, and properly maintained.
 - b) have outriggers strong enough and firmly anchored,
 - c) Have chains, ropes and lifting gear firmly secured to the outriggers above and to the chair, skip etc. The construction (lifting operations) regulations apply to the lifting gear,
 - d) Be designed so that the occupant cannot fall out,
 - e) Carry no loose materials which could interfere with the safety of the occupant,
 - f) Have means of preventing spinning and tipping (a swivel connection at the suspension point is strongly advised),
 - g) In the case of skips, be at least 910 mm deep, and
 - h) Be under the supervision of a competent person during installation and use.

- A boatswain's chair may only be used as a workplace when the work would not take long enough to make the use of a suspended (or standard) scaffold reasonably practicable.

CHAPTER 11.0

11.0 HOISTS, CRANES & DERRICKS

Safety of Hoist ways. Platforms and Cages.

- Hoist ways must be enclosed wherever access is provided or wherever persons could be struck by the platform or other moving parts. Gates must be fitted in the enclosure at all landing places and must normally be at least 2m high, but gates 910 mm high are acceptable where persons are not at risk of falling down the hoist-way or coming into contact with moving parts. Gates must be kept closed except for the movement of persons and materials; it is the duty of all persons to see that this is done.
- Hoist platforms and cages must be fitted with a device capable of supporting them, fully loaded, should hoists, ropes or driving gear fail.
- Hoists must be fitted with ver-run stops at the top.

Operation of Hoists.

- Hoists must only be capable of being operated from one position at a time, whether by rope, lever or switch. Hoists must not be operated from the cage.
- Where the hoist driver cannot see the platform or cage during its movement, a signalling system, which covers all landing places, must be used.

Safe working Load and Marking of Hoists.

- A) The platform of materials or goods hoists must carry a notice stating (I) the safe working load and (ii) that passengers must not ride on the platform.
-
- The safe working load must not be exceeded except for test purposes.
- B) Cages for passenger's hoists must carry a notice stating (i) the safe working load and (ii) the number of passengers permitted.
- No greater number of passengers may be carried and the safe working load must not be exceeded except for test purposes.

Cranes & Derricks

Manufacture's recommendations on operating conditions shall be followed by the contractor. Rated load capacities and recommended operating speeds and special hazard warnings or instructions must be conspicuously posted on all equipment visible to the operator while he is at his control station.

A boom angle indicator and a load-indicating device in good working order must be provided for cranes and derricks. Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standards for the type of crane in use. Accessible areas within the swing radius of the rear of the rotating superstructure of a crane must be barricaded to prevent an employee from being struck or crushed by the crane.

In operating boom equipment, careful clearance shall be given to electrical distribution and transmission lines. For lines rated 50 kV or below, minimum clearance is 10 ft, whereas for loads rated over 50 kV, minimum clearance shall be 10 ft + 0.4 in per each kV over 50 - or use twice the length of the line insulator, but never less than 10 ft.

For hammerhead tower cranes, adequate clearance must be maintained between the moving and rotating structures and fixed objects to allow the passage of employees without harm. Employees required to perform duties on the horizontal booms of hammerhead tower cranes must be protected against falling by guard rails or by safety belts and lanyards. Overhead and gantry cranes must have the rated load of the crane plainly marked on each side, and if the crane has more than one hoisting unit, each must have its rated load marked on the load block in marking clearly legible from the ground or floor. All operation must be prescribed in ANSI B30.2, “Safety code for Overhead and Gantry Cranes”

Derricks in use must meet the applicable requirements for design, construction, installation, inspection, testing, maintenance, and operation prescribed in ANSI B30.6, “Safety code for Derricks”

CHAPTER 12.0

12.0 MOTOR VEHICLES

Motor equipment left unattended at night near areas where work is in progress must have appropriate lights, reflectors, or barricades to identify the location of the equipment. A safety tire rack, cage, or equivalent protection must be used when a worker is inflating, mounting, tires installed on split rims or rims equipped with locking rings. Heavy machinery that is suspended or held aloft by the use of slings, hoists, or jacks must be blocked or cribbed to prevent falling or shifting before employees are permitted to work under them. Bulldozer and scraper blades and similar equipment shall be either fully lowered or blocked when being repaired or when not in use. All controls must be in the neutral position and the motor stopped and brakes set, unless work being performed requires otherwise. Parked equipment must be checked and parking brakes set. All cab glass shall be safety glass. All vehicles must have a service brake system, an emergency brake system, and a parking brake system. Vehicles that require additional light shall have at least two headlights, as well as brake lights.

Other standard vehicles equipment such as seat belts, rear-view mirrors, and safety latches on operating levers shall be in accordance with standard vehicle codes, and state-inspected where appropriate.

CHAPTER 13.0

13.0 **BARRICADES**

- i) Contractor shall erect and maintain barricades required in connection with his operation to guard or protect.
 - a) Hoisting Areas.
 - b) Areas adjudged hazardous by contractor or Client.
 - c) Owner's existing property subject to damage by Contractor's operations.
- ii) Contractor's employees and those of his subcontractors shall become acquainted with Project Managers barricading practice and shall respect the provisions thereof.

13.1. Guarding of Floor Openings and Floor Holes.

13.1.1 Every temporary floor opening shall have railings, or shall be constantly attended by someone. Every floor hole into which persons can accidentally fall shall be guarded by either:

- a) A railing with toe board on all exposed sides, or
- b) A floor hole cover of adequate strength and it should be hinged in place. When the cover is not in place, the floor hole shall be constantly attended by some one or shall be protected by a removable railing.

13.2. Every stairway floor opening shall be guarded by a railing on all exposed sides, except at entrance to stairway. Every ladder way floor opening or platform shall be guarded by a guard railing with toe board on all exposed sides (except at entrance to opening), with the passage through the railing either provided with a swinging gate or so offset that a person can not walk directly into the opening.

13.3. Guarding of Open-Side Floors and Platform.

Every open-sided floor or platform 120 cm or more above adjacent floor or ground level shall be guarded by a railing (or the equivalent) on all open sides, except where there is entrance to ramp, stair-way, or fixed ladder. The railing shall be provided with a toe board beneath the open sides wherever.

- a) Persons may pass;
- b) There is moving machinery ; or
- c) There is equipment with which falling materials could create a hazard.

CHAPTER 14.0

14.0 **HANDLING & STORAGE OF MATERIALS**

14.1 **Cement.**

- a) Storage and Stacking - Cement shall be stored at the work site in a building or a shed which is dry, leak proof and as moisture-proof as possible. The building or shed for storage should have minimum number of windows and close fitting doors and these should be kept closed as far as possible.

Cement received in bags shall be kept in such a way that the bags are kept free from the possibility of any dampness or moisture coming in contact with them. Cement bags shall be stacked off the floor on wooden planks in such a way as to keep them 150 to 200 mm clear from the floor and space of 450 mm minimum shall be left all-round between the exterior walls and the stacks. In the stacks the cement bags shall be kept close together to reduce circulation of air as much as possible. Owing to pressure on bottom layer of bags sometimes 'warehouse pack' is developed in these bags. This can be removed easily by rolling the bags when cement is taken out for use.

The height of stack shall not be more than 15 bags to prevent the possibility of lumping up under pressure. The width of the stack shall be not more than four bags length or 3 metres. In stacks more than 8 bags high, the cement bags shall be arranged alternately lengthwise and crosswise so as to tie the stacks together and minimise the danger of toppling over.

For extra safety during monsoon, or when it is expected to store for an unusually long period, the stack shall be completely enclosed by a water proofing membrane such as polyethylene, which shall close on the top of the stack. Care shall be taken to see that the waterproofing membrane is not damaged any time during the use.

Drums or other heavy containers of cement shall not be stacked more than two layers high.

The manner of storage shall facilitate the requirement that lots of cement received are removed and used more or less in the order in which they are received.

- b) HANDLING - Hooks shall not be used for handling cement bags unless specifically permitted by the engineer-in-charge.

14.2. **Polyethylene Pipes.**

- a) Storage & Stacking - Black polyethylene pipes may, be stored either under cover or in the open. Natural polyethylene pipes, however, should be stored under cover and protected from direct sunlight.

Coils may be stored either on edge or stacked flat one on top of the other, but in either case they should not be allowed to come into contact with hot water or steam pipes and should be kept away from hot surface.

Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set.

Storage of pipes in heated areas exceeding 27° C should be avoided.

- b) Handling - Removal of pipe from a pile shall be accomplished by working from the ends of the pipe.

14.3. Pipes of Conducting Materials.

- a) Storage and Stacking - Pipes shall be stacked on solid level sills and contained in a manner to prevent spreading or rolling of the pipe. Where quantity storage is necessary, suitable packing shall be placed between succeeding layers to reduce the pressure and resulting spreading of the pile.

In stacking and handling of pipes and other conducting materials, the following minimum safety distances shall be ensured from the overhead power lines:

11 kV and below	40m
Above 11 and below 33 kV	60 m
Above 33 and below 132 kV	70 m
Above 132 and below 275 kV	70 m
Above 275 and below 400 kV	50 m

- b) Handling - Removal of pipes from a pile shall be accomplished by working from the ends of the pipe. During transportation, the pipes shall be so secured as to insure against displacement.

14.4 Paints Varnishes and Thinners.

- a) Storage and Stacking - Paints, varnishes, lacquers, thinners and other flammable materials shall be kept in properly sealed or closed containers. The containers shall be kept in a well ventilated location, free from excessive heat, smoke, sparks or flame. The floor of the paint stores shall be made up of 10 cm thick loose sand.

Paint materials in quantities other than required for daily use shall be kept stocked under regular storage place.

Where the paint is likely to deteriorate with age, the manner of storage shall facilitate removal and use of lots in the same order in which they are received.

Temporary electrical wiring / fittings shall not be installed in the paint store. When electric lights, switches or electrical equipment are necessary, they shall be of explosion proof design.

- b) Handling - Ventilation shall be adequate to prevent the accumulation of flammable vapours to hazardous levels of concentration shall be provided in all areas where painting is done.

When painting is done in confined spaces where flammable or explosive vapours may develop, any necessary heat shall be provided through duct work remote from the source of flame.

Sources of ignition, such as open flame and exposed heating elements, shall not be permitted in area or rooms where spray painting is done nor shall smoking be allowed there.

Care should be taken not to use any naked flame inside the paint store. Buckets containing sand shall be kept ready for use in case of fire. Fire extinguishers when required shall be of foam type conforming to accepted standards.

Each workman handling lead based paints shall be issued 1/2 litre milk per day for his personal consumption.

14.5. Bitumen, Road Tar, Asphalt, etc.

- a) Storage and Stacking - Drums or containers containing all types of bitumen, road tar, asphalt, etc. shall be stacked vertically on their bottoms in up to 3 tiers. Leaky drums shall be segregated. Empty drums shall be stored in pyramidal midal stacks neatly in rows.
- b) Handling Bitumen / Tar - Bitumen / tar shall not be heated beyond the temperature recommended by the manufacturer of the product. While discharging heated binder from the boiler, workers shall not stand opposite to the jet so as to avoid the possibility of hot binder falling on them. The container shall be handled only after closing the control valve. While handling hot bitumen / tar, workers shall exercise scrupulous care to prevent accidental spillage thereof. The buckets and cans in which the hot material is carried from boiler shall be checked before use to ensure that they are intact and safe. Mops and other applicators contaminated with bituminous materials shall not be stored inside buildings.

14.6. Bituminous Roofing Felts.

- a) Storage and Stacking - Bituminous roofing felts shall be stored away from other combustible flammable materials. For long storage it shall be kept under shade.
- b) Handling - Bituminous roofing felts should be handled in a manner to prevent cracking and other damages.

14.7. Flammable Materials.

- a) Storage and Stacking - In addition the following provisions shall also apply :
 - 1) Outdoor storage of drums requires some care to avoid contamination because moisture and dirt in hydraulic brake and transmission fluid, gasoline, or lubricants may cause malfunction of failure of equipment, with possible danger to personnel. The storage area should be free of accumulations of spilled products, debris and other hazards.
 - 2) Compressed gases and petroleum products shall not be stored in the same building or close to each other.
- b) Handling - Petroleum products delivered to the job site and stored there in drums shall be protected during handling to prevent loss of identification through damage to drum markings, tags, etc. Unidentifiable petroleum products may result in improper use, with possible fire hazard, damage to equipment or operating failure.

Workmen shall be required to guard carefully against any part of their clothing becoming contaminated with flammable fluids. They shall not be allowed to continue work when their clothing becomes so contaminated.

CHAPTER 15.0

15.0 EXCAVATION & SHORING

Excavation and Trenching: All trenches, 1.5 meters or more in depth, shall at all times be supplied with at least one ladder for each 30 meters in length or fraction thereof. Ladder shall be extended from bottom of trench to at least 1 meter above surface of the ground. Sides of a trench which is 1.5 meters or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides collapsing. Excavated material shall not be placed within 1.5 meters of edge of trench or half of depth of trench, whichever is more cutting undermining or undercutting be done.

CHAPTER 16.0

16.0 CONCRETE CONSTRUCTION

16.1. **Handling of Plant.**

16.1.1. Mixers - All gears, chains and rollers of mixers shall be properly guarded. If the mixer has a charging skip the operator shall ensure that the workmen are out of danger before the skip is lowered. Railings shall be provided on the ground to prevent anyone walking under the skip while it is being lowered.

16.1.2. All cables, clamps, hooks, wire ropes, gears and clutches, etc, of the mixer, shall be checked and cleaned, oiled and greased, and serviced once a week. A trial run of the mixer shall be made and defects shall be removed before operating a mixer.

16.1.3. When workmen are cleaning the inside of the drums, and operating power of the mixer shall be locked in the off position and all fuses shall be removed and a suitable notice hung at the place.

16.2. **Trucks.**

When trucks are being used on the site, traffic problems shall be taken care of. A reasonably smooth traffic surface shall be provided. If practicable, a loop road shall be provided to permit continuous operation of vehicles and to eliminate their backing. If a continuous loop is not possible, a turnout shall be provided. Backing operations shall be controlled by a signalman positioned so as to have a clear view of the area behind the truck and to be clearly visible to the truck driver. Movement of workmen and plant shall be routed to avoid crossing, as much as possible, the truck lanes.

16.3. **Formwork.**

16.3.1. Formwork shall be designed after taking into consideration spans, setting temperature of concrete, dead load and working load to be supported and safety factor for the materials used for formwork.

16.3.2. All timber formwork shall be carefully inspected before use and members having cracks and excessive knots shall be discarded.

16.3.3. The vertical supports shall be adequately braced or otherwise secured in position that these do not fall when the load gets released or the supports are accidentally hit.

16.3.4. Tubular steel centering shall be used in accordance with the manufacturer's instructions. When tubular steel and timber centering is to be used in combination necessary precautions shall be taken to avoid any unequal settlement under load.

16.3.5. All centering shall be finally, inspected to ensure that:

- a) Footings or sills under every post of the centering are sound.
- b) All lower adjustment screws or wedges are snug against the legs of the panels.
- c) All upper adjustment screws or heads of jacks are in full contact with the formwork.
- d) Panels are plumb in both directions.
- e) All cross braces are in place and locking devices are in closed and secure position.

- f) In case of CHHAJAS and balconies, the props shall be adequate to transfer the load to the supporting point.

16.4. Ramps and Gangways.

16.4.1. Ramps and gangways shall be of adequate strength and evenly supported. They shall either have a sufficiently flat slope or shall have cleats fixed to the surface to prevent slipping of workmen. Ramps and gangways shall be kept free from grease, mud, snow or other slipping hazards or other obstructions leading to tripping and accidental fall of a workman.

16.4.2. Ramps and gangways meant for transporting materials shall have even surface and be of sufficient width and provided with skirt boards on open sides.

16.5. Prestressed Concrete.

16.5.1. In pre-stressing operations, operating, maintenance and replacement instructions of the supplier of the equipment shall be strictly adhered to.

16.5.2. Necessary shields should be put up immediately behind the prestressing jacks during stressing operations.

16.5.3. Wedges and other temporary anchoring devices shall be inspected before use.

16.5.4. The prestressing jacks shall be periodically examined for wear and tear.

16.6. Erection of Prefabricated Members.

16.6.1. A spreader beam shall be used wherever possible so that the cable can be as perpendicular to the members being lifted as practical. The angle between the cable and the members to be lifted shall not be less than 60°.

16.6.2. Methods of assembly and erection specified by the designer shall be strictly adhered to at site. Immediately on erecting any unit in position, temporary connections or supports as specified shall be provided before releasing the lifting equipment. The permanent structural connections shall be established at the earliest opportunity.

16.7. Heated Concrete.

When heaters are being used to heat aggregates and other materials and to maintain proper curing temperatures, the heaters shall be frequently checked for functioning and precautions shall be taken to avoid hazards in using coal, liquid, gas or any other fuel.

CHAPTER 17.0

17.0 MASONRY

17.1. Walls.

17.1.1. **General** - Depending on the type of wall to be constructed the height of construction per day shall be restricted to ensure that the newly constructed wall does not come down due to lack of strength in the lower layers. Similarly, in long walls adequate expansion / crumple joints shall be provided to ensure safety.

17.2. **Opening in Walls** - Whenever making of an opening in the existing wall is contemplated, adequate supports against the collapse or cracking of the wall portion above or roof or adjoining walls shall be provided.

17.2.1. **Guarding of Wall Openings and Holes** - Wall opening barriers and screens shall be of such construction and mounting that they are capable of withstanding the intended loads safely. For detailed information reference may be made to good practice. Every wall opening from which there is a drop of more than 120 mm shall be guarded by one of the following;

- a) Rail, Roller, Picket Fence, Half Door or Equivalent Barrier - The guard may be removable but should preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where there is danger to persons working or passing below on account of the falling materials, a removable toe board or the equivalent shall also be provided. When the opening is not in use for handling materials, the guards shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening. The opening should have a sill that projects above the floor level at least 2.5 cm.
- b) Extension platform into which materials may be hoisted for handling shall be of full length of the opening and shall have side rails or equivalent guards.

17.2.2. Every chute wall opening from which there is a drop of more than 120 mm shall be guarded by one or more of the barriers specified in 17.2.1. or as required by the conditions.

CHAPTER 18.0

18.0 **HEALTH STANDARDS**

18.1 **DRINKING WATER**

- a) In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.
- b) Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where such drinking water shall be stored.
- c) Every water supply or storage shall be at a distance of not less than 50 feet from any latrine drain or any other source of pollution.

18.2 **WASHING FACILITIES**

- a) In every work place adequate and suitable facilities for washing shall be provided and maintained for the use of contract labour employed therein.
- b) Separate and adequate cleaning facilities shall be provided for the use of male and female workers.
- c) Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition.

18.3 **LATRINES AND URINALS**

- a) Latrines shall be provided in every work place on the following scale namely:-
 - i) Where female are employed there shall be at least one latrine for every 25 females.
 - ii) Where males are employed, there shall be at least one latrine for every 25 males.

Provided that where the number of males or females exceeds 100, it shall be sufficient if there is one latrine for 25 males or females as the case may be upto first 100, and one for every 50 thereafter.

