

# Diamond Research and Mercantile City Limited

**Name of work : Providing and laying of Sewerage Network, Construction of Sewage Pumping Station with Electrical-Mechanical work and Rising main for Phase-1 of dream City Limited with operation and maintenance of whole Sewerage collection system for 5 years.**

E- Tender

TENDER NOTICE (online) NO : MD/DCL/05/2017-18

## VOLUME-I : TECHNICAL BID

- Last date of download of tender documents from website smc.nprocure.com.** : up to 22/03/2018, upto 17.00 hrs
- Date of Pre-bid conference** : Bidders shall have to post queries on E-mail address [dreamclsurat@gmail.com](mailto:dreamclsurat@gmail.com) on or before 16/03/2018
- Last date of submission of online tender** : Upto 22/03/2018, upto 18.00 hrs
- Last date of submission of tender fees, EMD and other documents in hard copy** : From 26/03/2018 to 02/04/2018 to Chief Financial Officer, Dream City Limited, "SUDA Bhavan", B/H Old Multistoried Building, Nanpura, Surat-395001, by R.P.A.D./Speed Post upto 16.00 hrs.
- Estimated cost of Capital work** : Rs. 12,25,22,714.16/-
- Earnest Money Deposit (EMD)** : Rs.12,25,300.00/-  
50% shall be in the form of crossed Demand Draft of Nationalised Bank payable at Surat and remaining 50% shall be in the form of Bank Guarantee of Nationalised Bank (encashable at Surat) or 100% EMD amount shall be in form of crossed Demand Draft of Nationalised Bank payable at Surat.
- Document Fees** : Rs. 20,160.00/-(Including GST)
- Opening of Tender (Online)** : 09/04/2018, 16.00 hrs. onwards

Tender to be submitted to:  
The Managing Director,  
Dream City Limited,  
Surat – 395 001.

DIAMOND RESEARCH AND MERCANTILE CITY LIMITED

VOLUME-I  
CONDITIONS OF CONTRACT AND SPECIFICATIONS  
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## 1. NOTICE INVITING TENDERS

### (A) RECEIPT AND OPENING OF TENDER :

Online Tenders will be received from the established and reliable contractors on or before 18.00 hours on 22/03/2018 on website smc.nprocure.com. The tender received after due time and date specified will not be accepted.

### (B) NAME OF WORK:- **Providing and laying of Sewerage Network, Construction of Sewage Pumping Station with Electrical-Mechanical work and Rising main for Phase-1 of dream City Limited with operation and maintenance of whole Sewerage collection system for 5 years.**

1. ESTIMATED COST : Rs. 12,25,22,714.16/-
2. EARNEST MONEY DEPOSIT : Rs.12,25,300.00/-
3. TIME LIMIT : 12 (Twelve) months [Including monsoon]
4. Document Fee : Rs. 20,160.00/- (Including GST)
5. Registration Required : "AA" Class

### (C) OPENING OF TENDERS :

The tenders will be opened online in presence of bidders and opening authority subject to receipt of Tender Fees, EMD and other Documents in hard copy. The tenders will be opened in two stages i.e Qualification Bid / Technical Bid and Commercial Bid.

### (D) PURCHASE OF TENDER DOCUMENTS :

Tender Documents can be downloaded from smc.nprocure.com. up to 22/03/2018

Tender documents fees of Rs. 20,160.00/- (Including GST) towards the cost of tender documents in pay order or by demand draft of any nationalized bank, in favour of "The Managing Director, Dream City Limited, Surat" payable at Surat and shall be submitted along with EMD and other documents. The cost of the Tender Documents will not be refunded in any circumstances. Dream City ltd. shall not be liable for any postal delay in any case.

### (E) CONTRACT PERIOD :

The total contract period is hereby fixed as 12 (Twelve) months [Including monsoon] from the 15<sup>th</sup> Day of issuance of work order.

### (F) Tenderer must comply with and agree to all instructions & requirements in the Notice and in the Instructions to Tenderers, including requirements in the Contract Documents.

- (a) All tenders must be submitted in the prescribed Tender form.
- (b) Each Tender must be accompanied by the completion Schedule.
- (c) Each tender must be accompanied by the Tender Security (Earnest Money Deposit) Rs.12,25,300.00/- as specified in the tender notice
- (d) The successful tenderer shall execute the Contract Agreement within fifteen days after the date of Notice of award.