- b) Every latrine shall be under cover and so partitioned off as to secure privacy and shall have proper door and fastenings.
- c) Construction of latrines: The inside walls shall be constructed of masonry or some suitable heat-resisting non-absorbent materials and shall be cement washed inside and outside at least once a year, latrines shall not be of standard lower than borehole system.
- d) i) Where workers of both sexes are employed, there shall be displayed out side each block of latrine and urinal, a notice in the language understood by the majority of the workers " For Men only " or " For Women only " as the case may be.
ii) The notice shall also bear the figure of man or woman, as the case may be.
- e) There shall be at least one urinal for male workers upto 50 and for female workers upto 50 employed at a time, provided that where the number of male or female workers, as the case may be exceeds 500, it shall be sufficient if there is one urinal for every 50 males or females upto the first 500 and one for every 100 or part thereafter.
- f) i) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.

- ii) Latrines and urinals other than those connected with a flush sewage system shall comply with the requirements of Public Health Authorities.
- g) Water shall be provided by means of tap or otherwise so as to conveniently accessible in or near the latrines and urinals.
- h) Disposal of excreta: Unless otherwise arranged by the local sanitary authority, arrangements for proper disposal of excreta by incineration at the work place shall be made by means of a suitable incinerator. Alternately excreta may be disposed off by putting a layer of night soil at the bottom of a pucca tank prepared for the purpose and covering it with 15 cm layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn to manure).
- i) The contractor shall at his own expense , carry out all instructions issued to him by the Engineer-in-charge to effect proper disposal of night soil and other conservancy work in respect of the contractor's workmen or employees of the site. The contractor shall be responsible for payment of any charges which may be levied by the municipal or cantonment authority for execution of such on behalf.

18.4 PROVISION OF SHELTER DURING REST

At every place there shall be provided , free of cost , four suitable sheds , two for meals and other two for rest separately for the use of men and women labour . The height of each shelter shall not be less than 3m from the floor level to the lowest part of the shed roof. These shall be kept clean and the space provided shall be on the basis of 0.6sq.m per head.

Provided that the Engineer-in-charge may permit subject to his satisfaction , a portion of building under construction or other alternative accommodation to be used for the purpose.

18.5 CRÈCHES

- I) At every work place , at which 20 or more women workers are ordinarily employed , there shall be provided two rooms of reasonable dimensions for the use of their children under at the age of six years . One room shall be used as a play room for the children and the other as their bedroom.
- ii) The rooms shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the places clean.
- iii) The contractor shall supply adequate number of toys and games in playroom and sufficient number of cots and bedding in the bed room.
- iv) The contractor shall provide one aya to look after the children in the crèche when the number of women workers does not exceed 50 and two when the number of women workers exceeds 50.
- v) The use of the rooms earmarked as crèches shall be restricted to children, their attendants and mothers of the children.

18.6 CANTEENS

- D) In every work place where the work regarding the employment of contract labour is likely to continue for six months and where in contract labour numbering 100 or more are ordinarily employed , an adequate canteen shall be provided by the contractor for the use of such labour .
- ii) The canteen shall be maintained by the contractor in an efficient manner.
- iii) The canteen shall consist of at least a dining hall, kitchen, storeroom, pantry and washing places separately for workers and utensils.
- iv) The canteen shall be sufficiently at all times when any person has access to it.
- v) The floor shall be made of smooth and impervious materials and inside walls shall be lime washed or colour washed at least once a year .The inside walls of the kitchen shall be lime washed every four months.
- vi) The premises of the canteen shall be maintained in a clean and sanitary condition.
- vii) Suitable arrangements shall be made for the collection of disposal of garbage.
- viii) Waste water shall be carried away in suitable covered drains and shall not be allowed to accumulate so as to cause nuisance.
- ix) The dining hall shall accommodate at a time 30 percent of the contract labour working at a time.

- x) The floor area of the dining hall, excluding the area occupied by the service counter and any furniture except tables and chairs shall not be less than one sq.m per diner to be accommodated as prescribed in sub-rule (ix).
- xi) a) 1. There shall be provided and maintained sufficient utensils crockery, furniture and any other equipment necessary for efficient running of canteen.
2. The furniture utensils and other equipment shall be maintained in a clean and hygienic condition.
b) 1. Suitable clean clothes for the employees serving in the canteen shall be provided and maintained.
2. A service counter, if provided, shall have top of smooth and impervious material.
3. Suitable facilities including an adequate supply of hot water shall be provided for the cleaning of utensils and equipment.
- xii) A portion of the dining hall and service counter shall be partitioned off and reserved for women workers in proportion to their number.
- xiii) Sufficient tables stools or benches shall be available for the number of diners to be accommodated as prescribed in sub rule (ix).
- xiv) The food stuff and other items to be served in the canteen shall be in conformity with the normal habits of the contract labour .
- xv) The charges for food stuffs, beverages and other items served in the canteen shall be based on ‘No profit No loss’ and shall be conspicuously displayed in the canteen.
- xvi) In arriving at the price of foodstuffs, and other article served in the canteen , the following items shall not be taken into consideration as expenditure namely :-
 - a) The rent of land and building.
 - b) The depreciation and maintenance charges for the building and equipment provided for the canteen.
 - c) The purchase, repairs and replacement of equipment including furniture , crockery, cutlery and utensils.
 - d) The water charges and other charges incurred for lighting and ventilation.
 - e) The interest and amounts spent on the provision and maintenance of equipment provided for the canteen.
- xvii) The accounts pertaining to the canteen shall be audited once every 12 months by registered accountants and auditors.

18.7 ANTI-MALARIAL PRECAUTIONS

The contractor shall at his own expense, conform to all anti-malarial instructions given to him by Engineer-in-charge including the filling up of any borrow pits which may have been dug by him.

CHAPTER 19.0

19.0 RECORD OF FIRST AID TREATMENT.

Project Data: _____

Project:

Location:

Injured Data:

Name:

Employer:

Employer's Supervisor:

Injury Data:

Date:

Time:

Description of Injury:

First Aid Treatment:

Treatment administered by:

Type of treatment administered:

Referred for Medical Treatment:

_____ No

_____ Yes.

Doctor _____

Hospital _____

Report Prepared By:

Treatment Received By:

Date:

Date:

CHAPTER 20.0

20.0 DAMAGE REPORT FORM

Contract _____

Plant and equipment affected. _____

Serial numbers or identifying marks _____

Owner of plant or equipment _____

Place, date and time of incident _____

Circumstances of incident _____

Details of damage _____

Names of operators involved (if not Company employees, also give details of such contractors concerned) _____

Were normal working methods used ? _____

Contributory causes of incident _____

Names of witness _____

(attach statements) _____

Preventative action proposed or taken _____

Signature of Site Agent or Manager _____

Date _____.

CHAPTER 21.0

21.0 PERSONNEL ACCIDENT REPORT FORM.

Division / Dept (if applicable) _____

Contractor _____

Full name and address of injured person (IP) _____

Occupation of IP _____ Age of IP _____

Employed (state if self - employed or under training) _____

Trade of sub contractor (where applicable) _____

Particulars of accident:

Date and time of accident _____

Exact place where accident happened. _____

What was IP doing at time of accident? _____

Did IP cease work? _____

First air or hospital treatment. _____

Time lost (state if IP is still off work) _____

Brief description of accident, giving dimensions where applicable _____

Details of tools, equipment plant or machinery. _____

What protective clothing / equipment was being worn / used by IP? _____

Nature of injury and part of the body injured. e.g. punctured foot, hand, broken leg. _____

Contributory factors:

Unsafe system of work YES/NO _____

Lack of training, supervision etc. YES/NO _____

Environmental Conditions (wind, rain, ice, etc.) YES/NO _____

State of equipment (faulty brakes, damaged lifting gear, etc.) YES/NO _____

Housekeeping (untidy access, nails in timber. etc) YES/NO _____

Other _____

Delete as appropriate and give details.

Names and address of witness _____

If reportable:

Date and time Safety Officer informed by Telephone _____

Preventative action taken or proposed _____

Signature of Site Agent or Manager _____

Date _____

SECTION 4: CONTRACT DATA

Contract Data

1. The following documents are also part of the Contract:
- The Schedule of Other Contractors working simultaneously in the area if any
 - The Schedule of Key Personnel organogram to be submitted along with Bio data of Key Personnel for approval of Engineer in Charge
 - The Methodology and Program of Construction
 - The Schedule of Key and Critical equipment to be deployed on the work as per agreed program of construction

2. The **Employer** is:

Mahindra World City (Jaipur) Limited
SEZ Project Office,
Vill & PO – Kalwara,
Tehsil- Sanganer, Dist-Jaipur -302029
Phone No: 09799299120/ 09929388805

Authorized Representative: **HEAD (Infrastructure & Development)**

4. The Name and identification number of the Contract is: **CONSTRUCTION OF WATER SUPPLY SYSTEM FOR HANDICRAFTS AND LIGHT ENGINEERING SEZ AT MAHINDRA WORLD CITY, JAIPUR OF MWC JAIPUR** and the number is **MWCJL/IT/ITES/ISW/2008-09/T-10**
5. The Works consist of **Development For Special Economic Zone At Mahindra World City, Jaipur** as described in detail under the caption “Scope of Work” in the Special conditions of Contract.
6. The Date of Commencement shall be the date specified in the Letter of Intent of the work.
7. The Intended Completion Date for the whole of the Works is **Twelve (12) Months** reckoned from the date of commencement as indicated in the letter of Intent, issued by the Employer. The work shall have the following milestones
- 8. Milestone dates:**
- | <u>Physical completion of works</u> | <u>Period from the date of commencement of work</u> |
|-------------------------------------|---|
| Milestone 1 | will be given at the time of award |
| Milestone 2 | will be given at the time of award |
| Milestone 3 | will be given at the time of award |
9. The Contractor shall submit a work schedule including the commencement date, to reflect the ground realities and adhering to the schedule of milestone indicated above. This revised work schedule shall be submitted within 10 days of delivery of the Letter of Intent.
10. The Site Possession Date shall be the date within seven days from the date of issue of letter of Intent.

11. The Site is located at **Mahindra World City (Jaipur) Limited, MAHINDRA WORLD CITY, JAIPUR. Village: Kalwada, Tehsil : Sanganer, District: Jaipur, PIN- 302029**
12. The Defects Liability Period is **24 Months** from the certified date of completion of works. (where sectional completion certificate is issued this will apply from those dates for those sections).
- 13.. Insurance requirements are as under:

Sr. No.	Policy for	Insurance cover required
1	Contractor's All Risk Insurance for works	By Contractor
2	Loss or damage to Employer's Equipment	By Contractor
3	Other Employers property	By Contractor
4	Personal injury or death insurance: a) Third Party	By Contractor
	b) For Contractor's Employee	By Contractor Contractor should ensure such insurance is in force through out the Contract period (Including defect liability period) and necessary proof to be submitted before the commencement of the project and at least a fortnight before the expiry of current insurance. The Contractor should indemnify and include in the policy the Employer
(iii)	Motor Vehicle Insurance	By Contractor as per statutory requirements, covering third Party liability.
	Third Party liability insurance (Including the name of Employer)	By Contractor Minimum cover Rs. 10 Lacs.
	Contractor's Equipments (Including liability arising out of usages of such equipment)	By Contractor.

14. The language of the Contract documents is English
15. The law which applies to the Contract is the laws of Republic of India
16. The currency of the Contract is Indian Rupees.
17. The proportion of payments retained (retention money) shall be 5 % from each bill to be released within 30 days after the issue of Completion Certificates.
18. The liquidated damages for the whole of the works are 0.5% of the Contract value per day or part or part thereof
19. The maximum amount of liquidated damages for the whole of the works is five percent (5%) of final Contract price.
20. Deleted

21. The amounts of the advance payment are:

<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>
1. Mobilization	10% of the Contract price	On submission of un-conditional Bank Guarantee. 5 % initially and 5 % on completion of mobilization/actual commencement of work as stipulated in the Contract.

(The advance payment will be paid to the Contractor no later than 15 days after fulfilment of the above conditions).

22. Repayment of advance payment for mobilization and equipment:

The advance shall be recovered with percentage deductions from the interim payments certified by the Engineer in Charge under the Contract. The mobilization advance shall be recovered from all progressive invoices right from first interim payment certificate and will be recovered fully prior to the completion of 80 % of the total work value.

23. The Securities shall be for the following minimum amounts equivalent as a percentage of the Contract Price:

24. Performance Security shall be for 5% per cent of Contract price to be submitted prior to signing the Contract. Performance Security shall be released within 30 days after the Certified date of Completion.

25. The standard form of Performance Security acceptable to the Employer shall be an unconditional and irrevocable Bank Guarantee of the type as presented in Section 5 of the Bidding Documents and valid for one month after the expiry of the defect liability period.

26. The as-built drawings in 2 sets are required before issue of certificate of completion of whole or section of the work, as the case may be. The amount to be withheld for non submission is **Rs. 100, 000/-**.

27. The following events shall also be fundamental breach of Contract:

27.1 The Contractor has contravened any Clause / sub-Clause of the General Condition of Contract.

27.2 The Contractor does not adhere to the agreed construction program and agreed environmental management plan and also fails to take satisfactory remedial action as per Agreements.

27.3 The Contractor fails to carry out the instructions of Engineer in Charge within a reasonable time determined by the Engineer in Charge in accordance with General Condition of Contract Clause 8 and 11.

SECTION 5: FORMS OF SECURITIES

Forms of Securities

Acceptable forms of securities are annexed. Bidders should not complete the Performance and Advance Payment Security forms at this time. Only the successful Bidder will be required to provide Performance and Advance Payment Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

Annex A: Performance Bank Guarantee

Annex B: Bank Guarantee for Advance Payment

PERFORMANCE GUARANTEE

This Guarantee of guarantee (hereinafter referred to as “**Guarantee**”) made this (date)..... by Bank (Bank Name)....., a scheduled bank with its head office at (address)..... (hereinafter referred to as the “**Bank**”) of the first part in favour of M/s. Mahindra World City (Jaipur) Limited, a company incorporated under Companies Act, 1956 and having its office at 411, 4th Floor, Neel Kanth Tower, Bhawani Singh Road, C- Scheme, Jaipur - 302 001 (hereinafter referred to as “**MWCJL**” which expression shall, unless repugnant to the meaning and context here to, include its affiliates, successors and assigns) of the other part.

WHEREAS:

- A. M/s. Mahindra World City (Jaipur) Limited is developing a special economic zone at Jaipur called “Mahindra World City, Jaipur” (hereinafter referred to as “**SEZ**”);
- B. On the assurance of M/s -----having its registered office at ----- (hereinafter referred to “**Contractor**”) that they are having the necessary infrastructure and capacity to undertake construction of ----- package at the SEZ to the quality, specifications and time frame as per the terms and conditions stipulated by MWCJ, MWCJ and Contractor have entered into a contract dated xx (hereinafter referred to as “**Contract**” which expression shall include any agreed amendments or modifications thereto) to execute the work within the SEZ in accordance with the terms and conditions of such Contract;
- C. Contractor has, by its acceptance to enter into the Contract with MWCJ has agreed to furnish a bank guarantee to MWCJ to ensure timely and satisfactory performance and completion of the work as per terms of the Contract;
- D. The Bank has, at the request of the Contractor, agreed to grant in favour of MWCJ, a guarantee to secure performance by Contractor of its obligations under the said works contract.

NOW THIS GUARANTEE WITNESSES AS FOLLOWS:

- 1. The Bank hereby unconditionally, unequivocally and irrevocably guarantee to MWCJ and agrees and undertakes that if in the sole and unfettered opinion of MWCJ, Contractor has failed to perform its obligations under the said Contract and any amendments or modifications thereto, the Bank shall upon demand of MWCJ forthwith pay to MWCJ, without demur, contestation or dispute, without reference to Contractor, the amount set forth in certificate by MWCJ as the amount of loss / claim / damage / cost / expense arising or likely to arise out of breach or non fulfilment of the said Contract. Any such certificate or demand by MWCJ on the Bank, shall be conclusive as regards the amount due and payable by the Bank to MWCJ under this Guarantee, notwithstanding any dispute between Contractor and MWCJ as to the liability for or quantum of loss / damage / claim / costs / expenses and notwithstanding any notice by Contractor to the Bank withhold or not to pay any amount to MWCJ against this Guarantee either before or after invoking of this Guarantee by MWCJ. Provided always the total liability of the Bank hereunder shall be limited to Rs. (.....) (Rupees.....).

2. This Guarantee of the Bank shall be effective immediately from the date hereof and shall be in force for till a certificate is issued by MWCJ to the Bank in accordance with Clause 5 of this Guarantee unless a claim or demand in writing is served upon the Bank by MWCJ. If a demand is so served, this Guarantee shall continue in full force and effect (notwithstanding the expiration date) in respect of the amount so demanded until the obligation of the Bank in respect hereof is finally determined and the payment made to MWCJ.
3. The Bank agrees that MWCJ has the fullest liberty, without affecting in any manner the Bank's obligations hereunder, to vary any of the terms and conditions of the said Contract, to extend the time of performance by the Contractor from time to time and to forbear from enforcing any of the terms of the said Contract without any notice to or the consent of the Bank and the Bank shall not be released from its liability under this Guarantee by reason of any such variation or extension or forbearance being granted to Contractor. The Bank agrees that MWCJ has no obligation whatsoever to exercise its rights against collateral, if any, of Contractor but may immediately call on this Guarantee.
4. The Bank agrees that MWCJ has the fullest liberty, without affecting in any manner the Bank's obligation hereunder, to assign this guarantee in favour of any MWCJ affiliate company in India without the consent of but with prior intimation to, the Bank, and the Bank shall not be released from its liability under this Guarantee by reason of any such assignment. The Bank shall forthwith, on receipt of such intimation; undertake necessary endorsements or amendments hereto to incorporate the assignment in favour of such MWCJ affiliate assignee.
5. This Guarantee herein contained shall remain in force and effect till MWCJ certify that the terms and conditions of the said Contract have been fully and properly carried out and that the Contractor has fulfilled all its obligations under the Contract and that MWCJ has no claim against the Contractor on any account against the said Contractor. The Bank shall be released of its liabilities and obligations under this Guarantee only after such a certificate as aforesaid is issued by MWCJ to the Bank.
 - i) The Bank shall not revoke this Guarantee during its currency except with the previous consent in writing of MWCJ.
 - ii) Only neglect or forbearance, on the part of MWCJ, in the enforcement of the payment of any money, the payment whereof is intended to be hereby secured or the giving of the time for the payment hereto shall in no way relieve the Bank of their liability under this Guarantee.
6. Any notice or communication under this Guarantee shall be in writing and shall be served on the Bank at its address first hereinbefore mentioned and to MWCJ at its address first hereinbefore mentioned. Either party may notify to the other in writing any change in such address for service of notice upon it. The notices shall be served personally against acknowledgement or by Registered Post / Fax / Telex.
7. This Guarantee shall not be affected by any change in the constitution of the Bank or of Contractor or of MWCJ.
8. This Guarantee shall be governed by the applicable laws of India.
9. The expression "The Bank" and the Contractor hereinbefore used shall include their respective successors and permitted assigns.

IN WITNESS WHERE OF..... FOR AND ON BEHALF
OF THE BANK HAS SIGNED THIS GUARANTEE ON THE DAY AND THE
YEAR FIRST ABOVE WRITTEN.

()

WITNESSES :

1.

2.

ANNEXURE –B

DRAFT OF ADVANCE BANK GUARANTEE

This Guarantee of guarantee (hereinafter referred to as “**Guarantee**”) made this (date)..... by Bank (Bank Name)....., a scheduled bank with its head office at (address)..... (hereinafter referred to as the “**Bank**”) of the first part in favour of M/s. Mahindra World City (Jaipur) Limited, a company incorporated under Companies Act, 1956 and having its office at 411,Neelkanth Towers, Bhawani Singh Marg, C-Scheme, Jaipur - 302001. (hereinafter referred to as “**MWCJL**” which expression shall, unless repugnant to the meaning and context here to, include its affiliates, successors and assigns) of the other part.

WHEREAS:

- A. M/s. Mahindra World City (Jaipur) Limited is developing a special economic zone at Jaipur called “Mahindra World City, Jaipur” (hereinafter referred to as “**SEZ**”);
- B. On the assurance of M/s -----having its registered office at ----- (hereinafter referred to “**Contractor**”) that they are having the necessary infrastructure and capacity to undertake construction of ----- package at the SEZ to the quality, specifications and time frame as per the terms and conditions stipulated by MWCJ, MWCJ and Contractor have entered into a contract dated xx (hereinafter referred to as “**Contract**” which expression shall include any agreed amendments or modifications thereto) to execute the work within the SEZ in accordance with the terms and conditions of such Contract;
- C. MWCJ has agreed to pay an advance of Rs. ----- in accordance with the terms of the Contract to the Contractor to perform its obligations under the Contract. Such advance given by MWCJ shall be secured by Contractor by way of a bank guarantee;
- D. The Bank has, at the request of the Contractor, agreed to grant in favour of MWCJ, a guarantee to secure advance payment made by MWCJ to the Contractor.

NOW THIS GUARANTEE WITNESSES AS FOLLOWS:

- 1. The Bank hereby unconditionally, unequivocally and irrevocably guarantee to MWCJ and agrees and undertakes that if in the sole and unfettered opinion of MWCJ, Contractor has failed to pay the amount equivalent to Rs. -----given as advance by MWCJ to the Contractor (hereinafter referred to as “**Advance**”)with in the time stipulated in the Contract, the Bank shall upon demand of MWCJ forthwith pay to MWCJ, without demur, contestation or dispute, without reference to Contractor, amount equivalent to Advance. Any such certificate or demand by MWCJ on the Bank, shall be conclusive as regards the amount due and payable by the Bank to MWCJ under this Guarantee, notwithstanding any dispute between Contractor and MWCJ as to the liability for or quantum of loss / damage / claim / costs / expenses and

notwithstanding any notice by Contractor to the Bank withhold or not to pay any amount to MWCJ against this Guarantee either before or after invoking of this Guarantee by MWCJ Provided always the total liability of the Bank hereunder shall be limited to Rs. (.....)
(Rupees.....).

2. This Guarantee of the Bank shall be effective immediately from the date hereof and shall be in force for till a certificate is issued by MWCJ to the Bank in accordance with Clause 5 of this Guarantee unless a claim or demand in writing is served upon the Bank by MWCJ. If a demand is so served, this Guarantee shall continue in full force and effect (notwithstanding the expiration date) in respect of the amount so demanded until the obligation of the Bank in respect hereof is finally determined and the payment made to MWCJ.
3. The Bank agrees that MWCJ has the fullest liberty, without affecting in any manner the Bank's obligations hereunder, to vary any of the terms and conditions of the said Contract, to extend the time of performance by the Contractor from time to time and to forbear from enforcing any of the terms of the said Contract without any notice to or the consent of the Bank and the Bank shall not be released from its liability under this Guarantee by reason of any such variation or extension or forbearance being granted to Contractor. The Bank agrees that MWCJ has no obligation whatsoever to exercise its rights against collateral, if any, of Contractor but may immediately call on this Guarantee.
4. The Bank agrees that MWCJ has the fullest liberty, without affecting in any manner the Bank's obligation hereunder, to assign this guarantee in favour of any MWCJ affiliate company in India without the consent of but with prior intimation to, the Bank, and the Bank shall not be released from its liability under this Guarantee by reason of any such assignment. The Bank shall forthwith, on receipt of such intimation; undertake necessary endorsements or amendments hereto to incorporate the assignment in favour of such MWCJ affiliate assignee.
5. This Guarantee herein contained shall remain in force and effect till MWCJ certify that the Contractor has dully paid the Advance back to MWCJ. The Bank shall be released of its liabilities and obligations under this Guarantee only after such a certificate as aforesaid is issued by MWCJ to the Bank.
 - i) The Bank shall not revoke this Guarantee during its currency except with the previous consent in writing of MWCJ.
 - ii) Only neglect or forbearance, on the part of MWCJ, in the enforcement of the payment of any money, the payment whereof is intended to be hereby secured or the giving of the time for the payment hereto shall in no way relieve the Bank of their liability under this Guarantee.
6. Any notice or communication under this Guarantee shall be in writing and shall be served on the Bank at its address first hereinbefore mentioned and to MWCJ at its address first hereinbefore mentioned. Either party may notify to the other in writing any change in such address for service of notice upon it. The notices shall be served personally against acknowledgement or by Registered Post / Fax / Telex.
7. This Guarantee shall not be affected by any change in the constitution of the Bank or of Contractor or of MWCJ.
8. This Guarantee shall be governed by the applicable laws of India.

9. The expression “The Bank” and the Contractor hereinbefore used shall include their respective successors and permitted assigns.

10. IN WITNESS WHEREOF..... FOR AND ON BEHALF OF THE BANK HAS SIGNED THIS GUARANTEE ON THE DAY AND THE YEAR FIRST ABOVE WRITTEN.

()

WITNESSES :

1-

2-

PART – II : TECHNICAL SPECIFICATIONS

Water Supply Works

SECTION – I

1 SCOPE OF WORK

- 1.1 Work under this Contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely finish including testing and commissioning of all the external water supply and other specialised services as described hereinafter and as specified in the Schedule of Quantities and/or shown on the Public Health Engineering drawings attached herewith.
- 1.2 Without restricting to the generality of the foregoing the external water supply related to all mechanical, electrical, instrumentation and structural works shall include the following: -

Water Supply – Distribution net work comprising of all types of valves, construction of chambers and other allied works.

2 SPECIFICATIONS

- 2.1 Work under this Contract shall be carried out strictly in accordance with the specifications attached with the tender.
- 2.2 Items not covered under these specifications due to any ambiguity or misprints, or additional works, the work shall be carried out as per latest Manual on Water Supply and Treatment published by Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, New Delhi.
- 2.3 Works not covered under para 2.1 and 2.2 will be carried out with the latest amendments or relevant Indian Standards Specifications or codes of practice and, if not available as per British Standards Specifications or codes of practice or unified plumbing code of U.S.A. The decision of the Project Manager will be final and binding.
- 2.4 The work shall be carried out strictly as specified in Schedule of Quantities and technical specifications. In case of any ambiguity, the details of the particular item as given in Schedule of Quantities shall supersede the details in specifications.
- 2.5 I.S. Codes referred shall mean latest I.S. Codes amended upto date
- 2.6 **Cement & Steel**

The Contractor shall be fully responsible for proper protection, safe keeping of cement to the satisfaction of the Project Manager.

Receipt & Issue of steel shall be subjected to the check of the Project Manager.

3 EXECUTION OF WORK

- 3.1 The work shall be carried out in conformity and co-ordination with the Architectural, Road, Electrical, Telecom, Structural, Public Health Engineering and other specialised service & drawings issued to the Contractor. It would be the responsibility of the Contractor to co-ordinate the work with other disciplines and execute the work accordingly. No claim for re-doing of work, idle wages, and wastage of labour, material and machinery, damage to works by any other agency or any other claim whatsoever would be entertained.
- 3.2 The Contractor shall co-operate with all other trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings, diversions and other requirements well in advance to prevent hold up of progress of the construction schedule of the work for other agencies working at the site.
- 3.3 On award of the work, the Contractor shall submit a schedule of completion in the form of a PERT chart and bar chart for approval of the Project Manager. All dates and time schedule agreed upon shall be strictly adhered to, (within the stipulated time of completion/commissioning. The specified phasing, if any, and stages of handing over of the completed works will be decided by the Project Manager).
- 3.4 If part of site is not available for any reasons or there is some unavoidable delay etc., the programme shall be modified without any extra claim or compensation.

4 DRAWINGS

- 4.1 Architectural drawings shall take precedence over Public Health Engineering drawings as to all dimensions, levels etc.
- 4.2 Contractor shall verify all levels and dimensions at site before starting the work and bring to the notice of the Project Manager all discrepancies or deviations, if any noticed. The decision of the Project Manager shall be final.
- 4.3 Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small-scale drawings.
- 4.4 All drawings supplied with the tender shall be returned in good condition along with the tender offer.
- 4.5 Any drawings issued by the Project Manager for the works are the property of the Project Manager and shall not be lent, reproduced or used on any works other than intended without the written permission of the Project Manager in writing.
- 4.6 The Tender drawings provided for tendering purposes shall be as contained in the Tender Documents and shall be used as a reference only. The Contractor should visualise the nature and type of work contemplated and ensure that the rates and prices quoted by him in the Schedule of Quantities have due consideration of the

qualitative and quantitative variations, as may be found at the site and complexities of work involved during actual execution / construction.

- 4.7 Two copies of drawings, on the basis of which actual execution of work is to proceed, shall be furnished free of cost to the Contractor progressively according to the work programme submitted by the Contractor and accepted by the Project Manager.

5 INSPECTION AND TESTING OF MATERIALS

- 5.1 Contractor shall be required, to produce the manufacturers test certificate (in original) for the particular batch of materials supplied to him. The tests carried out shall be as per the relevant Indian Standard Codes.

- 5.2 For examination and testing of materials and works at the site, the Contractor shall provide and arrange all testing and measuring/gauging equipment necessary for the requisite test as may be required to be carried out by the Project Manager at the site or Laboratory at the cost of Contractor but not limited to the following:

Theodolite

Dumpy level

Steel tapes

Weighing machine

Plumb bobs, Spirit levels, Hammers

Micrometers

Thermometers, Stoves

Hydraulic test machine

Smoke test machine

Concrete Cube test machine etc.

- 5.3 All such equipment shall be tested for calibration at any approved laboratory at regular intervals as required by the Project Manager to the entire satisfaction of Project Manager, at the cost of the Contractor.

- 5.4 All testing equipment required for site testing shall be preferably located in a special room at the site meant for the purpose, at Contractors cost and readily available prior to the testing.

6 METRIC CONVERSION

- 6.1 All dimensions and sizes of materials and equipment given in the tender document are in metric unit.

- 6.2 Any weights or sizes given in the tender having changed due to metric conversion, the nearest equivalent sizes as per Indian Standards shall be acceptable without any additional cost.

7 REFERENCE POINTS

7.1 Contractor shall provide and maintain permanent bench marks, flag tops and other reference points for the proper execution of work. These shall be preserved till the end of the work at Contractor's cost.

7.2 All such reference points shall be in relation to the levels and locations given in the Architectural and Public Health Engineering drawings.

8 REFERENCE DRAWINGS

8.1 The Contractor shall maintain one set of all drawings issued to him as reference drawings at the project site. These shall not be used on site or placed in rolls at site.

All corrections, deviations and changes made on site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made there in shall be initialled by the Project Manager.

9 SHOP DRAWINGS

9.1 The Contractor shall submit to the Project Manager four copies of the shop drawings, for his scrutiny and approval.

9.2 Shop drawings shall be submitted with the following details:-
Equipment layout and piping, and details of appurtenant structures.
The changes in layout and details of subsequent changes in the required items
Manufacturer or Contractor's fabrication drawings for any materials or equipment supplied by him.

9.3 The Contractor shall submit four copies of catalogues, manufacturer drawings, equipment characteristic data or performance charts as required by the Project Manager.

10 COMPLETION DRAWINGS

10.1 On completion of work, Contractor shall submit soft copy/ one complete set of original tracings and one reproducing tracing film with two prints of "As Built" drawings to the Project Manager. These drawings shall have the following information:

i) Water Supply System

Run of all water supply lines with diameters, locations of control valves, chambers and access panels etc.

Location of all mechanical equipment with layout and piping connections.

All other structures like pumping stations, water tanks etc.

- 10.2 Contractor shall provide four sets of catalogues, performance data and list of spare parts together with the name and address of the manufacturers for all electrical and mechanical equipment provided by him and installed in the Project.
- 10.3 All "Warranty cards" given by the manufacturers shall be handed over to the Project Manager.
- 10.4 Completion certificate shall not be issued unless the as-built drawings are submitted as indicated above.

11 CONTRACTOR'S RATES

- 11.1 Rates quoted in this tender shall be inclusive of cost of all materials, labour, supervision, erection, tools, plant, scaffolding, service connections, transport to and storage at site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required to completely do all the items of work and put them in proper working condition.
- 11.2 Rates quoted are for all heights and depths required for this work, unless specified otherwise.
- 11.3 All rates quoted must be for complete items inclusive of all such accessories, fixtures and fixing arrangements, nuts, bolts, hangers as a standard part of the particular item except where specially mentioned otherwise.
- 11.4 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar/concrete of appropriate mix and strength as directed by Project Manager. Contractor shall provide holes, sleeves, and recesses in the concrete and masonry work as the work proceeds.
- 11.5 Rates quoted shall be inclusive of all cost incurred in testing, commissioning of works and materials.

12 TESTING AND COMMISSIONING

- 12.1 Piping works shall be tested as specified under the relevant clauses of the C.P.W.D specifications and as specified in Manuals on Water Supply Treatment and Sewerage and Sewerage Treatment (second edition) by Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, Govt. of India.
- 12.2 Tests shall be performed in the presence of the Project Manager or their authorised representative.
- 12.3 All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the latest Manual on Water Supply and Treatment published by Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, New Delhi
- 12.4 Contractor shall perform all such tests as may be necessary and required by the local authorities to meet municipal or other bylaws in force.

12.5 Contractor shall provide all labour, equipment, tools, staging etc. and materials for the performance of the tests at his cost.

12.6 Contractor shall be fully responsible for the commissioning of the entire system for efficient operations to the satisfaction of Project Managers.

13 SITE CLEARANCE AND CLEANUP

13.1 The Contractor shall, from time to time clear away all debris and excess materials accumulated at the site , as desired by the Project Manager.

13.2 After the systems have been executed, tested and commissioned, Contractor shall clean-up the same and remove all plaster, paints stains, stickers and other foreign matters of discoloration leaving the same in a ready to use and in neat condition.

13.3 On completion of all works, the Contractor shall demolish all stores and temporary works remove all surplus materials, tools & labourers/ workmen and leave the site in a broom clean condition, to the satisfaction of Project Manager failing which the same shall be done at the risk and cost of the Contractor.

14 CUTTING & MAKING GOOD

No structural member shall be chased or cut without the prior written permission of the Project Manager.

15 MATERIALS

15.1 All materials used in the works shall conform strictly to the Tender specifications.

15.2 All materials, as specified shall be used with the approval of the Project Manager.

15.3 Unless otherwise specified and expressly approved in writing by the Project Manager, materials of makes and specifications mentioned in this tender shall be used.

15.4 Approved samples shall be kept in the office of Project Manager and shall be returned after the completion of maintenance period.

16 TENDER INFORMATION

16.1 The Contractor shall obtain all information relating to the preparation of the tender entirely on his own responsibility and expense.

16.2 The Contractor shall visit the site and familiarise himself with the actual site conditions, access, availability of materials, labour and other related matters for the speedy execution of the works.

16.3 The Contractor shall examine all specifications, tender conditions and drawings before tendering for the works.

- 16.4 Information, levels and dimensions given in the Tender drawings are correct but the Contractor shall make independent enquiries and verify the same. No claims for extras shall be admissible in case of any deviations due to incorrectness of the information, levels or dimensions.
- 16.5 The Contractor shall obtain all information relating to the local regulations, bye laws, octroi, taxes applicable, if any and all laws relating to his work or profession and strictly follow them for execution of the work. No additional claims shall be admissible on this account.

17 STORAGE OF MATERIALS

- 17.1 All materials shall be stored in a proper manner protected from natural elements so as to avoid contamination and deterioration, at the place as indicated and approved by Project Manager.
- 17.2 Contractors stores shall be open to inspection by the Project Manager at all reasonable hours.
- 17.3 Location of stores and storage yards shall be approved in advance by the Project Manager prior to construction and occupation. The Contractor shall maintain the same at his risk & cost till the completion of the project.

18 SAFETY/SECURITY

- 18.1 Contractor shall take adequate protection of the Project Manager and his authorised representative at all reasonable hours, when they are on duty at the work site / project site.

19 STATUTORY APPROVAL

- 19.1 The Contractor shall take all statutory approvals which are required during and after the completion of works

20 SITE ORDER BOOK

- 20.1 The Contractor shall maintain a site order book at the site office and he shall be further responsible for its proper upkeep.
- 20.2 All instructions relating to the job shall be recorded by the Project Manager and the Contractor is bound to carry out all such instructions given to him and compliance there of recorded in it.

END OF SECTION 1

Date : _____ Contractor : _____

Place : _____ Stamp/ Seal : _____

S E C T I O N - II

PART – I : GENERAL

1 GENERAL REQUIREMENTS

- 1.1 All pipes and fittings and appurtenance shall be laid at proper depths or to the required slopes in a neat workman like manner.
- 1.2 Both ends of the pipelines shall be blocked with suitable timber or other type of plugs at the end of each day's work.
- 1.3 Pipelines shall be kept clean throughout the progress of the work. Special care shall be taken to avoid accumulation of debris, building materials and trench water and mud from collecting, within the pipelines.
- 1.4 Pipelines shall be kept free from all types of animals and carcasses during laying.
- 1.5 Location of all appurtenances e.g. butterfly, scour and air valves and fire hydrants shall be confirmed from the Project Manager before execution at site.
- 1.6 Exact location and depth of all the lines shall be as shown on the drawings and as directed by the Project Manager.
- 1.7 No pipe line shall cross any open drain between its high flood level and bed level to avoid corrosion, contamination of water supply and blockage of drain.

2 ALIGNMENT AND GRADE

All pipe lines and drainage system shall be laid to alignment and gradient shown on the drawings but subject to such modifications as shall be ordered by the Project Manager from time to time to meet the requirements of the works at site. No deviations from the lines, depths of cutting or gradients as shown on the plans and sections shall be permitted except by the express direction in writing of the Project Manager.

3 EXCAVATION AND PREPARATION OF TRENCH

- 3.1 All excavation work should be carried out as per specification for earthwork as mentioned in latest Manual on Water Supply and Treatment published by Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, New Delhi, unless otherwise specified in Schedule of Quantities.
- 3.2 The excavation for pipe works and drain works shall be open cutting unless the permission of the Project Manager for the ground to be tunnelled is obtained in writing. Where pipe lines have to be constructed along narrow passages, Project Manager/Owner may order the excavation to be made partly in tunnel and in such cases the excavated soil shall be brought back later on for refilling the trenches or tunnel.