- (e) The successful Tenderer will be required to furnish a performance bond (Security Deposit) of and amount equal to (2%) Two percent of the tendered amount.
- (f) The successful Tenderer shall furnish insurance in accordance with the contract documents.
- (g) The Dream City Limited may withhold issuance of the Notice of proceed for a period not exceeding fifteen days after the date of execution of the contract agreement.
- (h) The tender and tender guarantee bond (Earnest Money Deposit) shall be submitted by the Agency in whose name tender has been issued. Transfer of tender documents to any other party is prohibited.
- (i) All intending tenderers will have to purchase digital signatures in order to participate in the online bidding process.
- (j) All the applicant contractors are required to have their own employers' code number under EPF Act, 1952 and are required to comply the applicable provisions of said statute regularly and totally.**

(G) Tender Validity Period :

The validity period of the tender submitted for this work shall be of one hundred twenty (120) calendar days from the last day of online submission of tender for this work and the Tenderer shall not be allowed to withdraw or modify the tender offer on his own during the validity period.

(H) Rights Reserved :

Without assigning any reason, The Dream City Limited reserves the right to reject the lowest or any other or all tenders or part of its. To waive any informality or irregularity in any tender, which in the opinion of the Dream City Limited does not appear to be in its best interest and the tenderer shall have no cause of action or claim against the Dream City Limited or its officers, employee, successors or assignees for rejection of this tender.

The Dream City Limited further reserves the right to withhold issuance of the notice to proceed, after execution of the contract agreement by the successful Tenderer. The Dream City Limited is not obliged to give reasons for any such action.

During Tender validity period, if any Tenderer withdraws or makes any modifications or additions in the terms and conditions on his own in this tender, then The Dream City Limited shall without prejudice to any right or remedy be at liberty to reject the tender and forfeit the Earnest Money Deposit in full. Such Tenderer may be disqualified from tendering for further works under the jurisdiction of The Dream City Limited.

The Dream City Limited reserves the right to increase or decrease the scope of work and split the tender in two or more parts without assigning any reason even after the award of contract.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 2. QUALIFICATIONS OF TENDERERS :

The tenderer shall fulfill the following requirements / experiences for qualification in its name.

- A. The Tenderer must have achieved average annual turnover during last three financial years, ending on 31st March, 2018 (in all classes of engineering activities) of Rs. 367.57 Lacs
- B. The Bidder should have satisfactorily completed either of the work during last Seven years.
1. One similar completed works, each costing not less than amount equal to 80% of the Rs.6,49,71,773.06  
Or
  2. Two similar completed works, each costing not less than amount equal to 50% of the Rs.6,49,71,773.06  
Or
  3. Three similar completed works, each costing not less than amount equal to 40% of the Rs.6,49,71,773.06

Similar works means works of Providing and Laying MS/D.I./HDPE/ G.R.P./ RCC Pipeline.

- C. The Bidder should have satisfactorily completed either of the work during last Seven years.
1. One similar completed works, each costing not less than amount equal to 80% of the Rs.5,75,50,941.10  
Or
  2. Two similar completed works, each costing not less than amount equal to 50% of the Rs.5,75,50,941.10  
Or
  3. Three similar completed works, each costing not less than amount equal to 40% of the Rs.5,75,50,941.10

Similar works means works of construction of Sewage pumping Station.

- D. To meet all financial criteria as indicated in notice inviting tender (NIT), the bidder may consider following enhancement factors for the cost of works executed and financial figures to arrive at common base for the value of the works completed in India. Cut of month shall be considered from month of tender submission

Financial Year	Multiplying factor
Immediate last year of the assessment year*	1.1
Second	1.21
Third	1.33
Fourth	1.46
Fifth	1.61
Sixth	1.77
Seventh	1.95

\*Here assessment year shall be reckon from year and month in which tender is submitted

- E. The experience of Joint Venture / Sub-contractors / back to back work SHALL NOT BE considered.
- F. The Bidder should submit Solvency Certificate of 20% of the estimated cost of the tender i.e. Rs. 245.05 lacs issued by schedule bank / Nationalized bank only.
- G. The Bidder should submit the list of the works already completed in last 7 years in prescribed performa and attested copies of certificates issued by head of the office concerned for completed work.
- H. The Bidder shall submit Declaration regarding the work on hand with the bidder in prescribed Performa. Attested copies of work orders, interim certificate if any shall also be attach as supporting documents for above.
- I. The Bidder shall submit the attested copy of partnership deed, power of attorney, etc.
- J. Joint Venture shall not be allowed.
- K. Even though the Bidder meet the above criteria, they are subject to be disqualified if they have
  - i) Made misleading or false presentations in the forms, statements and attachments submitted in proof of the qualification requirements; and / or
  - ii) During verification if it is found from client that of poor performance such as abandoning the works, not properly completing the contract and penalized for the same, litigation history, or financial failure etc.
  - iii) The Bidder shall note that in case the Bidder / MOU partner is blacklisted / stated as defaulter / penalized / barred participating in tenders by any of government agencies / semi government agencies in India during last 7 years then in that case, the Bidder will be disqualified though the bidder satisfies all the prequalification conditions mentioned above.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