3.3 Opening out Trenches

In excavating the trenches, etc. the solid road metalling, pavement, curbing etc. and turf is to be placed on one side and preserved for reinstatement when the trenches or other excavation shall be filled up. Before any road metal is replaced, it shall be carefully shifted. The surface of all trenches and holes shall be restored and maintained to the satisfaction of the Project Manager and of the owners of the roads or other property traversed and the Contractor shall not cut out or break down any live fence of trees in the line of the proposed works but shall tunnel under them, unless the Project Manager shall order to the contrary. The Contractor shall grab up and clear the surface over the trenches and other excavations of all trees, stumps, roots and all other encumbrances affecting execution of the work and shall remove them from the site with the approval of the Project Manager.

3.4 Obstruction of Roads

The Contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and sufficient space shall then be left for public and private transit. He shall remove the materials excavated and bring them back again when the trench is required to be refilled. The Contractor shall obtain the consent of the Project Manager in writing before closing any road to vehicular traffic but the foot walks must be clear at all times.

3.5 Removal of Filth

All night soil, filth or any other offensive matter met with during the execution of the works, immediately after it is taken out of any trench, sewer or cesspool, shall not be deposited on to the surface of any street or where it is likely to be a nuisance or passed into any sewer or drain but shall be at once put into the carts and removed to a suitable place as directed by Project Manager.

3.6 Excavation to be taken to Proper Depths

The trenches shall be excavated to such depth that the pipes shall rest on bedding as described in the several clauses relating these. In bad ground/rock excavation below the pipe, the Project Manager may order the Contractor to excavate to a greater depth if required and to fill up the excavation to the level of the bed of pipe with fine sand. For such extra excavation more than 1.5m deep the Contractor shall be paid extra at rates laid down for such works in the schedule, if the extra work was ordered by the Project Manager in writing. But if the Contractor should excavate the trench to a greater depth than is required without a specific order to that effect in writing by the Project Manager the extra depth shall have to be filled up with fine sand and properly rammed, to the requirements and specifications of the Project Manager at the Contractor's own cost and charges.

3.7 Classification of Soils

The earthwork shall be classified in different categories as specified in the chapter of Earthwork in CPWD specifications.

The Contractor is required to carry out his own survey to assess the type of soil.

3.8 Ground Water Table

- 3.8.1 It is expected that generally the ground water table is at app. 3 m below the existing ground level. However the Contractor is required to carry his own investigations at his expense regarding the same.

3.9 Refilling

- 3.9.1 After the pipes or other work has been laid and tested to be water tight, the trench or other excavations shall be refilled as stipulated in the latest Manual on Water Supply and Treatment published by Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, New Delhi for earth work with all latest amendments.

3.10 Contractor to Restore Settlement and Damages

The Contractor shall, at his own costs and charges, make good promptly during the whole period including performance period the works are in hand, any settlement that may occur in the surfaces of roads, berms, footpaths, gardens, open spaces etc., whether public or private caused by his trenches or by his other excavations and he shall be liable for any accidents caused thereby. He shall also, at his own expenses and charges, repair and make good and damage done to buildings and other property. If in the opinion of the Project Manager he fails to make good such works with all practicable dispatch, the Project Manager shall be at liberty to get the work done by another agency at the site at the risk & cost of the Contractor and deduct from any money that may be due to him or recovered from him in any other manner according to the law of the land, the amount paid to the agency for the rectification.

3.11 Disposal of Surplus Soil

The Contractor shall at his own costs and charges provide places for disposal of all surplus materials not required to be used on the works, and dispose off as directed by the Project Manager. As each trench is refilled the surplus soil shall be immediately removed, the surface properly restored and roadways and sides left clear. The disposal of surplus excavated earth shall be paid on lead basis for different leads.

3.12 Timbering and Shoring of Trenches

The Contractor shall at all times support efficiently and effectively the sides of the trenches and other excavations by suitable timbering, shoring, piling and sheeting and they shall be close, in loose or sandy strata and below the sub soil water level.

All timbering, shoring, sheeting and piling with their walls and supports shall be of adequate dimensions and strength and fully braced and strutted so that no risk of collapse or subsidence of the walls of the trench shall take place.

Steel/Timber Sheeting

Steel/timber sheeting shall be of good quality steel or well seasoned wood of requisite strength, good quality, free from knots and cracks and preferably treated with preservative. The sheeting and struts and bracing should be strong enough and suitably spaced to support the sides of excavation and to prevent any movement of soil. The wooden or steel sheets should be sufficiently long and

thick, driven and fixed continuously or at intervals as may be required. Sheeting and bracing shall be provided by the Contractor whenever in the opinion of the Project Manager, such sheeting and bracing are required for proper and satisfactory execution of the work. If the Project Manager is of the opinion that at any place, sufficient or proper sheeting has not been provided, he may order for additional sheeting and further strengthening at the Contractor's expense. The Contractor shall bring to site sufficient quantity of sheeting and bracing materials ahead of starting the excavation work depending on the volume of works involved and the speed to be attained to complete the work within the stipulated time.

As far as practicable, sheeting shall be driven ahead of excavation and finally to a depth sufficiently below the bottom of the trench.

The Contractor shall be held responsible and will be accountable for the insufficiency of all timbering, bracing, sheeting and piling used as also for all damage to persons and property resulting from improper quality, strength, placing, maintaining or removing of the same.

3.13 Shoring of buildings

The Contractor shall shore up all buildings, walls and other structures, the stability of which is liable to be endangered by the execution of the work and shall be fully responsible for all damages to persons or property resulting from any accident there from.

3.14 Removal of Water from Trench etc.

The Contractor shall at all times during the progress of the work keep the trenches and excavations free from water which shall be disposed of by him in a manner as will neither cause injury to the public health nor to the public or private property nor to the work completed or in progress nor to the surface of any roads or streets, nor cause any interference with the use of the same by the public.

3.15 Width and Depth of Trench

The Project Manager shall have power by giving an order in writing to the Contractor to increase the maximum width in respect of which payment will be allowed for excavation in trenches in certain lengths to be specifically laid down by him, where on account of bad ground or other unusual conditions, he considers that such increased widths are necessary in view of the site conditions.

3.16 Measurements

The Earth work shall be measured separately for each category of soil for various depths as specified in the SOQ for different works.

4 RESPONSIBILITY

4.1 Responsibility for various activities in pre-commissioning and commissioning procedures will rest with the Contractors.

P A R T - II

EXTERNAL WATER SUPPLY SYSTEM

1 SCOPE OF WORK

- 1.1 Work under this Contract consists of furnishing all material, labour, tools & tackles, equipment and appliances necessary to completely install the various systems as required by the drawings, specified hereinafter and given in the schedule of quantities.
- 1.2 Without restricting to the generality of the foregoing the system shall include the following:
- a) Water supply distribution net works, pipe lines, all types of valves & fittings, construction of chamber and other allied works.
- 1.3 The minimum width of trenches shall be kept at the bottom, as per recommendations of relevant I.S codes for various types of pipes.
- a) For C.I /D.I pipes : Nominal dia of pipe plus 400mm and minimum 550mm in all kind of soil and 1000mm in rock.

2 DUCTILE IRON PIPES AND FITTINGS (PRESSURE PIPES)

2.1 Standards

Ductile iron pipes and fittings to be supplied under this Contract shall conform to the requirements of IS:8329 - 1990.

2.2 Marking of pipes and fittings

The following cast-on or cold stamped marks shall appear on the socket end of each pipe:-

- a) the indicator that the pipe is of ductile : "D" .
- b) the year of manufacture (the last two digits)
- c) the manufacture's identification mark.
- d) the nominal diameter (DN)
- e) the class designation
- f) the serial number

In the case of fittings, these marks shall be placed on the body of each fitting along with its main characteristics (i.e. the angle of bend in degrees, the pressure rating of the flanges etc.). For pipes and fittings having a spigot end for use with a "push-on"

type joint, socket penetration lines (two white painted lines) shall be painted on the spigot end of the pipes and fittings.

2.3 Process of manufacture

The manufacturing method for ductile iron pipes and fittings shall comply with IS: 8329 - 1990 (Part - 4). Pipes shall be cast centrifugally in metal or sand mould. Fittings and accessories shall also be cast in metal or sand mould. Pipes, fittings and accessories may be subjected, if necessary, to suitable heat treatment in order to give them the required mechanical characteristics. The metal used shall be such that the pipes and fittings are of ductile iron with minimum strength of 420N/sq.mm and 0.2% proof stress of 300N/sq.mm.

2.4 Thickness and Diameters

The diameters and thickness of the standard pipes shall be as shown in Table 1.

Where fittings required are to be used other than those specified in IS:8329 - 1990, the requirements shall be stated in the SOQ and the dimensions shall be as given in the drawings.

2.5 Length of straight pipes

The effective lengths of all straight pipes shall be as defined IS : 8329 - 1990 and shall be within the range of 4 to 6 metres.

Table-1:

Pipe diameter (mm)		Pipe shell thickness (mm)	
Nominal Diameter	Outside Diameter	Pipes with flexible joint and welded-on flanges	Pipes with cast-on flanges
80	98	6.0	7.0
100	118	6.1	7.2
150	170	6.3	7.8
200	222	6.4	8.4
250	274	6.8	9.0
300	326	7.2	9.6
350	378	7.7	10.2
400	429	8.1	10.8
450	480	8.6	11.4
500	532	9.0	12.0
600	635	9.9	13.2
700	738	10.8	14.4
800	842	11.7	15.6
900	945	12.6	16.8
1000	1048	13.5	18.0

2.6 Tolerance on Dimensions

The tolerance on wall thickness, length, diameter and standard mass of pipes and fittings shall be accordance with IS: 8329 - 1990 as shown in Table 2 &3.

Table - 2 : Tolerance on Length

The tolerance on length of pipes shall be as follows.

Type of casting	Tolerance in mm
(a) Socket and spigot and plain ended pipes	+/- 25
(b) Flanged pipes	+/- 10

On the total number of socket and spigot pipes to be supplied in each diameter, the manufacturer may supply up to 10 percent pipes in length than the specified length as follows in the table 2.1 :

Specified Length	Decrease in Length
Upto 4 m	0.5, 1m
Over 4 m	0.5,1,1.5,2 m

2.7 Tolerance on Mass

The permissible tolerance on standard mass of pipe is +/- 8 percent for sizes up to and including 200 DN and +/- 5 percent for sizes above 200 DN. The pipes of the heavier mass than the maximum are accepted provided they comply.

Table - 3 : Tolerance on Quality for Push-On Joint Pipes

Nominal Diameter DN mm	Allowable Difference Between Minor Axis and DE (min) mm
80 to 300	1.0
350 to 600	1.75
700	2.0
750 to 800	2.4
900 to 1000	3.5

Table - 4

The tolerance on the wall thickness (e) and the flange thickness (b) of the pipes shall be as follows.

Dimensions	Tolerance in mm
a) Wall thickness	$-(1.0 + 0.05e)^*$
b) Flange thickness	$+/- (2 + 0.05b)$

* No limit for the plus tolerance is specified.

2.8 Internal Lining of Pipes and Fittings

The internal surface of pipes and fittings except blank flanges, sockets and bell mouth shall be lined with cement mortar in accordance to IS:8329 - 1990. The cement shall be ordinary Portland Cement if pipes are locally manufactured. The cement mortar mix shall be one part by weight of cement to 3.5 parts by weight of sand. The lining thickness shall be as shown in Table 5.

Table - 5 :

Dimensions in mm

DN Group	Nominal Size DN	DE	Layer Thickness			Approximate mass per unit length kg.
			Normal	Minimum mean value	Minimum value at one point	
I	40	56	3	2.5	1.5(3)	0.8
	50	66	3	2.5	1.5(3)	1.0
	60	77	3	2.5	1.5(3)	1.3
	65	82	3	2.5	1.5(3)	1.4
	80	98	3	2.5	1.5(3)	1.7
	100	118	3	2.5	1.5(3)	2.1
	125	144	3	2.5	1.5(3)	2.7
	150	170	3	2.5	1.5(3)	3.2
	200	222	3	2.5	1.5(3)	4.2
	250	274	3	2.5	1.5(3)	5.2
II	300	326	3	2.5	1.5(3)	6.3
	350	378	5	4.5	2.5	12.3
	400	429	5	4.5	2.5	14.0
	500	532	5	4.5	2.5	17.5
III	600	635	5	4.5	2.5	20.9
	700	738	6	5.5	3.0	29.3
	800	842	6	5.5	3.0	33.4
	900	945	6	5.5	3.0	37.6
	1000	1048	6	5.5	3.0	41.7
	1200	1255	6	5.5	3.0	50.0

2.9 Jointing

To ensure the reliability of a pipe line it is essential to use only gaskets complying with IS:12820, IS:8329 & supplied by the pipe manufacturers for push on joints with adequate specified lubricants with the help of adequate tools. The quality of rubber gasket shall be of SBR grade for bulb 2 type and heel-5. type with IRHD hardness of 50+5, -4, & 80+/- 4 respectively. The recommended allowable deflection at each push on joint shall be as follows:

Nominal Dia in mm	Recommended Bending Angle
80-200	5 Deg.
250-350	4 Deg.
400-600	3 Deg.
700-900	2 Deg.30'
1000	2 Deg.

3.0 FLANGES

Flanges shall be provided on pipes for making connections to valves, accessories and equipment, as necessary and required or as directed by Project Manager. Connections shall be made by the correct number and size of the bolts and bonnet gasket and gland packing. Bolt hole dia for flanges shall conform to match the specification of all type of accessories and valves. The flanges shall conform to the specification as specified in SOQ.

4.0 VALVES

4.1 Gunmetal valves

- a) Valves 65mm dia and below shall be heavy gunmetal fullway valves or globe valves conforming to I.S. 778-1984 , 20 Kg/Sq.cm class II or as specified. Valves shall be tested at manufacturer's works and the same stamped on it.
- b) All valves shall be approved by the Project Manager before they are allowed to be used on work.

4.2 Butterfly Valves

- a) Butterfly valves of approved quality for pressure rating of 150 P.S.I. with locking arrangement and gearbox with handle operated or gearbox with lid shall be provided, as given in the Schedule of Quantities.
- b) Butterfly valves shall be of specified quality conforming to IS-13095 or BS: 5155
- c) Joints for butterfly valves shall be made with suitable tail /socket pieces on the pipe line and flanged joints made with 3mm thick insertion rubber gasket with appropriate number of bolts, nuts and washers.
- d) Butterfly valves shall be provided on all junctions/crossings as well as all branches as shown in the drawings or as specified.

4.3 Sluice Valves/ Scour Valves

- a) Sluice valves shall be of the specified size and class and shall in all respects conforming to IS: 14846 – 2000.
- b) Scour valves shall be Butterfly valves/ Sluice valves as specified above. They shall be installed at the lowest level or tail end of the system as shown on drawings and directed by the Project Manager.c) Discharge pipe from scour valve shall be connected only to a storm water drain and shall be clearly above the high flood level (connections to sewer lines are not permitted).

4.4 Air Valves

- a) Air valves shall be single acting or double acting type air valves with cast iron body and bronze/gunmetal internal parts and plastic float, as specified in

Schedule of Quantities.

- c) Each air valve shall be provided with an isolating valve and chamber of specification given above and M.S. cover as shown in the details. The M.S. cover shall be painted as per standard specifications.

Non Return Valve

Non return Valves and any other special type of valves and accessories as needed due to functional requirement of the system and as per site conditions, shall be provided, as specified in SOQ and drawings and otherwise also with prior approval of the Project Manager.

5.0 STORAGE TANKS (UGR)

5.1 Reinforced Cement Concrete Tanks

- a) Contractor shall provide puddle flanges fabricated from M.S./G.I. pipes of required sizes and lengths and welded to 6mm M.S. plate as per design & drawing. The length and width of the plate shall be equal to the outer dia plus (+) 150 mm. All puddle flanges must be fixed in true alignment and level and shall be tack welded to the reinforcement to prevent movement during concreting.
- b) Contractor shall make connections of pipe lines laid and fixed by him to existing concrete, masonry or steel tanks as required at site. No additional payment shall be allowed for making connections.

5.2 Inlet, Outlets, Overflow and Scour piping

Outlets for storage tanks shall be made smooth to allow smooth flow of water. All outlet connections shall be at least one size higher than the pipe connection and shall be connected to the pipe by a reducer. (Bushes shall not be used).

Contractor shall provide sockets for inlet, outlet, scour and overflow pipes, sockets for float level switches and inter connections as required. Overflow pipes shall be one diameter greater than the inlet pipe and shall be provided with a mosquito proof brass grating. Scour pipes of sizes mentioned in the schedule of quantities shall be provided with a bend and pipe pieces and valve terminating outside the tank wall.

6.0 FIRE HYDRANTS

- 6.1 Fire hydrants shall be stand pipe type twin headed 63mm dia instantaneous gunmetal coupler outlets of approved make.
- 6.2 Each fire hydrant shall be provided with an 100mm cast iron double flanged sluice valve and valve chamber and duck foot bend and a suitable 100-80mm dia flanged cast iron /MS stand post pipe for correcting the installation height of the hydrant as specified in the Schedule of Quantities.

7.0 ANCHOR/THRUST BLOCK

- 7.1 Suitable Anchor /Thrust Block /Pipe Support shall be provided at all bends, Tees and as per requirement to encounter the excessive and unbalanced thrust.
- 7.2 Valve anchors as per requirements shall be provided independently to secure the perfect alignment and pipe jointing.
- 7.3 Anchor /Thrust Block shall be designed taking into consideration the pipe size, water hammer, type of fittings and type of soil. The shop drawings shall be provided by the Contractor for approval of the Project Manager before casting the block for each situation.

8.0 CEMENT CONCRETE AND MASONRY WORKS

8.1 Materials

a) Water

Water used for constructional purpose shall conform to IS: 456-1978. Water used for all the constructional purposes shall be clear and free from oil, acid, alkali, organic and other harmful matters, which shall deteriorate the strength and durability of the structure. In general, the water suitable for drinking purpose shall be considered good enough for constructional purpose.

b) Aggregate for Concrete

The aggregate for concrete shall be in accordance with I.S: 383-1963 and I.S: 515-1959 with latest amendments. In general, these shall be free from all impurities that may cause corrosion of the reinforcement. Before actual use these shall be washed in water, if required as per the direction of Project Manager. The size of the coarse aggregate shall be as per I.S:383-1963.

c) Sand

Sand for various constructional purposes shall comply in all respects with I.S 650 and I.S. 2116. It shall be clean, coarse, hard and strong, sharp edged, durable, uncoated, free from any mixture of clay, dust, vegetable matters, mica, iron impurities, soft or flaky and elongated particles, alkali, organic matters, salt, loam and other impurities which may be considered by the Project Manager as harmful for constructional purpose.

d) Cement

The cement used for all the constructional purposes shall be ordinary portland cement or /rapid hardening portland cement 43 grade conforming to I.S codes as per the list enclosed in section -4 with latest amendments.

e) Mild Steel Reinforcement

High strength deformed steel round bars conforming to all requirements of IS: 1139-1959 and cold twisted bars conforming to I.S codes as per the list enclosed in section - IV with all latest amendments. These shall be clean & free from loose

mill scale , loose rust & mud , oil, grease or any other coating which may destroy the bond between concrete & steel.

f) Bricks

Bricks shall first class designation 35 (as per relevant IS Standards) and have uniform colour, thoroughly burnt but not over burnt, shall have plain rectangular faces with parallel sides and sharp right angled edges. They should give ringing sound when struck. Brick shall not absorb more than 20% to 22% of water, when immersed in water for 24 hours. Bricks to be used shall be approved by the Project Manager before use .

g) Other Materials

Other materials like steel fibres , plastics etc. not fully specified in these specifications and which may be required in the work shall conform to the latest I.S. code and CPWD specification. All such materials shall be approved by the Project Manager before use.

8.2 Cement Concrete (Plain or Reinforced)

- a) Cement concrete pipes bedding, cradles, foundations and RCC slabs for all works shall be mixed by a mechanical mixer of quantities of the concrete poured at one time .
- b) Concrete work shall be of such thickness and mix as given in the schedule of quantities and drawings.
- c) All concrete work shall be cured for a period of at least 10 days. Such work shall be kept moist by means of wet gunny bags at all times. All pipe trenches and foundations shall be kept dry during the curing period.
- d) Rate for cement concrete work shall be inclusive of all shuttering and centring etc. at all depth and heights

VALVE CHAMBERS

- 9.1 Contractor shall provide for all, full way valves, sluice valves, butterfly valves and other type of valves as specified in the item of work in Schedule of Quantities. These shall be made, in stone masonry chambers in cement mortar 1:5 (1 cement:: 5 fine sand) on cement concrete foundations 150mm thick 1:5:10 mix (1 cement : 5 fine sand: 10 graded stone aggregate 40mm nominal size) 12mm thick cement plaster inside and outside finished with a floating coat of neat cement inside with 8mm thick M.S surface box with hinged cover and locking arrangement, properly anchored in precast reinforcement concrete slab of 1:2:4 (1 cement : 2 coarse sand: 4 graded stone aggregate 20mm nominal size), makes as specified and shown in drawings, including excavation, back filling rammed complete or as specified in Schedule of Quantities.

- 9.2 Valve chambers shall be constructed as specified in SOQ but generally shall be of following sizes:

	Length MM	Width MM	Depth MM
For pipe upto 150 mm dia.	900	900	1000
For pipe above 150 mm dia.	1200	1200	1000

10.0 TESTING

- 10.1 All pipes, fittings and valves shall be tested for the following main tests in accordance with IS: 3114 -1985, standard specifications and as per Clause No. 5.4.3 of Manual on Water Supply & Treatment of Central Public Health & Environmental Organisation. These tests are not exhaustive and are indicative only :-

- a) Hydrostatic Pressure Test
- b) Leakage test

A test register shall be maintained and all entries shall be signed and dated by the Contractor(s) and the Project Manager.

- 10.2 In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or the mains. He shall rectify all leakages, and shall replace all defective fittings and materials in the system. Any damage done due to bad workmanship, carelessness, or burst pipes or failure of fittings shall be made good during the defects liability period without any extra cost.
- 10.3 After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above before handing over.

11.0 DISINFECTION

- 11.1 After completion of the work the Contractor shall flush clean the entire system with the treated water after connection has been made.
- 11.2 After the first flushing, add commercial bleaching powder is to be added to achieve a dosage of 0.5 mg/l of water in the system added and flushed. This operation should be performed thrice to ensure that the system is fully disinfected and usable.

12.0 MEASUREMENT

- 12.1 The measurements shall be done conforming to IS:1200 with the latest amendments to date and as per latest CPWD specifications and/or as specified in the respective heads of various item of works to be executed and as described in detail SOQ, as applicable the case may be.

13.0 PRE-COMMISSIONING

- 13.1 Ensure that all pipes are free from debris and obstructions.
- 13.2 Check all valves and fire hydrant for effective opening and closing action. Defects should be rectified or valves replaced.
- 13.3 Ensure that all connections to branches has been made.
- 13.4 Ensure that mains have been connected to the respective pumps, underground and overhead tanks.
- 13.5 Water supply should be available at main underground tank.
- 13.6 All main line valves should be closed.

14.0 COMMISSIONING

- 14.1 Fill underground tank with water. Add fresh bleaching powder solution near inlet at the rate determined after water test.
- 14.2 Start water supply pump and allow water to fill overhead tanks.
- 14.3 After filling overhead tanks drain the same to its one fourth capacity through tank scour valve. (This is to ensure removal of all mud, debris etc. in the tank).
- 14.4 Fill overhead tank to full.
- 14.5 Release water in the main lines by opening valves in each circuit. Drain out water in the system through scour valves or fire hydrant in lower regions. Ensure clean water is now coming out of the system.
- 14.6 Open valves for individual sectors. Observe for leakages of malfunctions, check pressure & flow at end of line by opening hydrants etc. Remove and rectify defects notice.
- 14.7 Check all fire hydrants for proper operation by opening each valve and allowing water to flow for a few minutes. Also check for effective closure of valve.
- 14.8 The entire water supply system should be disinfected with bleaching powder and system flush cleaned.
- 14.9 Send four samples of water drawn from four extreme locations for testing for bacteriological test in sterilised bottles obtained from the concerned laboratory. (Laboratory personal may collect the samples themselves).

END OF PART – II

PART - V

STRUCTURAL WORKS

1. SCOPE OF WORK

The work consists of furnishing all necessary labour, material, tools & tackles , plants required for construction of Overhead tanks and Under ground tanks, etc. The Contractor will have to construct all the approach roads upto sump and pump house, the site of work, fencing of site etc.

2. MATERIAL

All materials and their source of supply before bringing to the site, must be approved by the Project Manager & any material not confirming to standard specifications shall be removed from the site of work. All approved samples must be deposited in the office of the Project Manager before placing orders for the materials with the suppliers. The materials brought on to the site shall conform to the samples already approved. Fresh samples may be deposited with the project developers whenever the type and source of material changes for approval by the Project Manager .

3. QUALITY CONTROL AND QUALITY ASSURANCE

The work is to satisfy high structural soundness and aesthetic finish. Quality control measures, will form the backbone for the high quality assurance for the components as also the finished work.

At the site level Contractor is to arrange the materials, their stacking / storage in appropriate manner ensuring the quality. Contractor shall provide equipment / manpower to test continuously the quality of water, cement, composition and grading of coarse aggregates, grading of fine aggregate, slump of concrete, bulkage of sand, temperature measurement etc. The tests shall be conducted continuously and results of tests maintained in a regular way. In addition, he shall keep tools and equipment for checking the levels, evenness of surface, Verticality, correct slope, hardness of surface etc. The Contractor shall at his expense provide cube moulds for concrete cubes, and shall have testing apparatus for testing the cement setting time and strength of cubes, and shall maintain the same properly for testing cement/concrete samples etc. for their quality and soundness.

The Project Manager shall be free to carry out tests elsewhere as may be considered necessary by him from time to time. The Contractor shall provide the samples and labour for collecting the samples. Nothing extra shall be payable to the Contractor for the samples or for the collection of the samples.

The test shall be conducted at the site laboratory that may be established by Contractor or at any other standard laboratory selected by Project Manager in & around Delhi .The Contractor shall transport the samples to the laboratory for which nothing extra shall be payable. In case the Contractor failing to arrange transportation of the samples in proper time the Project Manager shall have them transported and recover twice the actual cost from the Contractor's bills.

All charges in connection with testing shall be borne by the Contractor.

The Contractor or his authorised representative may witness the testing. Whether witnessed by the Contractor or not, the Test results shall be binding on the Contractor.

4. DESIGN MIX CONCRETE

All cement concrete designated by strength shall be treated as design mix concrete. The design mix concrete shall conform to the grades specified on the drawings. The aggregate and cement shall be measured by weight in an approved weigh batching equipment. Water shall be measured electronically.

The design mix concrete shall conform to minimum cement content as 380 kg/cum and maximum water cement ratio as 0.45 for M20.

It is specifically highlighted that in addition to the above requirements, the max. cement content shall be limited to 450 Kg/Cum for basement slab and wall and all water retaining structures.

The Contractor shall be responsible for designing the mixes of the specified performance to suit the degree of workability and characteristic strength required for the various parts of the works. The mix designs shall be evolved in a full-fledged concrete laboratory approved by the Project Manager. The mix designs shall be finalised during the mobilisation period of the Contract. The Contractor shall design alternative mixes for use in both thin and narrow sections and thick sections. Special mixes using finer aggregates shall be designed for infilling pockets and narrow spaces and for regions of congested reinforcement. Special mixes containing admixtures shall also be designed where workability requirements dictate their use.

The min/max cement content for design mix concrete shall be maintained as per the amounts given in Table - C. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on a approved mix design, nothing extra shall become payable to the Contractor.

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 IS:456. The design mix shall in addition be such that it is cohesive, does not segregate, and should result in a dense and durable concrete and capable of giving the finish as specified. For liquid retaining structures, the mix shall also result in watertight concrete. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

4.6 Water Cement Ratio and Workability

The quantity of water added to the cement and aggregates during mixing should be such as to produce concrete having sufficient workability to enable it to be worked into the corners of the shuttering, around reinforcement and to be properly compacted. Reference may be made to IS : 456, clause 4, for guidance with respect to the workability

Due account shall be taken of the variation of moisture content, within any consignment of aggregate or any variations due to variations due to watering, exposure to rain or drying weather. The Contractor shall carry out regular moisture content tests on stacked aggregates and submit the results to the Project Manager as desired by him.

In case of nominal mix concrete the maximum value of water cement ratio shall be 0.68 and in the case of design mix concrete the water cement ratio shall be determined by the mix design.

The Contractor shall exercise particularly tight control of the water content for fair faced concrete the colour of which is sensitive to small variations of water in the mix.

When a suitable water cement ratio has been determined and agreed with the Project Manager, it shall be maintained throughout the corresponding part of the works. Approved tests shall be undertaken periodically by the Contractor to satisfy the Project Manager of the maintenance of the consistency. However, the amount of water added to a mix other than fair faced concrete may be reduced below the agreed design with the consent of the Project Manager if the Contractor is able to demonstrate that such reduction is in consistence with producing concrete of the required workability and characteristic strength.

The Contractor shall regularly test the concrete for slump test and provide complete facilities for the same site.

Unless otherwise permitted, the slump at the point of concreting as measured in accordance with the methods laid down IS: 1199 shall be in the range of 75 to 100 mm.

4.7 Requirement of Designed Mixes

- 4.7.1 The measure of quality control exercised by the Contractor in the manufacture of the concrete at site shall be the standard deviation derived from the analysis of cube results tested in accordance with IS: 516. The cubes shall be prepared from the point of discharge of the concrete mixer as per IS: 1199.
- 4.7.2 The sampling, strength test and acceptance criteria shall be as per IS: 456, clauses 14 and 15, except as specified in these specifications.
- 4.7.3 The Contractor shall design each concrete mix to achieve a target mean strength greater than the required characteristic strength . In the first instance the Contractor shall assume a standard deviation as suggested in Table 6 of IS: 456.
- 4.7.4 Should the further analysis of the next 100 cubes test results of concrete of nominally similar proportions of similar materials and produced over a period not exceeding twelve months by the same plant under same supervision show the standard deviation to be less than that indicated in IS : 456, the Contractor may redesign the mix assuming a standard deviation as suggested in Table 1, column II of IS :10262 and shall submit the details of the proposed new mix proportions to the Project Manager for his considerations.

4.7.5 If at any time the statistical minimum strength of the concrete defined in the acceptance criteria in IS : 456, clause 15 falls below the characteristic strength, the Contractor shall redesign the mix. Details of the new mix proportions shall be submitted to the Project Manager for his approval and the Contractor's supervision and degree of control over mix proportions shall be improved if required

4.8 Approval of Designed Mixes

4.8.1 The Contractor shall submit to the Project Manager the details of design mix for comments with the sufficient evidence based on trial mixes, that for the grade of concrete, the intended workability, the proposed proportions and the method of manufacture will produce concrete of the required quality. Evidence of conformance to proportions of chloride and sulphate contents shall also be submitted.

4.8.2 The Contractor shall obtain from the Project Manager his written approval on the mix design for each grade of concrete before any concrete of that grade is placed in the works.

4.8.3 For each grade of concrete, three separate batches of concrete shall be made by the Contractor using materials of quality of the proposed supply and under full scale to site.

4.8.4 The workability of each of the trial batches shall be tested and six specimen preliminary test cubes shall be produced from each trial batch. Three cubes of each set shall be tested at 28 days and results submitted to the Project Manager.

4.8.5 The trial mix proportions for each grade of concrete shall be considered satisfactory if the mean strength of the 9 cubes tested at 28 days exceeds the specified characteristic strength by between 0.6 and 1.2 times in current margin and the least cube strength is greater than the specified characteristic strength and the Contractor has satisfied that the concrete contains the correct amount of cement and the free water cement ratio is below the maximum specified value.

4.8.6 Following approval by the Project Manager on the trial mix proportion should the Contractor wish to have substantial changes in the materials or in the proportions of the materials to be used in a mix, the Project Manager will require fresh trial mixes to be made and their results submitted for the comments prior to such materials or proportions being adopted by the Contractor.

5. CONCRETE TESTING

5.1 Test Cubes

5.2 The strength of concrete either in assessing the availability of the trial mixes or when placed in the works shall be determined from 150 mm cubes made, cured, stored, transported and tested in accordance with IS: 516.

5.3 Test cubes shall be made as, where and when the Project Manager may require. The moulds for making cubes will be as per IS: 10086.

5.4 Test cubes shall be made under the direct supervision of competent persons appointed by the Contractor to supervise all stages of the manufacture and testing.

He should be well conversant with the concept. Cubes shall be made by the Contractor in the presence of the Project Manager from fresh concrete at the point of discharge from mixer and the Contractor should have suitable facilities in the form of a site laboratory with protection as agreed with or approved by the Project Manager for storing and curing of the test cubes.

5.5 Test cubes shall be marked and dated and for the grade and the part of the works in concrete they represent has been placed so that these can be specified.

5.6 The Contractor shall also provide complete facilities at site for determining the crushing strength of the concrete cubes. The compression-testing machine shall have a minimum capacity of 1500 KN. and be of the electrical-cum-hand-operated lever.

6 WORKS TESTS

6.1 When concrete of a particular grade is first used in the works, three cubes shall be taken from three separate batches testing each at the first 7 days of using that grade. Of these 9 days made daily, three cubes (each cube representing concrete made in a different batch) shall be tested at 7 days and the remaining six cubes shall be tested at 28 days. Each set constituting three cubes shall be termed as a "Sample" in accordance with IS: 456 clause 14.4. For every subsequent 15 cum concrete or for every day's concreting be it less in volume, samples shall be made for each grade of concrete one of each will be tested at 7 days and the other at 28 days.

6.2 If the concrete strength determined from 28 days samples does not meet the acceptance criteria as per clause 15 of IS:456, the materials and/or their proportions for that made shall be modified by the Contractor to the satisfaction of the Project Manager. In addition the Contractor shall at his own expense take remedial action as the Project Manager may consider necessary with respect to the concrete placed for the portion of the works represented by the set of cubes which have failed to meet the acceptance criteria.

7 WEIGH BATCHING

All concrete ingredients except water for controlled concrete shall be weigh batched. The weigh batches shall be of approved type and manufacture.

Batching shall be of an accuracy of not less than 1/2 kg and the weigh batching equipment shall have an accuracy of plus or minus 3 percent. The weigh batchers shall be tested for accuracy of calibration before commencement of work on each day.

Water should be measured electronically in the controlled proportions as per the design mix requirement .

8 CONCRETE MIXING

All concrete, whether nominal mix or design mix, shall be mixed in a mixer for the minimum time necessary to produce adequate quality and uniform distribution of the materials. In general, it is good practice to feed a small amount of water first

followed by the solids material suitably fed uniformly and simultaneously into the mixer. If possible, the greater part of the water should also be fed during the same time, the remainder of the water being added after mixing of the solids. The mixer shall be of approved type and manufacture and as per IS: 1791 and IS: 4925.

Allowance shall be made for the moisture content of the aggregates when calculating the amount of water to be added for each mix.

Precautions are necessary during hot weather concreting as indicated in IS: 7861, Part I. these may consist of dampening sub-base and forms.

Temperatures, erecting sunshades, reducing time between placement of concrete and start of curing, and minimising evaporation particularly during the first few hours subsequent to the pouring of concrete. The temperature of the aggregate, water and cement when added to the mixer shall be such that the temperature of the concrete is less than that indicated below in Table. For the indicated relative humidity.

Assumed Wind Velocity	Concrete temperature in degree centigrade	Relative Humidity in %
10KM/HOUR	38	40
10KM/HOUR	33	20

9 CONSTRUCTION JOINTS AND POUR STRIPS

Construction joints shall be made only where shown on the drawings. Where the Contractor wishes to form joints in concrete other than those shown on the drawings, he shall submit his proposals giving the position of form, treatment of such joints to the Project Manager. No separate payment shall be made for making construction joints and pour strips.

Pour strips in basement raft and retaining walls shall be provided after a gap of three weeks minimum.

Vertical construction joints shall be formed against a stop board and horizontal construction joints shall be level.

Except where shown otherwise on the drawings, reinforcement shall continue through construction joints.

The specifications of construction joints shall conform to Indian Roads Congress Special Publication No.33, Appendix I.

As soon as possible after the form work has been struck for vertical joints or after the concrete has set in horizontal joints, the surface laitance of the hardened concrete on the face of the joint shall be removed to expose the coarse aggregate in such a manner that the loosened particles of aggregate and damaged concrete are not left on the surface. The exposed face shall be swept clean of foreign matter and laitance. Feathered construction joints will not be permitted.

10 Contraction Joints

Contraction joints where required will be shown on the drawings. No separate payment shall be made for making Contraction joints.

Contraction joints shall not be hacked, wetted or mortared before concrete is placed against them.

11 Separation Joints

Separation joints shall be provided where shown in the drawings or as directed by the Project Manager. They shall be constructed with an initial gap between the adjoining parts of the width specified in the drawings.

The Contractor shall ensure that no debris is allowed to enter separation joints.

12 Water Bars

Where water bars are shown on the drawings, the joints shall be incorporate PVC water bar such as "Fixostop" or approved equivalent conforming to Central Water Commission Standards (Annexure 1). The water bars shall be complete with all the necessary moulded or prefabricated intersection pieces assembled in accordance with the drawings with bends and butt joints in running lengths made by welding with an electrically heated jig.

Jointing and fixing of water bars shall be carried out strictly in accordance with the manufacturer's instructions. Refer Table below.

TYPE OF JOINTS	'FIXOSTOP' TYPE
Four strips in raft	230 kV
Horizontal construction joints between raft & retaining wall	240 RS
Out side face of pour strips in retaining walls	230 KD
Expansion joints in retaining walls	Fixocap - 38
Joints between basement and temporary retaining wall panels	230 KD
Horizontal construction joint between retaining wall and upper basement floors	240 RS
Construction joint between raft	230 KD

Water bars shall be appropriate type & approved by the Project Manager.

The water bars shall be installed so that they are securely held in their correct position during the placing and impacting of the concrete. Necessary supporting devices to prevent sagging of the water bars shall be provided.

Where reinforcement is present adjacent to water bars, adequate clearance shall be left between the reinforcement and water bars to facilitate compaction of the concrete.

Double headed nails may be used at the edge of the water bar outside the line of the external grooves for fixing purpose, but no other holes shall be permitted through the water bar.