**3. INFORMATION TO TENDERER :**

- |   |  |
|---|--|
| 1. Tender validity period   | 120 days (One hundred & Twenty days) from the last date of receipt of tender                                   |
| 2. Earnest Money Deposit  | Rs.12,25,300.00/-  |
| 3. Security Deposit   | Two Percent (2%) of tendered Amount.   |
| 4. Time of Completion   | 12 (Twelve) months [Including monsoon]   |
| 5. Period of liability for defects.   | Twelve Months after completion of work.  |
| 6. Penalty for delay  | Zero Point two percent (0.2%) of the contract price per day maximum up to ten percent of the contract price.   |
| 7. Last date of download of tender  | Date :- 22/03/2018 up to 18.00 hrs from smc.nprocure.com.  |
| 8. Last date of submission of online Tender                                       | Date :- 22/03/2018 up to 18.00 hrs   |
| 9. Last date of submission of Tender fees, EMD and other Documents (In Hard Copy) | From 26/03/2018 to 02/04/2018 up to 16.00 hrs  |
| 10. Pre-Bid :   | Bidders shall have to post their queries on e-mail address dreamclsurat@gmail.com on or before Dt. 16/03/2018. |

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

#### 4. SUBMISSION OF TENDER

( Following condition shall supersede relevant condition mentioned elsewhere in the bidding document )

- E.M.D & Tender fee shall be submitted in electronic format only through online (by scanning) while uploading the bid . This submission shall mean that E.M.D & tender fee are received for purpose of opening the Bid . Accordingly , offer/tenders of those tenders whose E.M.D & tenders fee is received electronically , shall be opened. However, for the purpose of realization of EMD and tender fee , bidder shall send the EMD as well as Tender fee in required format in original through RPAD/Speed post so as to reach to Account Department (Dream city) during 26/03/2018 to 01/04/2018. punitive action shall be initiated for non submission of EMD & Tender fees in original to Account Department (Dream City limited) by bidder including abeyance of registration and cancellation of E- tendering code for one year . All documents of supporting of Bid shall be in electronic format only through online ( by scanning ) during the bidding period & hard copy will not be accepted separately.”
  - **All Documents must be coloured scanned to be seen as original. Scanning in Black and White or gray shall not be acceptable .**
  - **All the Documents must be notarized with clearly displaying stamp , number and name of the notary.**
  - **Price Bid shall have to be quoted strictly online only. No hard copy of price bid shall be accepted.**
  - **Addenda/corrigenda to these tender documents , if issue must be signed and submitted online and also in hard copy.**

#### 5. DOCUMENT TO BE SUBMITTED IN HARD COPY.

**“Following Documents shall only be submitted in HARD COPY to Dream City Limited by all bidders”**

- Earnest Money Deposit as mentioned in the Tender . (i.e DD/Bank Guarantee)
- Tender fees as mentioned in the tender
- Affidavit on Non judicial Stamp Paper of Rs. 100/-
- Under taking of not blacklisted on non-judicial stamp paper.
- Addenda and Corrigendum (if any).

Technical bid and qualification documents mentioned in the tender and price bid are not to be submitted in physical form . please note that Non – Submission of Hard Copies of technical Bid as well as price Bid does not absolve the bidders from any liability created from the bid condition and bidding process . Price bid shall have to be quoted strictly online only. Technical –Bid in Hard copy shall be Submitted only by Successful bidders upon intimation from DREAM CITY.”



## 6. DETAILS TO BE SUBMITTED IN QUALIFICATION (online)

The following details are required to be submitted in in electronic format only through online (by colour scanning)

- a) The scan copy of Tender fees, EMD, Affidavit and Under taking of not blacklisted on non-judicial stamp paper.
- b) Documents/certificate supporting Annexure-I to VII in required Performa .
- c) Necessary documents required for various details mentioned in No.(2) “Qualification of Tenderers”. (form-3(A))
- d) Registration Certificate.
- e) Solvency Certificate.
- f) Balance Sheet for the last 3 years.(Turn over as per CVC guide line)
- g) Scan Copy of Addenda and Corrigendum (if any).