13 INSERTS

- 13.1 The Contractor shall fix all necessary inserts such as steel plates, pipe sleeves, bolts etc. and make provision of holes, pockets, dowels etc. in the form work to enable subsequent fixing of supports, brackets, ceilings, precast members etc. As indicated on the drawings, in the schedule of quantities or as required by the Project Manager, in- situ concrete inserts shall be as per IS : 1946 and of a type approved by the Project Manager.
- 13.2 Nothing extra over and above the provision as per the priced schedule of quantities shall be paid to the Contractor for placement of inserts in position before concreting.
- 13.3 With the prior agreement of the Project Manager , expansion type fasteners may be used by the Contractor in hardened concrete.
- 13.4 The inserts shall be properly protected from damage, slurry leakage, etc. by methods such as applying grease, wrapping with burlap, plugging with hemp cloth etc. to the satisfaction of the Project Manager.

14 CONCRETE IN SLOPES

- 14.1 The Contractor will ensure proper compaction of concrete at places of slope in concrete like raft near lift pits, ramps, staircases etc. No extra payment shall be made for such concrete placed & maintained in slopes.

15 CRACKS / INFIRMITIES

If any cracks or infirmities develop in the concrete construction which in the opinion of the Project Manager may be detrimental to the strength of the construction, the Contractor at his own expense shall test the structural element in question. If under these test loads the cracks or infirmities develop further the Contractor at his own expense shall dismantle the construction, cart away debris, replace the construction and carry out all consequential work there to at no extra cost to the satisfaction of the Project Manager.

If in the opinion of the Project Manager the cracks or infirmities are not detrimental to the stability or durability of the construction, the Contractor shall grout the cracks or infirmities with epoxy or other suitable material and repair / replace the infirmities at his own expense and risk. He shall also make good all other building works such as plaster, moulded surface, finish of floors, roofs, ceiling etc. which in the opinion of the Project Manager have suffered damage either in appearance or stability owing to such cracks or infirmities.

The scheme of repair work shall be subject to the approval of the Project Manager and carried out to the satisfaction of the Project Manager. The decision of the Project Manager as to the extent of the liability of the Contractor in the above matter shall be final and binding on the Contractor.

16 RETAINING STRUCTURES

The Contractor shall take special care for concrete for retaining structures, underground structures and those specifically called for to guarantee the finish and water tightness.

The testing of structures for water tightness shall be indicated in the next clause. The Contractor shall include his price of hydro testing of structure, all arrangements for testing such as water, temporary bulk heads, pressure gauges, pipe lines etc. Hydrostatic test for water tightness could be done at full storage level or soffit cover slab, as directed by the Project Manager.

Any temporary arrangements that may have to be made to maintain the stability of the structures shall also be considered to have been taken into account while quoting the rates.

Any leakage that may occur during the Hydrostatic tests or frequently during the DLP, the period which the structure is guaranteed shall be effectively checked either by cement/epoxy pressure grouting, guniting or other methods as may be approved by the Project Manager. Such rectification shall be done by the Contractor to the satisfaction of the owner / Project Manager at no extra cost to the Owner. After rectification, the structure shall be subjected to hydrostatic-tests till the acceptance criteria is satisfied.

17 CURING AND PROTECTION

Curing of concrete shall be complete and continuous using water that is free of harmful amounts of deleterious materials that may attack, stain or discolour the concrete.

Immediately after compaction and completion of any surface finishes, the concrete shall be protected from evaporation of moisture by means of polyethylene sheets, wet hessian or other material kept soaked by spraying. As soon as the concrete has attained a degree of hardening sufficient to stand-with surface damage, moist curing shall be implemented and maintained for a period of at least 15 days after casting.

Method of curing and their duration shall be such that the concrete will have satisfactory durability and strength and members will suffer a minimum distortion, be free from excessive efflorescence and will not cause by its shrinkage undue cracking in the works.

The top surface of slabs and other horizontal surfaces shall be cured by impounding water in cement mortar bunds. Deeply sloping and vertical formed surfaces shall be kept completely and continuously moist prior to and during the striking of form work by applying water to the top surfaces and blowing it to pass down between the form work and the concrete.

The Contractor shall give careful consideration to the curing methods and conditions for fair faced concrete components which are specified to have exposed concrete finish shall receive the same curing treatment. Moreover, water used for curing shall be of such quality so as not to discolour the concrete.

All fair faced concrete shall be protected from damage from the time of striking the form work. All edges and surfaces of such concrete shall be protected from chipping using notched timber corner pieces or other suitable covers which shall be maintained in place until the completion of the works.

The Contractor shall be responsible for ensuring all fair faced concrete free of stains from concrete materials and shall clean all such staining as may occur at his own cost as soon as possible to the satisfaction of the Project Manager.

Approved non-wax base curing compounds may be used in lieu of moist curing only with the permission of the Project Manager. Such approved compounds shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set.

18 TESTING CONCRETE STRUCTURES FOR WATER TIGHTNESS AND ACCEPTANCE CRITERIA

18.1 Overhead Reservoir

In case of structures whose external faces are exposed such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry during the period of observation of seven days after testing for a seven - day period for absorption after filling with water. Nothing extra will be paid on this account .

18.2 Underground Tanks, Pump Rooms And Sumps

18.2.1 In the case of structures whose external faces are merged and are not accessible for inspection, such as under ground tanks, the structures shall be filled with water after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The fall in level of water shall be recorded again at subsequent intervals over a period of seven days. Back filling shall be held till the tanks are tested. The total drop in surface water level over a period for seven days shall be taken as a presentation of the water tightness of the structure. Nothing extra will be paid on this account .

18.2.2 A structure shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

18.3 Basements

The requirements of water tightness shall be deemed to be satisfied if the walls and floor show no signs of leakage or sweating and remain completely dry. Nothing extra will be paid on this account .

18.4 Compartments

Each compartment / segment of the structure shall be tested individually and then all together. Nothing extra will be paid on this account .

18.5 Roofs

18.5.1 The roofs of liquid retaining structures shall be watertight and shall be tested on completion by flooding the roof with water to a minimum depth of 25 mm for 24 hrs. Where this is impracticable, because of roof falls or otherwise, to maintain a 25 mm depth of water, the roof shall have water applied by a continuous hose of sprinkler system to provide a consistent flow of water over the entire area of the roof for not less than 6 hrs. In either case the roof shall be considered satisfactory if no leaks or damp patches show on the soffit. Should the structure not satisfy either of these tests, then after completion of the remedial work it should be re-tested in accordance with this clause. The roof insulation and covering should be completed as soon as possible after satisfactory testing. Nothing extra will be paid on this account .

18.6 Miscellaneous Structures

18.6.1 For structures such as pipes, tunnels, cooling tower cabins etc. The hydrostatic test shall be carried out by filling with water, after curing as specified and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test. Nothing extra will be paid on this account .

Acceptance Criteria

Any concrete work shall satisfy the requirements given below, as may be applicable individually and collectively for all to be acceptable.

The Project Manager's decision as to the acceptability or otherwise of any concrete work shall be final and binding on the Contractor.

For work not accepted, the Project Manager may review and decide whether remedial measures are feasible to render the work acceptable. The Project Manager shall in that case direct the Contractor to undertake and execute the remedial measures. The Contractor shall expeditiously and effectively implement these. Nothing extra shall become payable to the Contractor by the owner for executing such remedial measures.

19 GROUTING

19.1 Grout shall be provided as specified on the drawings. The proportion of standard grout shall be such as to produce a floatable mixture consistent with minimum water content and shrinkage. Surfaces to be grouted shall be thoroughly roughened and cleaned. All structural steel elements to be grouted shall be cleaned of oil, grease, dirt etc. The use of hot strong caustic solution for this purpose will be permitted. Prior to grouting, the hardened concrete shall be saturated with water and just before grouting water in all pockets shall be removed. Grouting once started shall be done quickly and continuously variation in grout mixes and procedures shall be permitted if approved by the Project Manager. The grout proportions shall be limited as indicated below in Table below:

USE	GROUT MIX	MIX PROPORTIONS	W/C RATIO
A) Fluid mix	Under 25 mm	1 Part port land cement to 1 part sand	0.44
B) General mix	25 mm and over but less than 50 mm	1 part port land cement to 2 parts sand	0.53
Stiff	50 mm and	1 part port land	0.53
Mix	Over	Cement to 3 parts sand	

19.2 Non-shrink grout where called for in the schedule of quantities, or specified on the drawings shall be provided in strict accordance with the manufacturer's instructions/ specifications on the drawings.

20 LOAD TESTING ON COMPLETED STRUCTURES

20.1 During the period of construction or within the defect liability period the Project Manager may at his discretion order. The load testing of any completed structure or any part thereof if he has reasonable doubts about the adequacy of the strength of such structure for any of the following reasons:

- A) Results of compressive strength on concrete test cubes falling below the specified strength.
- B) Premature removal of formwork.
- C) Inadequate curing of concrete.
- D) Over loading during the construction of the structure or part thereof.
- E) Carrying out concreting of any portion without prior approval of the Project Manager.
- F) Honey combed or damaged concrete, which in the opinion of the Project Manager is particularly weak and will affect the stability of the structures to carry the design load, more so in important or critical areas of the structure.
- G) Any other circumstances attributable to alleged negligence of the Contractor, which in the opinion of the Project Manager may result in the structure or any part thereof being of less than the expected strength.

All the loading tests shall be carried out by the Contractor strictly in accordance with the instructions of the Project Manager, IS: 456 and as indicated hereunder. Such tests should be carried out only after the expiry of minimum 28 days or such longer period as directed by the Project Manager.

The structure should be subjected to a superimposed load equal to 1.25 times the specified superimposed load considered in the design. This load shall be maintained for a period of 24 hours before removal. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members as directed.

The deflection due to super imposed load shall be checked by sufficient number of approved deflectometers capable of reading upto 1/500 of a cm and located suitably over the structure as directed by the Project Manager. The method of test loading and acceptance criteria shall be as per clause 16 of IS: 456 for reinforced concrete.

If the load test results are unacceptable the part of the work concerned shall be taken down or cut out and reconstructed to comply with the specifications. Other remedial measures may be taken to make the structure secure at the discretion of the Project Manager. However, such remedial measures shall be carried out to the complete satisfaction of the Project Manager.

All costs involved in carrying out the load tests and other incidental expenses thereto shall be borne by the Contractor regardless of the results of the tests. The Contractor shall take down or cut out and reconstruct the defective work or shall make the remedial measures instructed, at his own cost.

In addition to the above load tests, non destructive test methods such as core test and ultrasonic pulse velocity test shall be carried out by the Contractor at his own expense if so desired by the Project Manager. Such tests shall be carried out by an agency approved by the Project Manager and shall be done under their guidance using only recommended testing equipment. The acceptance criteria for these tests shall be actually agreed between the Project Manager and the Contractor.

21 SUPERVISION

All concreting work shall be done under strict supervision of the qualified and experienced representatives of the Contractor. The Contractor's Project Manager and supervisors who are in-charge of concreting work shall be skilled in this class of work and shall personally supervise all the concreting operations.

Special attention shall be paid to the following:

Proportioning, mixing, and quality testing of the materials with particular control on the water - cement ratio.

Laying of materials in place and thorough compaction of the concrete to ensure solidity and freedom from voids and honey combing.

Proper curing for the requisite period

Position of reinforcement and that of inserts are not disturbed during concreting and consolidation by vibration.

22 QUALITY ASSURANCE AND QUALITY CONTROL

The Project Manager reserves the right to make changes in the mix proportions including increased cement content or/and a change in the Contractor's control procedure, should the quality control during progress of the works prove to be inadequate in his opinion .

All the concrete work shall be true to level, plumb and square within the acceptable tolerance. The corners, edges and arises in all cases shall be finished properly and carefully.

The Contractor shall prepare a detailed quality assurance and quality control manual for his staff and obtain approval of the same from the Project Manager. The manual shall contain detailed instructions of all aspects of quality assurance and quality

control for the entire construction work.

23 TOLERANCES

- 23.1 The acceptable tolerances for all concrete construction and materials shall be as per CPWD specifications & relevant IS Codes with latest revisions.

24 MEASUREMENT FOR PAYMENT

In general, the measurement shall be governed under IS: 1200 (Part I-XII) with latest revisions. Dimensions shall be measured nearest to 1 cm .except for the thickness of slab, which shall be measured to the nearest 0.5 cm. The areas shall be worked out to the nearest 0.01 sq. m.

No deduction shall be made for the following:

Opening up to 0.1 sq. In calculating area opening up to 0.1 sq. The size shall include the thickness of any separate lintels or stills. No extra labour for forming such opening or voids shall be paid for.

The volume occupied by reinforcement and inserts.

The volume occupied by water pipes, conduits, anchor bolts etc. not exceeding 25 sq. cm. Each in cross-sectional area. Nothing extra shall be paid for leaving and finishing such cavities and holes.

- 24.3 Measurement shall be taken before any rendering is done to the concrete members. The measurement will not include rendering.

25 FORM WORK

GENERAL

The term "Formwork" or "Shuttering" shall include all forms, moulds, sheeting, shuttering, planks, walers poles, posts, shores, struts and strutting, ties, uprights, walling, steel rods, bolts, wedges and all other temporary supports to the concrete during the process of pouring & setting. The formwork for all precast works shall be of steel or fibre glass . Shuttering may be provided with wooden battens inside to give the desired exposed finish in precast members. The formwork for cast in situ reinforced concrete may be of timber or steel. However, steel shuttering shall be used for columns, beams and slabs as specified by the Project Manager.

A sufficient number and size of walers shall adequately support all shuttering planks with supporting members to ensure rigidity of form during concreting to avoid delay and unnecessary rejection of forms. The Contractor shall obtain the approval of the Project Manager for the design of the forms and the type of timber used for preparing actual samples of different types of about 10-sq. m. for their satisfaction before fabricating forms.

Struts, braces, ties and props shall be of adequate size and number to support the shuttering rigidly placed during concreting, and shall be strong enough to with stand vibrations. Joints in props shall not be allowed.

If form work is held together by bolts and wires , these shall be so fixed that no iron shall be exposed on surface against which concrete is to be laid. The Project Manager may at his discretion allow the Contractor to decide the location and size of such tie-bolts but the holes left in the concrete by these tie-bolts is shall be filled as specified by them at the Contractor's expense.

25.1 Type of shuttering

It is intended to use in this job the specified type of shuttering as below :

25.2 Planks Shuttering

All facing form work to come in contact with concrete shall consist of:-

- a) Laps jointed or tongue and grooved. Unplained bandsawn planks not less than 4 cm. thick and more than 18 cm. wide unless other wise directed by the Project Manager.
- b) Unplained bandsawn planks of 1.25 cm. to 2.0 cm. thickness mounted on 6 mm thick ply wood board as per relevant drawings and the instructions of the Project Manager.

25.3 Ply Wood Shuttering

The Contractor shall provide 19-mm thick shuttering quality plywood of approved make at such locations as called for by the Project Manager. The joints in plywood shuttering shall be located as shown in the relevant drawings or as directed by the Project Manager.

25.4 Steel Shuttering

The Contractor shall provide steel shuttering for such locations as called for and as per the relevant drawings and the directions of the Project Manager.

Provision shall be made in the shuttering for beams and columns for a pot hole of convenient size so that all extraneous materials that may be collected could be removed before concreting.

25.5 Camber

Forms and formwork shall be cambered as described below unless other wise shown or specified.

TYPE OF MEMBER	COMPRESSION AS % OF TENSILE STEEL	STEEL	CAMBER CO-EFFICIENCY
Simple Span	0%		0.066
	50%		0.037
Continuous	0%		0.032
Restrained span	50%		0.020
Cantilever	0%		0.086
	50%		0.046

Camber in Centimeters ($K * L * 2.54 / D$)

Where K: Camber co-efficient
L: Length of member in meter
D: Depth of member in meter

- 25.6 Care shall be taken that all formwork is set in plumb and true to line and level & camber where required and as specified by the Project Manager without twists.

All shuttering shall be adequately strutted, propped to the satisfaction of the Project Manager to prevent deflection under the dead weight of concrete and superimposed live load of workmen and materials. In addition, plant formwork shall be so arranged as to permit removal without jarring the concrete, wedges clamps & bolts shall be used wherever practicable instead of nails.

Timber surfaces of forms in contact with concrete shall be oiled with shuttering oil of specified quality without pigment or colouring of the quality approved by the Project Manager. The use of oils, which darken the surface of the concrete, shall not be allowed. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during the concreting and the curing.

Immediately before concreting is commenced, the formwork shall be carefully examined to see that all dirt, shaving, saw dust and other refuse has been removed by brushing, washing, and cleaning it. Openings shall be provided in all form of work to facilitate cleaning.

All formwork erected shall be approved by the Project Manager or his authorised representatives, before concreting is started.

25.7 Removal of Form Work

Unless other wise permitted in writing by the Project Manager, the minimum period for keeping form work in position shall conform to the Indian Standard Specifications and shall be as follows:

Under side of beams, joints	21 days
Under side of slabs	10 days
Lintels, walls openings	3 days
Sides of Slabs and beams	3 days

The Project Manager may vary the above period if he considered it necessary for structural stability immediately after the forms are removed. The area shall be cleaned with a jet of water and a soft brush.

Stripping Of Formwork

Formwork shall be removed carefully without jarring the concrete and curing of the concrete shall be commenced immediately.

25.9 Reuse Of Forms

The Contractor shall not be permitted re-use of shuttering of ply wood form work brought new on the works for more than 14 times for exposed concrete. Reuse shall be permitted only if forms are properly cared for, stored, and adequately repaired after each use. The Project Manager may in their absolute discretion order removal of any forms they consider unfit for use in the works or rejection of any form they consider unfit for use.

25.10 Hacking

Immediately after removal of forms, the concrete surface intended to be either plastered or finished shall be roughened with brush hammer or with chisel and hammer as directed by the Project Manager or the Architects to make the surface sufficiently coarse and rough to provide application for plaster.

No extra payments shall be made to the Contractor for such work on concrete surface after removal of the formwork.

No payment shall be made for temporary formwork used in concreting, not for formwork required for joints or bulkheads. In floor or elsewhere, whether such joints are to be covered later with concrete, mastic, or other materials.

25.11 Pockets And Openings:

Where boxes, pockets or openings are required (not exceeding 0.1 sq. m.) to be formed in the concrete, no deduction shall be made for the area of box or pockets in measuring the area of concrete surface shuttered. In other words, the area of shuttering shall be reckoned as if the box or pocket or openings were not present.

However, on measuring the concrete quantity, the volume of the box or pocket shall be deducted. If the area of box, pocket or openings against the shuttered faces exceeds 0.1 sq. m. It shall be paid not as a box or pocket or opening but as form work at the rates for form work.

No extra payment shall be made for holes to be made in the formwork for inserting electrical conduit hooks for fans etc.

25.12 General Direction for Form Work

25.12.1 General

Joints in formwork shall be designed to prevent leakage not only between individual elements forming the panels but also from the horizontal vertical junctions between the panels themselves.

Suitable jointing arrangements and recommendations shall be made in consultation

with Project Manager.

Formwork shall be strong enough to with stand normal handling conditions and should not deform under pressure exerted by the concrete.

Formwork shall be of sufficient and uniform stiffness to prevent excessive variation in vibration characteristics over the area of any panel

25.12.2 Jointing Faults

Lose of alignment from damaged formwork, poor design, inadequate or excessive tolerances or leakage at joints causing grout loss discoloration or colour difference between different stages of the work. In addition, poor compaction around the corners and inserts shall not be permitted & Contractor will have to rectify such works without any extra claim.