**Note :- ALL Necessary Documents, Certificates like Excise Registration, GST Registration, Work Experience Certificates and work order of similar works, Partnership Deed If any, Power of Attorney If any, Valid Bank Solvency etc. must be notarized colour scan copy.**

**The tenderer shall have to strictly submit the Technical Bid and Price Bid online only.  
The submission in hard copies shall be rejected and tender shall not be opened further.**

### APPROVED LIST OF BANKS

Where the contractor is required to submit F.D.R., bank guarantee, etc. against payment towards any deposit or advance e.g. EMD, SD, etc., such F.D.R, bank guarantees, etc. shall be produced from any one of the following Nationalized banks as listed below:

1. Indian Bank
2. State Bank of India
3. Punjab National Bank
4. Bank of Baroda
5. Union Bank of India
6. Bank of India
7. Oriental Bank of Commerce
8. Canara Bank
9. Central Bank of India
10. Corporation Bank
11. Allahabad Bank
12. Indian Overseas Bank
13. Dena Bank
14. Syndicate Bank
15. Andhra Bank
16. Punjab & Sind Bank
17. Bank of Maharashtra
18. Vijaya Bank
19. United Bank of India
20. UCO Bank or Any Other Nationalized Bank
21. IDBI
22. HDFC
23. AXIS Bank
24. ICICI Bank Limited

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

**7. ANNEXURES FOR PRE-QUALIFICATION TO BE FILLED IN BY TENDERER**

**ANNEXURE-I**

**Performa for list of works of similar nature already completed by the Tendered  
During last 7 years**

Sr. No	Name of work and place	Cost on Completion	Time taken in months to complete the work	Client Name	Date of Completion
1	2	3	4	5	6

❖ **It is mandatory to submit the supporting documents / certificates through online (Notarized colour scan copy)**

Note : Bidder shall give completion certificate from client. In absent of such completion certificate, experience shall not be considered for evaluation.

Signature of the Contractor with seal.

Place:

Date



**ANNEXURE-III  
AFFIDAVIT**

- 1.0 I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.
- 2.0 The undersigned also hereby certifies that neither our firm M/s \_\_\_\_\_ nor any of its constituent partners have abandoned any work in India nor any contract awarded to us for such works has been rescinded during last five years, prior to the date of this bid.
- 3.0 The undersigned hereby authorize(s) and request(s) any bank, person, authorities, government or public limited institutions, firm or Dream city ltd to furnish pertinent information deemed necessary and requested by the DREAM CITY to verify our statements or our competence and general reputation.
- 4.0 The undersigned understands and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the DREAM CITY.
- 5.0 The DREAM CITY and its authorised representatives are hereby authorised to conduct any inquiries or investigations to verify the statements, documents, and information submitted in connection with this application and to seek clarification from our bankers and clients regarding any financial and technical aspects. This Affidavit will also serve as authorisation to any individual or authorised representative of any institution referred to in the supporting information, to provide such information deemed necessary and requested by yourselves to verify statements and information provided in the Tender or with regard to the resources, experience and competence of the Applicant.

\_\_\_\_\_  
Signed by the authorised signatory of the firm

\_\_\_\_\_  
Title of the office

\_\_\_\_\_  
Name of the firm

\_\_\_\_\_  
Date

**Note:** The affidavit format as indicated above to be furnished on non judicial stamp Paper of **Rs.100.**

- ❖ **It is mandatory to submit the above Affidavit through online (Notarized colour scan copy) and also in hard copy.**

## ANNEXURE-IV

### Structure and Organisation of the Company

1. Name of Applicant
2. Nationality of Applicant
3. Office Address  
Telegraphic Address  
Telephone No. (O) (M)  
Telex No.  
Fax No.  
Email address :
4. Year and location of establishment
5. The Applicant is
  - a) An individual
  - b) A proprietary firm
  - c) A firm in partnership
  - d) A limited company or Corp.  
(if a firm in partnership)
6. For how many years has your organization been in business of similar work under it's present name ? what were your fields when your organization was established?

**Signature of Applicant.**

**Date :**

**ANNEXURE-V**

**Details of Technical staff with tenderer**

<b>Sr. No.</b>	<b>Name of personnel</b>	<b>Qualification</b>	<b>Total experience</b>	<b>Who is proposed to be posted for this work</b>

❖ It is mandatory to submit the above list through online (Notarized colour scan copy)

**ANNEXURE-VI**

**Contractors Schedule for execution of work in the form of Bar chart**

<b>Sr. No.</b>	<b>Description of Activity</b>	<b>Start month and date and completion month and Date</b>

❖ **It is mandatory to submit the above list through online (Notarized colour scan copy)**

**ANNEXURE-VII**

**UNDER TAKING BY THE TENDERER FOR NOT BLACK LISTED ON RS. 100/-  
GOVERNMENT STAMP PAPER**

I/We.....Address.....

..... Solemnly affirm and state that on oath that ..... (Name of Tenderer) has not been black listed by any Government/Semi Government/Public Sector Undertaking/Public limited and not has been banned/suspended business dealings with the said firm. The information given above is true to the best of my knowledge. I/We agree that if any notice in future, my/our bid/tender shall be rejected/terminated.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

- ❖ **It is mandatory to submit the above Affidavit through online (Notarized colour scan copy) and in hard copy.**



## **8. TURN KEY TENDER AND CONTRACT FOR WORKS**

General Rules and Directions for the Guidance of Contractors.

1. All work proposed to be executed under this contract shall be notified in a form of invitation to tender Posted on a board hung up in the Dream city ltd Office and signed by the Officer authorized by Managing Director.

This form will state the work to be carried out, as well as the date for submitting and opening of the tender, earnest money to be deposited with the tender, and the amount of security deposit to be deposited by the successful tenderer and the percentage, if any to be deducted from bills. It will also state whether a refund of quarry fees, royalties, octroi dues, ground rents and water-charges will be granted. Copies of the specifications, designs, drawings and estimated rates, schedule rates and any other documents required in connection with the work which will be signed by the Managing Director, for the purpose of identification shall also be opened for inspection by Contractors at the Office of the Dream City office during office hours.

Where the works are proposed to be executed according to the specification recommended by a Contractor and approved by a competent authority on behalf of the Dream City Limited such specification with designs and drawings shall form part of the accepted tender.

2. In the event of the tender being submitted by a firm, it must be signed by each partner thereof, and in the event of the absence of any partner, it shall be signed on his behalf by a person holding a power-of-attorney authorizing him to do so.
3. Receipt for payments made on account of any work when executed by a firm, should also be signed by all the partners, except where the contractors are described in their tender as a firm in which case the receipts shall be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipt for the firm.
4. Any person who submits a tender shall fill up the usual printed form including the column total according to specific item, stating at what rate he is willing to undertake each item of the work. Tenders which propose any alteration in work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort, will be liable to rejection. No single tender shall include more than one work, but contractors who wish to tender for two or more works shall submit a separate tender for each. Tenders shall have the name and the number of the works to which they refer written outside the envelope.
5. Managing Director or his duly authorized Assistant will open tenders in the presence of any intending contractors who may be present at the time, and will enter the amounts of the several tenders in a comparative statement in suitable form. In the event of a tender being accepted, the contractors shall there upon, for the purpose of identification, sign copies of the specifications and other documents mentioned in Rule 1. In the event of a tender being rejected the deposit will be refundable on application.
6. Dream City Limited shall have the right of rejecting all or any of the tenders without assigning any reasons.
7. No receipt for any payment alleged to have been made by a Contractor regard to any matter relating to this tender or the contract shall be valid and binding to Dream City Ltd unless it is signed by the Managing Director.

8. The memorandum of work to be tendered for and the schedule of materials to be supplied by Dream City Limited and their rates shall be filled in and completed by the office of the Dream City Limited before the tender form issued. If a form issued to an intending tenderer has not been so filled in and completed, he shall request the said office to have this done before he completes and delivers his tender.
9. All work shall be measured net by standard measure and according to the rules and custom of the Department of Dream City Limited without reference to any local custom.
10. Under no circumstances shall any Contractor be entitled to claim enhanced rates for any items in this Contract.
11. Every Contractor shall, if so desired by the Managing Director, produce along with his tender a banker's certificate of his financial stability. If he fails to produce such a certificate his tender will not be considered.
12. All corrections and additions or pasted slips should be initialed.
13. For the Capital and O&M works, all the prevailing taxes (i.e. GST, etc.) in the tender shall remain to the contractors account and it shall be applicable as defined in the tender elsewhere specifically. However, if any new taxes or service tax is levied by the Government, during the period of contract (Capital and O&M); the same shall be reimbursed/recovered on submission of documentary proof of its payment.
14. The checking and measurements of work will be taken according to the usual method in use in the Dream City Ltd and no proposals to adopt alternative methods will be accepted.

Managing Director's decision as to what is the "usual method in use, in the Dream City Ltd will be final".