25.13 Stop Ends

Stop ends, as vertical joints in length of formwork shall be carried out as per the instructions of Project Manager.

25.14 Ties

Tie bolts shall be strong enough to resist inadvertent bending which can prevent easy with drawl.

25.15 Bolt Holes

Pattern of bolt holes and fixing shall be as for Project Manager's design and instruction.

25.16 Cleanliness

When not in use, formwork materials shall always be kept under cover in clean area to minimise the possibility of contamination. Formwork shall always be cleaned on stripping and oiled before erection or re-erection. After erection, the formwork shall be covered to prevent exposure to rain, which might remove the mould oil or wash rust scale into prepared surface. After formwork is in place, hosing down with water shall not clean it. Any further cleaning shall be done with an air hose. Care shall be taken to keep the surface clean during and subsequent steel fixing and form work operations. Dirt and other materials shall not be allowed to enter the section to be cast.

25.17 Exposed Concrete Work

Exposed concrete work shall have original fair face finish of the concrete surface without rendering or plastering . The concrete surface shall be absolutely free from honey combing exposed off sets. Superfluous mortars cement slurry and foreign matters. The formwork shall be assembled in such a way as to facilitate removal of its parts in proper sequence without any damage to the exposed cement surface and corners etc. No concrete surface shall be rendered or painted with cement or other wise. The Contractor shall keep skilled staff for special care and supervision to check the form work and concreting so that every member is made true to its size, shape,

level and plumb preventing any deformation, sag, bulges etc. It shall have even and smooth contact surfaces and its joints shall be sufficiently watertight or have tongue and groove joints if required as shown on the drawings to prevent leakage of slurry or water. The formwork shall be oiled thoroughly to prevent absorption of water from fresh concrete.

The cambers bevelled edges and mouldings shall be made in the form it self. Centering used for supporting formwork shall be of tubular steel. It is not intended to use inter face pattern of formwork. However, the sizes and locations of joints shall have prior approval of the Project Manager of before proceeding with the laying of concrete. The Contractor shall also take precautionary measures to prevent any breaking or chipping of concrete until the building is handed over. No payment for surface covered under false ceiling, skirting , veneering etc. shall be made under this item. No extra claim on account of making grooves, drip courses sands, etc. shall be entertained.

25.18 Steel Shuttering

Steel shuttering should be made of 4 mm thick black steel sheet stiffened with angle iron frame of 40 x 40mm. The plates must be of suitable sizes and approved by the Project Manager as shown on the drawings. Before using the shuttering the same shall be coated with a standard quality form oil without any pigment or colour. No other substitute shall be permitted. Those truly vertical and horizontal joints as shown in the relevant drawings are obtained. In order to obtain shuttering lines, gaps between the adjacent plates must be suitably adjusted. The surface concrete after removing shuttering shall be free from honeycombing, off sets. super flues mortar, cement slurry, other foreign matter to result in the required finish and natural and original face of cement concrete without rendering with cement plaster when bolts used for holding the shuttering cannot be pulled out. The same bolts shall be left in position and the projecting end must be cut flush with the exposed surface skirts and steel shuttering used in the form work for obtaining exposed surface shall not be used for more than ten times. In order to obtain exposed concrete work of a uniform colour it shall be necessary to ensure that the sand used throughout the structure shall conform to a uniform approved colour.

26 STEEL REINFORCEMENT

26.1 General

This section covers the requirements for providing, fabricating, delivering & placing, anti corrosive treatment of steel reinforcement for all types of concrete work. Related work specified elsewhere

Cast-In-Situ Plain and Reinforced Concrete

The more important codes, standards and publications applicable to this section are listed hereinafter. In all cases, the latest issue/revision including the amendments up to the date of issue of tenders shall be applicable.

In case of any discrepancy or conflict between the standard codes, standards and publications on the one hand and "specific technical requirements" on the other, the latter shall govern.

IS: 280	Mild steel wire for general Construction managing purposes
IS: 432	Part I mild steel and medium tensile steel bars. Part II hard drawn steel wire.
IS: 456	Code of practice for plain and reinforced concrete.
IS:314	Parts I & II electrodes for metal arc welding of structural steel
IS: 816	Code of practice for use of metal arc welding for general construction in mild steel
IS: 1566	(Part I) specifications for hard-drawn steel wire fabric for concrete reinforcement
IS: 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS: 2502	Code of practice for bending and fixing of bars for concrete reinforcement
IS: 2629	Recommended practice for hot-dip galvanising of iron and steel.
IS: 2751	Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction
IS: 4759	Hot-dip zinc coating on structural steel and other allied products.
IS: 5525	Recommendations for detailing of reinforcement in reinforced concrete works
IS: 9417	Recommendations for welding cold-worked steel bars for reinforced concrete construction.

26.3 Bar Bending Schedule

Before commencement of fabrication of any steel reinforcement, the Contractor shall submit the bar bending schedule to the Project Manager for his approval.

Steel reinforcement used shall be either of the following types:

- A) Mild steel of grade 1 tested quality conforming to IS:432 - Part I
- B) High strength deformed steel bars tested quality conforming to IS:1786.
- C) Hard drawn steel wire fabric conforming to IS: 1566

All steel shall be procured from original producers. Re-rolled steel shall be incorporated in the work.

Only new steel shall be delivered to the site and shall be free from mill scale, loose rust, grease, oil, paint or any other deleterious materials which reduce or destroys bond. Every bar shall be inspected before assembling o the work and effective, brittle or burnt bar shall be discarded. Cracked ends of bars shall be discarded.

Binding Wire

Binding wire shall be black annealed steel wire informing to IS:280 and minimum 16 gauge, except for galvanized enforcement for which the wire shall be galvanised steel.

26.5 Welding Electrodes

Electrodes used for welding of steel bars shall be ordinary mild steel grade

electrodes conforming to IS: 814 and shall be of the best quality approved by the Project Manager, The work shall be carried out strictly as per IS: 2751

26.6 Bar Supports (Spacer Blocks / Cover Blocks)

Bar supports used as spaced cover blocks shall be of plastic and of approved type, colour and manufacture.

26.7 Storage

26.7.1 Reinforcement steel shall be handled and stored in a manner that bending or distortion of the bars is avoided and contamination of steel is prevented.

26.7.2 All reinforcement shall be stored horizontally above ground level on platforms, skids or other approved supports, clear of any running or standing water. Contact with soil shall be avoided. Proper drainage and protection from the reinforcement shall be provided to minimise corrosion.

26.7.3 Bars of different types and diameters shall be stored separately. Reference shall also be made to MOST specification road and bridge works, clause 1600.

26.7.4 Welding electrodes shall be stored in moisture controlled environment in accordance with the manufacturer's specifications.

26.8 FABRICATION

26.8.1 Reinforcement steel shall be carefully and accurately bent or formed with machines to the dimensions and configurations on the drawings and bar bending schedules.

26.8.2 All reinforcement shall be bent cold using appropriate tools & machines. Bars may be preheated only on approval of the Project Manager. Hot bars shall not be cooled by quenching and shall be in accordance with IRC: 21, IS: 2502.

26.8.3 It shall be ensured that the bars are not bent or straightened in any manner that will injure the material. Any bar incorrectly bent shall be used only if means for straightening and rebending be such as will not be effect the material adversely. Reinforcement shall not be bent or straightened without prior review by the Project Manager. Reinforcement shall be bent when in position on the works without approval of the Project Manager, whether or not it partially embedded in hardened concrete. Rebending or straightening of deformed bars shall in any case not be permitted for diameters more than 12 mm.

26.8.4 Reinforcement steel having a reduced section, visible inverse cracks in bends, or bars other wise damaged in anyway not be used.

26.8.5 Spiral reinforcement shall be accurately fabricated to the diameter and pitch shown on the drawings. One half (1 & 1.5) finishing turns shall be provided at top and bottom unless shown other wise.

26.8.6 Cut ends of galvanized rods shall be given a protective coat of approved zinc paint immediately after placing.

26.9 LAPPING

- 26.9.1 As far as possible, bars of maximum length available shall be used.
- 26.9.2 The Contractor shall base laps shown on the drawings or other wise permitted by the Project Manager on the use of maximum length.
- 26.9.3 The overlaps shall be staggered for different bars and lapped at points along the span where shear is not high.
- 26.9.4 Not more than one third of the bars or as specified in drawings shall be lapped at one section .
- 26.9.5 Reinforcement bars shall not be welded unless shown on the drawings or approval by the Project Manager.

26.10 PLACEMENT

- 26.10.1 All reinforcement bars shall be placed accurately and aligned in the position indicated on the drawings.
- 26.10.2 The Contractor shall provide approved type of inserts for maintaining the bars in position ensuring specified spacing and correct cover of concrete to the reinforcement as called for in the drawings. Precast cement mortar blocks of required shape and size, M.S. chairs and space bars shall be used in order to ensure accurate placing of reinforcement. Precast concrete blocks shall put well in advance and shall be equal in quality &- class of concrete specified in the relevant work.
- 26.10.3 All intersections of the reinforcement shall securely tied with two strands of binding wire twisted tight to make the skeleton or network rigid so that the reinforcement is not displaced during placing of concreting.
- 26.10.4 Tack welding of crossing bars shall not be done, unless authorised or approved by the Project Manager. Nothing extra will be paid for tack welding.
- 26.10.5 The Contractor shall take all reasonable precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete. Bars that are partially embedded in concrete shall not be field bent unless clearance has been obtained from the Project Manager.
- 26.10.6 Walkways and borrow runs for placing and compacting concrete shall be independent of the reinforcement.
- 26.10.7 Loose binding wire and other extraneous metal shall be removed from inside the formwork before placing of concrete.
- 26.10.8 Without relieving the Contractor of the responsibilities- for the correctness therefor, the cement shall be inspected and approved by the Project Manager in writing before any concrete is placed and the Contractor shall allow sufficient time for such inspection and subsequent remedial action to be carried out.

26.10.9 No part of the reinforcement shall be used for carrying electrical currents.

26.11 COVER TO REINFORCEMENT

26.11.1 Care shall be taken to maintain the correct cover to reinforcement as indicated in the drawings.

26.11.2 The maximum cover for reinforcement shall not be more than that shown on the drawings plus 5mm.

26.11.3 Exposed reinforcement intended for binding with future provisions shall be protected from corrosion as approved by the Project Manager.

26.12 CLEANING

26.12.1 After placing, the reinforcement shall be maintained in clean condition until the concrete is placed. On no point shall the bars be oiled, painted, or allowed to be exposed to it.

26.12.2 Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

26.13 WELDED LAPS

26.13.1 Wherever specified in the drawings or instructed by the Project Manager welded laps shall be provided at no additional cost.

26.13.2 The welding of bars shall be done in accordance with IS 816, IS 2751, IS 9417 and as specified on the drawings and instructions. Butt welding between the ends of bars in line whereby the stress is transferred across the ends will not be permitted.

26.13.3 The following size of electrodes shall be used for welding with longitudinal beads:

Diameter (mm)	6	10	20	32	40
Electrode size (mm)	2	2.5	3.5	5	5

26.13.4 The Contractor shall employ only qualified and trained welder specifically trained and experienced in welding of reinforcement bars to execute the welding of laps to the complete satisfaction of the Project Manager.

26.13.5 Before the welding of bars at site the Contractor shall make minimum 3 joints and get them tested in an approved lab. (Including X-ray testing of welds if required) at his cost. The Contractor shall be permitted to do the welding, after satisfactory test certificate from the laboratory obtained. Whenever the welder change similar tests shall be carried out again.

26.13.6 The following precautions shall be taken before welding :

- A) Bars shall be free from rust at the joints to be welded.
- B) Bars shall be aligned & kept in proper axis in order to minimise the

- crookedness in bar after welding.
- C) Slag produced in welding after alternate runs should be chipped & removed by brush.
 - D) Electrode should not be lighted touching the hot bar.
 - E) If the cold twisted deformed bars to be lapped has an untwisted end at the lapping point , the same portion shall be cut-off prior to welding upto a length of atleast 10 cms. from such ends.

26.14 Measurement For Payments

26.14.1 Reinforcement including authorised spacers bars & lappages shall be measured in lengths of different diameters , as actually used in the work nearest to a centimeter & their weight calculated on the basis of standard tables as per CPWD. Wastage of unauthorised overlaps shall not be paid for. Annealed steel wire required for binding of tack welding shall not be measured , its cost being included in the rate of reinforcement. The rate for reinforcement shall include the cost of labour & materials required for all operations described above except welding in lieu of overlaps which shall be paid for separately.

26.14.2 In general the measurement part shall be governed under IS : 1200 (Mode of measurement for building & civil engg.).

SECTION - 3**LIST OF APPROVED MAKES OF MATERIALS
FOR EXTERNAL WATER SUPPLY**

S.No.	Materials	I.S. Code No.	Brand Name	Manufacturer
1.	Gunmetal Valve (Fullway, check and globe valves)	778	LEADER	Leader Engg. Works, Jalandhar
			ZOLOTO	Zoloto Industries, Jalandhar
			SAINT	
2.	C.I. Non return valves (Swing check type reflux valve)	5312	KIRLOSKAR	Kirloskar Bros., Pune
			IVC	Indian Valve Co. Ltd., Calcutta
			LEADER	Leader Engg. Works, Jalandhar
3.	C.I. Double Flanged sluice valve	780	KIRLOSKAR	Kirloskar Bros. Pune
			IVC	Indian Valve Co. Ltd., Calcutta
4.	(a) Float valve (gunmetal) upto 50mm		LEADER	Leader Engg. Works, Jalandhar
			GG	Bombay Metal & Alloys Mfg. Co. Ltd., Bombay
	(b) Float valve (C.I) 50mm and above		IVC	Indian Valve Co. Ltd, Calcutta
			LEADER	Leader Engg. Works, Jalandhar
			KIRLOSKAR	Kirloskar Bros. Pune
5.	Ductile Iron Pipe	8329 – 1990	ELECTRO-STEEL	Electrosteel Casting Ltd.,
			Jindal	Jindal
6.	Butterfly Valve	13095 or BS-5155	AUDCO	Audco India Ltd.,
			IVC	The Indian Valve,
			KEYSTONE	Keystone Ind. Pvt. Ltd.
7.	Air Valve		LEADER	Leader Engg. Works, Jalandhar
			IVC	The Indian Valve
			SARKAR	H. Sarkar & Co.
8.	Pressure Release Valve		IVC	The Indian Valve
			LEADER	Leader Engg. Works, Jalandhar

S.No.	Materials	I.S. Code No.	Brand Name	Manufacturer
			SARKAR	H. Sarkar & Co.
9.	Fire Hydrant	908	MINIMEX	Minimax, Mumbai
			SUKAN	Sukan Equipments
			Newage	Newage
10.	C.I Fittings	1538	Juneja	Juneja Metal Works
			SKF	SKF
			BC	BC Iron Foundry
			ELECTRO-TEEL	Electro Steel Casting Ltd

**LIST OF APPROVED MAKES OF MATERIALS
FOR EXTERNAL SEWERAGE AND DRAINAGE SYSTEM**

S.No	Materials	I.S: Code with latest amendments	Brand Name	Manufacturer
1.	HDPE Pipes	14333	EMCO	EMCO General Plastic Ind. (P) Ltd.,
			ORIPLAST	ORI-PLAST LIMITED
2.	R.C.C. pipe and vent shaft	458-1980	Pragati, KK	As per ISI of approved quality.
3.	Cement	269-1976	ACC, Ultratech, Birla Plus, JK	Associated Cement Corp., Birla Group, JK Industries
4.	Cold twisted steel (deformed) bars	1786 -1989	TATA, SAIL, Rathi	TATA Steels, Steel Authority of India Ltd. Rathi Tor Steels
5.	Precast Manhole covers (SFRC)	12592		As per ISI of approved quality. ISI marked
6.	Plastic encapsulated steps	10910	KGM	KGM Associates

LIST OF OTHER APPROVED MAKES OF MATERIALS

S.No	Materials	Brand Name	Manufacturer
1.	Cement	Ultratech	L&T
		Vikram	Vikram
		JK	JK
2.	Reinforcement Steel	SAIL	SAIL
		TISCO	TISCO
		Rathi TOR	Rathi Udyog
3.	Structural Steel	SAIL	SAIL
		TISCO	TISCO
4.	Synthetic Enamel Paint	Asian	Asian Paints
		Jenson and Nicholson	Jenson and Nicholson
		Nerolac	Nerolac Paints
		Berger	Berger Paints
5.	Water Proof Cement paint	Super Snocem / Asian/ Berger or equivalent	
6.	Red Oxide Primer	Asian	Asian Paints
		Jenson and Nicholson	Jenson and Nicholson
		Shalimar	Shalimar Paints
7.	Water Proofing Compound	CICO	CICO water proofing compound
		Pidilite	Pidilite Industries
		Fosroc	Fosroc Chemicals

SECTION - 4

CONSOLIDATED LIST OF IS STANDARDS APPLICABLE & MANUALS

S.No.	IS Code No.	Description
PUBLIC HEALTH ENGINEERING		
1.	I.S:1536-1976	Specification for centrifugally cast (spun) iron pressure pipes for water, gas and sewage
2.	I.S:1538 (Par I to XXIII) – 1976	Specification for cast iron fittings for Pressure for water, gas and sewage
3.	I.S : 3714-1985	Code or Practice for laying of C.I. pipes
4.	I.S.:782-1978	Specification for caulking lead
5.	I.S.:1239 (Part II) 1982	Specification for mild steel tubes; tubular & other wrought steel filling
6.	I.S. : 1879-1987	Specification for malleable cast iron pipe fittings
7.	I.S. : 4984-1987	High density polyethylene pipe for potable water supplies, sewage and industries effluents
8.	I.S.:783-1985	Width and depth of trench for R.C.C. pipes
9.	I.S.:4127-1983	Width and depth of trench for S.W. pipes
10.	I.S:780-1984	Specification for sluice valve for water works purposes
11.	I.S.:651-1992	Specification for salt glazed stoneware pipe and fittings
12.	I.S.:456	Code of practice for plain & reinforced concrete
13.	I.S.:8329-1990	Code of practice for Ductile Iron pipe
14.	I.S.:12288-1987	Code of practice for use & laying of Ductile Iron pipe
15.	I.S.:12820-1989	Code of practice for dimensional requirements of rubber gaskets for mechanical joints & push on joints for use with cast iron pipes & fittings.
16.	I.S.:1172-1983	Code of practice for water supply, drainage & sanitation
17.	I.S.:1200 (P-16) 1979 – (P-19) 1981	Code of practice for methods or measurements of building & Civil Engineering works.
18.	I.S:1729-1979	Specification for sand cast iron spigot & socket soil, waste and ventilating pipes, fittings and accessories.
19.	I.S:1742-1983	Code of practice for building drainage
20.	I.S:3989	Soil, waste, rain water pipes and fittings (centrifugally spun)
21.	I.S:778	Gunmetal valves (fullway and check valves) upto 65mm dia.
22.	I.S:13095	Butterfly valve
23.	I.S:780	C.I double flanged sluice valve (80mm dia and above)
24.	I.S:5312	Swing check type C.I double flanged non-return valve
25.	I.S:1239-1982	G.I & M.S pipes
26.	I.S:1879 (part 1 to 10)	G.I fittings (malleable cast iron)
27.	I.S:651	Stoneware pipes & gully trap