- 15 Tenderers shall also note that as per the provisions of government, 1 % (one percent) construction cess on the work done amount shall be levied and shall be deducted from each running bill & final bill. The contractor shall quote the rate accordingly. This shall be applicable on capital works only. This shall not be applicable on O&M works.**
- 16 The successful tenderer shall submit the copy of technical bid duly sealed & signed within fifteen days of issue of work order.**
- 17 The tenderer shall invariably submit the Certificate of Provident Fund of Employee without which bill for payment shall not be processed.**
- 18 The successful tenderer shall submit the copy of labour lincense within fifteen days of issue of work order.**
- 19 All the DICL K9 CLASS, HDPE, RCC NP3/NP4 Class pipes shall have ISI mark on it.**
- 20 For the necessary modification / alteration / addition to complet the job, if any civil breaking or repairing is to be done, shall have to be carried out by contractor at his own cost, as per standard engineering practice. It shall be sole responsibility of contractor to clear construction and demolition waste (C.D. Waste) by their own risk and cost. The contractor shall ensure that their site must be clear in all respect by disposing C.D. Waste generated during the work. If its found that contractor is irregular and showing negligence to dispose C.D. Waste than Dream city ltd.is empowered to dispose the said C.D. waste through Dream city ltd. authorized C.D. waste contractor /agency. All the necessary expenditure made**

**towards disposal of this C.D. waste shall be recovered from the contractor along with the administrative charges and penalties.**

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 9. TENDER FOR WORKS

I/We hereby tender for the execution for the Dream City Limited (herein before and herein after referred to as "Dream City Limited") of the work specified in the memorandum within the time specified in such memorandum at the tendered rates specified in schedule B (memorandum showing items of work to be carried out) and in accordance in all respects with the specification, designs, drawings, and instructions in writing referred to in clause 13 of the annexed conditions of contract and agree that when materials for the work are provided by Dream City such materials and the rates to be paid for them shall be as provided in schedule A hereto.

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions of contract annexed hereto so far as applicable, and in default thereof to forfeit and pay to Dream City in office the sums of money mentioned in the said conditions.

Receipt No. \_\_\_\_\_ dated \_\_\_\_\_ from Dream City in respect of the sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) / A crossed order cheque of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) No. \_\_\_\_\_ dated \_\_\_\_\_ on the \_\_\_\_\_ in favour of Managing Director, Dream City Ltd is herewith forwarded representing the earnest money the full value of which is to be absolutely forfeited to Dream City should I/We not deposit the full amount of security deposit specified in the Memorandum, in accordance with Clause 1 of the said conditions.

Contractor:

Address:

Dated the \_\_\_\_\_ day of \_\_\_\_\_ 2018

(Witness)

(Address)

(Occupation)

The above tender is hereby accepted by me on behalf of the Dream City Limited.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

Dated \_\_\_\_\_ day of \_\_\_\_\_ 2018

**10. CONTRACT AGREEMENT FOR**

**Providing and laying of Sewerage Network, Construction of Sewage Pumping Station with Electrical-Mechanical work and Rising main for Phase-1 of dream City Limited with operation and maintenance of whole Sewerage collection system for 5 years.**

Articles of agreement made this \_\_\_\_\_ day of the month of \_\_\_\_\_ 2018. Between Managing Director of Dream City (which expression shall include his successors and assignees of one part) and \_\_\_\_\_ hereinafter called the contractor (which expression shall include their administrator and assignees of the other part).

WHEREAS the Contractors above named tendered for the works above mentioned and the same having been accepted by the General Body of Dream City Limited vide Resolution No. \_\_\_\_\_ dated \_\_\_\_\_; it is hereby agreed that the Contractor should carry out the works according to the terms and conditions of the contract detailed in the Item Rate Tender Books, - conditions and specifications, which have been signed by the contractors on.

In witness whereof the said Contractors and the Managing Director on behalf of the Dream City Limited have hereinto set their respective hands this \_\_\_\_\_ day of the month of \_\_\_\_\_ of the year 2018.

Signed, sealed and delivered by the said contractor in the presence of

Contractor,

I/c. Town Planner  
Surat Municipal Corporation  
and Dream City Limited

Dy. Commisioner  
Surat Municipal Corporation  
and Dream City Limited

I am responsible if the Contractor does not abide by the Condition of this contract.

Sealed with the common seal of the Dream City limited in the presence of ---

Surety.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

## 11. SURETY

This bond is made this \_\_\_\_\_ day of the month of \_\_\_\_\_ 2018. The Two Thousand eight \_\_\_\_\_ between Shri \_\_\_\_\_ (hereinafter called the surety) of the first part and the Managing Director on behalf of the Dream City Limited of the second part.

WHEREAS the Contractor/Contractors Shri/Ms. \_\_\_\_\_ of \_\_\_\_\_ has/have entered into a contract with the Dream City Limited for the works detailed below :-

Name of the work	Tender Amount	G.B. Resolution No. & date Sanctioning Contract
------------------	---------------	---

AND WHEREAS one of the conditions of the contract being that the Contractor/ contractors shall give surety/sureties to the Dream city ltd for the due fulfillment of the contract to the full value of the total expenditure of the work.

NOW THIS BOND WITNESSES and it is hereby agreed and declared as follows :-

I/We Surety/Sureties hereby bind myself/ourselves responsible for the due fulfillment of the contract in all its respects by the Contractor/Contractors and I/We do hereby agree and undertake to indemnity and keep harmless.

The Dream City Limited jointly as well as severally if the Contractor / Contractors fail / fails to carry out the whole or any part of the contract work as per the conditions and specifications of the work and as agreed to between the parties to the contract to the extent of full value of the total expenditure to be incurred in that behalf by Dream City Limited provided always that the expression "the Surety/Sureties" hereinbefore used shall include the heirs, executors, assigns or administrators of each and every person in this context.

IN WITNESS WHEREOF the said surety/sureties and the Managing Director on behalf of the Dream City Limited have hereinto set their respective hands this \_\_\_\_\_ day the month of \_\_\_\_\_ of the year 2018.

Surety

Signed in the presence.

Signed in the presence.

Dy. Commisioner  
Surat Municipal Corporation  
and Dream City Limited

**12. GST CLAUSE  
FOR CONSTRUCTION / ERECTION / COMMISSIONING / INSTALLATION /  
REPAIRS MAINTENANCE / RENOVATION / FABRICATION OF STRUCTURE  
INCLUDING BUILDING (MEANS ALL WORKS CONTRACT / TURN KEY  
PROJECT / SUPPLY OF MATERIAL / GOODS)**

- GST (Goods and Service Tax) has come in existence from 1<sup>st</sup> July, 2017. Contractor /Successful Bidder is bound to pay any amount of GST prescribed by the Govt. of India as per the Terms of Contract agreed upon during the course of execution of this Contract.
- During the course of execution of Contract, if there is any change in Rate of GST (Goods and Service Tax) by the Government, the same shall be reimbursed / recovered separately by Dream city Ltd., subject to the submission of Original Receipt / Proof for amount actually remitted by the successful Tenderer / Contractor to the competent Authority along with a certificate form Chartered Accountant of Contractor / Successful Bidder Certifying that the amount of GST paid to the Government and the same shall be intimated / submitted /claimed within 30 (Thirty) Days from the date of payment. Remittance of GST within stipulated period shall be the sole responsibility of the Successful Bidder / Contractor, failing which, Dream city Ltd. may recover the amount due, from any other payable dues with Dream city Ltd. and decision of Dream city Ltd. shall be final and binding of the Contractor / Successful Bidder in this regard. Further, the nonpayment of GST to the Government may lead to the termination of contract and forfeiture of security Deposit/ Performance Guarantee Amount.
- If imposition of any other new Taxes / Duties /Levies /Cess or any other incidentals etc. or any increase in the existing Taxes / Duties /Levies /Cess or any other incidentals etc.(Excluding GST) are imposed during the course of the contract, the same shall be borne by the Contractor / Successful Bidder only, in no case Dream city Ltd. shall be liable for the same.

Dy.Commissioner  
Surat Municipal Corporation  
and Dream City Limited

**13. IMPORTANT POINTS TO BE BROUGHT TO TENDERER'S NOTICE**

**THE TENDER MAY BE REJECTED OUTRIGHT IF THE TENDERER**

- A. Stipulates the validity period less than what is stated in the form or tender.
- B. Stipulates his own conditions.
- C. Does not quote his rates inclusive of terminal or GST etc. in his rates.
- D. Does not disclose the full names and addresses of all his partners in the case of partnership concern.
- E. Does not fill in and sign the tender form as well as the bill of quantities and rates, annexure, specifications etc.
- F. Does not pay the Earnest Money Deposit by Pay Order or demand draft with the PART – A: QUALIFICATION BID of the tender.
- G. Does not submit the tender before the stipulated time on the specified date in the accounts office as directed.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.



## 14. CONDITIONS OF CONTRACT

### Clause 1.

The Person/persons whose tender may be accepted [here-in after called the Contractor, which expression shall unless excluded by or repugnant to the context include his heirs, executors, administrators and assignees] shall [within 15 days of the receipt by him of the notification of the acceptance of his tender] deposit with Dream City Limited cash or D.D. or pay order endorsed to Managing Director sum sufficient which will make up the full Security deposit specified in the tender.

If the amount of the Security Deposit to be paid in Lump Sum within the period Specified above is not paid the tender Contract already accepted shall be considered as Cancelled. The Security deposit lodged by Contractor Shall be refunded after the expiry Memorandum after deducting dues, if any which become liable to be recovered from the contractor under the terms and condition of this Agreement.