S.No.	IS Code No.	Description
PUBLIC HEALTH ENGINEERING		
28.	I.S:458	R.C.C pipes
29.	I.S:1726	C.I. Manhole cover
30.	I.S:784-1978	P.S.C pipes
31.	I.S:5382-1985	PSC pipes, rubber ring for jointing
32.	I.S:7322-1985	PSC pipes, fittings
33.	I.S:1916 (latest)	PSC pipes lining
34.	I.S:456 (latest)	Plain and reinforced concrete
35.	I.S:2490 (part I - X)	Tolerance limits for Industrial effluents
36.	I.S:12591-1988	Precast concrete manhole covers and frame
37.	I.S:6392-1967	Class 4.6 and 6.6 for blots, nuts and bedding.
38.	I.S:6392-1971	Nuts and bolts
39.	I.S:6418	C.I flanges
40.	I.S:4985-1988	Unplasticized PVC pipes
41.	I.S:7181-1974	Flange Riser for Fire Hydrant
42.	I.S:210-1970	Stand post column for Fire Hydrant
43.	I.S:930-1975	Male coupling for Fire Hydrant
STRUCTURAL WORKS		
CEMENT		
S.No.	IS Code	Description of IS Codes
1	IS : 269.	Specification for 33 grade ordinary Portland cement.
2	IS: 650.	Specification for standard sand for testing of cement
3	IS : 4031	(Parts 1 to 13) Methods of physical test for hydraulic cement
4	IS : 4032	Method of chemical analysis of hydraulic cement.
5	IS : 6925	Methods of test for determination of water-soluble chlorides in concrete admixtures.
6	IS : 8112	Specification for 43 grade ordinary Portland cement
CONCRETE		
7	IS : 383	Specifications for coarse & fine aggregates from natural source for concrete.
8	IS : 456	Code of practice for Plain & Reinforced concrete.
9	IS : 457	Code of practice for general construction of plain & reinforced concrete for dams & other massive structures.
10	IS : 516	Methods of test of strength of concrete
11	IS : 1199	Methods of sampling & analysis of concrete.
12	IS : 1200	Methods of measurement for building & civil Project Manager.
13	IS : 1343	Code of practice for prestressed concrete.
14	IS : 2386	Parts I-VIII Methods of testing of aggregate for concrete.
15	IS : 2438	Specification for roller pan mixer
16	IS : 2514	Specification of concrete vibrating tables.
17	IS : 2571	Code of practice for laying in-situ cement concrete flooring

S.No.	IS Code No.	Description
PUBLIC HEALTH ENGINEERING		
18	IS : 2645	Specification for integral cement water-proofing compound.
19	IS : 2722	Specification for portable swing batchers for concrete (double bucket type)
20	IS : 2770	Methods of testing bond in reinforced concrete part-I pull out test
21	IS : 3025	Methods of sampling & test (physical & chemical) for water used in industry.
22	IS : 3370	Code of practice for concrete structures for storage of liquids.
23	IS : 3696	Parts I & II Safety code for scaffold & ladders.
24	IS : 3935	Code of practice for composite construction.
25	IS : 4014	Parts I & II
26	IS : 4326	Code of practice for earthquake resistant construction of building.
27	IS : 7242	Specifications for concrete spreaders.
28	IS : 7251	Specification for concrete finishers
29	IS : 7861	Part I & II Code of practice for extreme weather concreting.
30	IS : 7969	Safety code for handling & storage of building materials
31	IS : 8989	Safety code for erection of concrete framed structures.
32	IS : 8142	Method of test for determining setting time of concrete by penetration resistance.
33	IS : 9103	Specifications for admixtures for concrete.
34	IS : 9013	Method of making curing & determining compressive strengths of accelerated cured concrete specimen.
35	IS : 9284	Method of test for abrasion resistance of concrete.
36	IS : 10262	Recommended guidelines for concrete mix design.
	BUILDING CONSTRUCTION PRACTICES	
37	IS : 1838	Part I and II. Specifications for performed fillers for expansion joint in concrete pavements and structures.
38	IS : 1946	Code of practice for use of fixing devices in walls, ceilings, and floors of solid construction.
39	IS : 3414	Code of practice for design and installation of joints in buildings
40	IS : 6509	Code of practice for installation of joints in concrete pavements
41	IS : 11134	Code of practice for setting out of buildings
42	IS : 11433	Part I and II. Specifications for one part gun grade polysulphide based joint sealant
	CONSTRUCTION PLANT AND MACHINERY	
43	IS : 1791	Specification for batch type concrete mixers
44	IS : 2505	General requirements for concrete vibrators immersion

S.No.	IS Code No.	Description
PUBLIC HEALTH ENGINEERING		
		type
45	IS : 2506	General requirements for screed board vibrators
46	IS : 3366	Specification for pan vibrators
47	IS : 3558	Code of practice for use of immersion vibrators for consolidating concrete
48	IS : 4656	Specifications for form vibrators for concrete
49	IS : 4925	Specification for concrete batching and mixing plant
50	IS : 11993	Code of practice for use of screed board concrete vibrators
	INSTRUMENTS FOR TESTING CEMENT AND CONCRETE	
51	IS : 5513	Specification for vicat apparatus
52	IS : 5514	Specification for apparatus used in Le Chatelier test
53	IS : 5515	Specification for compaction factor apparatus
54	IS : 7320	Specification for concrete slump test apparatus
55	IS : 7325	Specification for apparatus for determining constituents of fresh concrete
56	IS : 10080	Specification for vibration machine
57	IS : 10086	Specification for moulds for use in tests of cement and concrete
58	IS : 10510	Specification for vee-bee consistometer

MANUALS

Schedule of specifications of Govt. Of Gujarat and C.P.W.D. specifications revised upto 1996, (Govt. of India) with all latest amendments issued from time to time

National Building Code (Bureau of Indian Standard)

Manual of water supply & Treatment, Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, New Delhi.

Hand book of Water Supply and Drainage, Bureau of Indian Standards.

Any other International Standards/ Code Of Practice relevant to the Work.

SECTION - 5

ABBREVIATIONS

Approx.	Approximate
Avg.	Average
B.O.Q.	Schedule of Quantities
B.S.	British Standard
C.I.	Cast Iron
Cm.	Centimetre
Cu.m/m ³	Cubic metre
C.P.W.D.	Central Public Works Department
Dia	Diameter
e.g.	For example
Fig.	Figure
G.I	Galvanised Iron
G.L	Ground level
I.S	Indian Standard
Kg.	Kilogram
Lpd	Litre per day
Lps or l/s	Litres per second
Lvl.	Level
Max.	Maximum
Min.	Minimum
Misc.	Miscellaneous
MLD	Million litres per day
PVC	Poly vinyl chloride
RCC	Reinforced Cement Concrete
Sq.m	Square metre
S.S	Suspended Solid
U.G	Underground
%	Percentage
°C	Degree centigrade
@	At the rate of

INFRASTRUCTURE WORKS FOR PROPOSED PHASE-II - SEZ OF MWC - JAIPUR**SCHEDULE OF QUANTITIES FOR WATER SUPPLY DISTRIBUTION SYSTEM**

(THE TENDERERS ARE REQUIRED TO QUOTE THEIR RATES IN FIGURES AND WORDS UNDER RESPECTIVE COLUMNS AND EXTEND THE AMOUNT IN SUBSEQUENT COLUMN)

NOTES:

- 1) All rates shall be quoted based on the First make of material given in the List of Material issued in the Tender Document. The Contractor has to confirm & ensure availability of the same as per project requirement. In the event of First make of material not being available when required in the project, the contractor may seek approval of alternate make. If rate of such make is lower than the First make, the contractor shall pass on such cost reduction to the client. However, if the alternate material is costlier then the additional cost shall be borne by the contractor.
- 2) The Following Materials shall be supplied free of cost to the Contractor. The Contractor has to Quote accordingly for the relevant item of works:
 - a) Cement,
 - b) Reinforcement Steel &
 - c) D. I. Pipes with Rubber Gasket.
- 3) The Contractors shall ensure to avail all the benefits related to SEZ projects and the same shall be passed on to client .

S.NO.	DESCRIPTION	UNIT	QTY.	RATE in (RS)	AMOUNT (RS)
1	Excavation for trenches in all types of soils and materials such as murum, sand, sandy silt, clay, black cotton soil, kankar etc including manually dressing of sides and compacting & dressing of bottom using earth compactor, Conveying D.I. Pipes to site, lowering to trenches at average depth varying from 1 to 2 metre , aligning, laying & jointing of D.I. Pipes& specials (Push on joints/double flanged CI/DI joints) as per IS:458-1988 as per IS:5382 (including cost of Rubber gaskets lubricants) etc. as per drawing, testing the pipe line (including conveying of water to site) etc and disposal of surplus soil with all lead and lift including cost of timbering, shoring & strutting, dewatering, back filling of trenches with excavated material, watering, consolidation in layers of 30 cm using earth compactor , barricading trenches complete as directed by engineer-in-charge, for the the following dia pipes.				
	a) 100 mm dia Ductile Iron pipes	Metre	1520.00		
	b) 150 mm dia Ductile Iron pipes	Metre	1950.00		
	c) 200 mm dia Ductile Iron pipes	Metre	40000.00		
	d) 250 mm dia Ductile Iron pipes	Metre	150.00		
	e) 300 mm dia Ductile Iron pipes	Metre	300.00		
	f) 350 mm dia Ductile Iron pipes	Metre	900.00		
	g) 400 mm dia Ductile Iron pipes	Metre	1400.00		
	h) 450 mm dia Ductile Iron pipes	Metre	850.00		
	i) 500 mm dia Ductile Iron pipes	Metre	2370.00		

S.NO.	DESCRIPTION	UNIT	QTY.	RATE in (RS)	AMOUNT (RS)
	j) 600 mm dia Ductile Iron pipes	Metre	1470.00		
2	Providing and laying approved sand for bedding of pipes etc., complete as per drawing and as directed.	Cum	2160		
3	Providing and laying D.I specials of Class K-12 suitable for push-on jointing for all the dia of pipes as per IS : 9523	Qtl	100.00		
4	Providing and laying D.I specials of class K-12 suitable for mechanical jointing for all the dia of pipes as per IS : 9523	Qtl	12.00		
5	Supplying 'T'-key of required size for operating butterfly valves with gear box with cap as per instructions complete	Each	10.00		
6	Providing and fixing C.I. air release valve class PN 1.0 including the cost of extension pipes and fittings as per design and site conditions complete in all respects, including the cost of M.S cover , nut bolts , rubber insertions & chamber as per design & instructions (excluding the cost of gate valve).				
	a) Single acting type of 25 mm dia	Each	4.00		
	b) Double air valve (flange face and drilled to either ISS or BSS as required)				
	i) 50 mm valve size	Each	1.00		
	ii) 80 mm valve size	Each	1.00		
	iii) 100 mm valve size	Each	1.00		
	c) Kinetic double Air Valve				
	i) 80 mm valve size	Each	1.00		
	ii) 100 mm valve size	Each	1.00		
7	Providing & fixing butterfly valves, wafers end type class PN - 1.0 as per IS : 5155, including necessary nuts, bolts, rubber insertions etc., complete without gear box.				
	a) 100 mm dia	Each	1.00		
	b) 150mm dia	Each	4.00		
	c) 200 mm dia	Each	6.00		
	d) 250 mm dia	Each	2.00		
	e) 300 mm dia	Each	4.00		
	f) 350 mm dia	Each	2.00		
	g) 400 mm dia	Each	6.00		
	h) 450 mm dia	Each	2.00		
	i) 500 mm dia	Each	2.00		
	j) 600 mm dia	Each	2.00		
8	Providing and fixing CI sluice valves (with wheel and cap) complete with bolts, nuts, rubber insertions etc.(the tail pieces if required will be paid separately) of Class PN-I as per specifications.				

S.NO.	DESCRIPTION	UNIT	QTY.	RATE in (RS)	AMOUNT (RS)
	100 mm dia	Each	5.00		
9	Providing and fixing fire hydrant stand pipe type provided with 63mm dia. twin landing valves and instantaneous female couplings of approved make, including 100 mm dia. M.S. stand pipe and other required fittings, rubber gaskets, nuts, bolts, washer etc., for making flanged joints complete in all respects. Including the cost of sluice valve etc., complete. as per drawing and as directed.	Each	60.00		
10	Constructing stone masonry chamber 90 x 90 x 100 cm inside with hard stone masonry in cement mortar 1:5 (1 cement: 5 fine sand) for sluice valve/butterfly valve with 45x45 cm MS cover frame with openable and locking arrangement as shown in the drawing, anchored in and with RCC top slab 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) necessary earth excavations and backfilling, foundation concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size) including necessary shuttering/formwork inside plastering with cement mortar 1:3 (1 cement: 3 coarse sand) 20mm thick finished with a floating coat of neat cement, complete in all respect as per drawing and as directed..	Each	10.00		
11	Constructing stone masonry chamber 120 x 120 x 100 cm inside with hard stone masonry in cement mortar 1:5 (1 cement: 5 fine sand) for sluice valve/butterfly valve with 45x45 cm MS cover frame with openable and locking arrangement as shown in the drawing, anchored in and with RCC top slab 1:2:4 mix (1 cement: 2 coarse sand: 4 graded stone aggregate, 20mm nominal size) necessary earth excavations and backfilling, foundation concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size) including necessary shuttering/formwork inside plastering with cement mortar 1:3 (1 cement: 3 coarse sand) 20mm thick finished with a floating coat of neat cement, complete in all respect as per drawing and as directed..	Each	10.00		
12	20 mm cement plaster on external surfaces of chambers with cement mortar 1:6 (1 cement : 6 coarse sand)	Sqm	510.00		
13	Disinfecting C.I./D.I./G.I water mains by flushing with water containing bleaching powder at 0.5 gm per litre of water and cleaning the same with the fresh water operation to be repeated three times including getting the samples of water from the disinfected main tested in the laboratory designated by the Construction Manager.				
	a) 100 mm dia pipe	Metre	1520.00		
	b) 150 mm dia pipe	Metre	1950.00		
	c) 200 mm dia pipe	Metre	40000.00		
	d) 250 mm dia pipe	Metre	150.00		
	e) 300 mm dia pipe	Metre	300.00		
	f) 350 mm dia. pipe	Metre	900.00		
	g) 400 mm dia pipe	Metre	1400.00		

S.NO.	DESCRIPTION	UNIT	QTY.	RATE in (RS)	AMOUNT (RS)
	h) 450 mm dia pipes	Each	850.00		
	i) 500 mm dia pipes	Each	2370.00		
	j) 600 mm dia pipes	Each	1470.00		
14	Providing and fixing G.I. Pipes (B class) complete with G.I. Fittings including trenching and refilling etc. (external work)				
	a) 25 mm dia nominal bore	Metre	800.00		
	b) 32 mm dia nominal bore	Metre	100.00		
	c) 40 mm dia nominal bore	Metre	100.00		
	d) 50 mm dia nominal bore	Metre	100.00		
	e) 65 mm dia nominal bore	Metre	100.00		
	f) 80 mm dia nominal bore	Metre	100.00		
15	Providing and fixing gun metal gate valve with C.I. Wheel of approved quality (screwed end)				
	a) 25 mm nominal bore	Each	80.00		
	b) 32 mm nominal bore	Each	2.00		
	c) 40 mm nominal bore	Each	2.00		
	d) 50 mm nominal bore	Each	2.00		
16	Providing and fixing brass ferrule (IS: 2692) with C.I. Mouth cover including boring and tapping the main for water services.				
	a) 15 mm nominal bore	Each	40.00		
	b) 20 mm nominal bore	Each	20.00		
	c) 25 mm nominal bore	Each	20.00		
	d) 32 mm nominal bore	Each	5.00		
	e) 40 mm nominal bore	Each	2.00		
	f) 50 mm nominal bore	Each	2.00		
17	Fixing water meter and stop cock in GI pipe line.				
	a) 25 mm dia	Each	80.00		
	b) 32 mm dia	Each	2.00		
	c) 40 mm dia	Each	2.00		
	d) 50 mm dia	Each	2.00		
18	Construction masonry chamber 30 x 30 x 50 cm, inside hard stone masonry work in cement mortar 1:5 (1 cement : 5 fine sand) for stop cock, with C.I. surface box 100 x 100 x 75 mm (inside) with hinged cover fixed in cement concrete slab 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) necessary excavation foundation concrete 1:5:10 (1 cement :5 fine sand : 10 graded stone aggregate 40mm nominal size) and inside plastering with cement mortar 1:3 (1 cement :3 coarse sand) 20mm thick finished with a floating coat of neat cement complete as per standard design.	Each	80.00		
19	Painting G.I. Pipes and fittings with two coats of anti corrosive paint of approved quality.				
	a) 25 mm dia. Pipe	Metre	800.00		
	b) 32 mm dia Pipe	Metre	100.00		
	c) 40 mm dia Pipe	Metre	100.00		
	d) 50 mm dia Pipe	Metre	100.00		

S.NO.	DESCRIPTION	UNIT	QTY.	RATE in (RS)	AMOUNT (RS)
20	Encasing CI/GI/RCC/SW/PVC pipes alround including bed concrete with 150mm thick cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 40mm nominal size) including necessary form work etc. , complete as per drawing and as diected.	Cum	350.00		
21	Brick masonry with bricks of class designation 100 in cement sand mortar 1:4.	cum	100.00		
22	Providing Random Rubble Stone masonry in cement sand mortar 1:5, all as per specifications.	Cum	100		
23	Providing and laying in position plain cement concrete including curing, compaction etc. complete including the cost of centering, shuttering and strutting etc in foundations and rafts at all level				
	1:4:8 (1 Cement : 4 coarse sand :8 graded stone aggregate 40 mm nominal size crusher broken)	Cum	50		
24	Providing Centering and shuttering with plywood or steel sheets including strutting, propping, bracing both ways and removal of form work for foundations, rafts, footings, culvert walls, slabs etc. at all level.	Sqm	200		
25	Charges for taking delivery of reinforcement steel from trailers/ trucks, stacking at own developed yard, straightening of steel bars, cutting, bending as per approved Bar Bending Schedule, placing in position and binding with 18 SWG annealed MS binding wire all complete.	Kg	2500		
26	Providing and laying reinforced cement concrete M20 grade at all level including curing, compaction, finishing complete. (Shuttering and reinforcement steel work will be paid separately)	Cum	50		
27	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steel bar conforming to IS: 1786 having min. cross sectional area 23mmx25mm and overall min. length 263 mm and width as 165mm with min. 112 mm space between protruded legs having 2mm tread on top surface by ribbing or check ring besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to withstand the bendtest and chemical resistance test as per specifications and having manufacturers permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1 cement : 3 coarse sand :6 graded stone aggregate 20mm nominal size) complete as per design.	Each	100		
28	Providing and fixing Precast covers Light duty LD-2.5 SFRC using minimum M-25 grade design mix concrete and steel fibre as reinforcement in position of size 600 mm X 600 mm size, complete as per standard design.	Each	20		
29	Providing and fixing MS angle iron frame for Manhole covers including one coat of red oxide primer and two coat of anti corrosive paint complete in all respect.	Kg	1000		
	Total :				