#### (A) Tender Costing Less than Rs. 1.00 Lac.

The Total Security deposit shall be recovered at the rate of 5% of approved tender Cost from contractor. Out of which 50% of amount as a Initial Security Deposit shall be payable at the rate of 2.5% of approved Tender Cost in form of Cash or D.D./ Pay Order of any Nationalized Bank (encashable at Surat city). The remaining amount of the Security deposits i.e. 2.5% of tendered amount shall be recovered from the running account bills in form of retention money at the rate of 2.5% of the gross amount of each bill. So as to make the total Security Deposit of 5% of the tendered amount up to the Final bill.

In Addition to 2.5% of RMD/ SD additional 10% Amount shall be retained from each Bill which shall be Released in Final Bill. Under no circumstances the said retention shall be released prior to Final Bill.

#### (B) Tender Costing More than Rs. 1.00 Lac and up to Rs. 2.00 Lacs.

The Total Security Deposit shall be recovered at the rate of 4% of approved tender Cost from contractor. Out of which, 50% of amount as a initial Security Deposit shall be payable at the rate of 2% of approved tender cost in from of Cash or D.D./ Pay Order of any Nationalized bank (encashable at Surat city). The remaining amount of the Security deposits i. e. 2% of tendered amount shall be recovered from the running account bills in form of retention money at the rate of 2% of the gross amount of each bill, so as to make the total Security Deposit of 4% of the tendered amount up to the Final bill.

In Addition to 2% RMD/ SD additional 10% Amount shall be retained from each Bill which shall be released in Final Bill. Under no circumstances the said retention shall be released prior to Final Bill.

#### (C) Tender costing more than Rs. 2.00 Lacs and up to Rs. 25.00 Lacs.

The Total Security Deposit shall be recovered at the rate of 4% of approved tender Cost from contractor. Out of which, 50% of amount as Initial security Deposit shall be payable at the rate of 2% of approved Tender Cost in from Cash or D.D. / Pay Order of any Nationalized bank (encashable at Surat city). The remaining amount of the Security deposits i. e. 2% of tendered amount shall be recovered from the running account bills in form of retention money at the rate of 2% of the gross amount of each bill, so as to make the total Security Deposit of 4% of the tendered amount up to the Final bill.

In Addition to 2% of RMD / SD additional 5% Amount shall be retained from each Bill which shall be released in Final Bill. Under no circumstances the said retention shall be released prior to Final Bill.

#### (D) Tender costing more than Rs.25.00 Lacs and up to Rs. 1.00 Crore.

The Total Security deposit shall be recovered at the rate of 4% of approved tender Cost from contractor. Out of which, 50% of amount as Initial Security Deposit shall be payable at the rate of 2% of approved Tender Cost in form of form D.D./ Pay Order / FDR/ Bank Guarantee of any Nationalized Bank (encashable at Surat city). The remaining amount of the Security Deposit i.e. 2% of tendered amount shall be recovered from the running account bills in the form of retention money at the rate of 2% of the

gross amount of each bill, so as to make the total security deposit of 4% of the tendered amount up to the Final bill.

In Addition to 2% RMD/ SD additional 5% Amount shall be retained from each Bill which shall be Released in Final Bill. Under no circumstance the said retention shall be released prior to Final Bill.

(E) Tender costing more than Rs.1.00 Crore.

The Total security deposit shall be recovered at the rate of 4% of approved tender cost from contractor. Out of which, 50% of amount as a initial security Deposit shall be payable at the rate of 2% of approved Tender Cost in form D.D./ Pay Order / FDR/ Bank Guarantee of any Nationalized Bank (encashable at Surat City). The remaining amount of the security deposit i.e. 2% of tendered amount shall be recovered from the running account bills in form of retention money at the rate of 2% of the gross amount of each bill, so as to make the total Security Deposit of 4% of the tendered amount upto the Final Bill.

In Addition to 2% of RMD/SD additional 5% amount shall be retained from each bill which shall be released in Final bill. Under no circumstances the said retention shall be released prior to Final Bill.

The amount recovered from the running bills/ retention money shall not be allowed to be transferred in the form of Bank Guarantee. However, the remaining 50% (2% of Security Deposit) of the amount so, deducted from running bills will be allowed for conversion in the form of interest bearing fixed deposit receipt, issue in favour of the Dream City Limited, Dream City Limited, Surat by a Nationalized Bank located at Surat only. The initial Security Deposit at the rate of 2% submitted in form of Bank Guarantee will be refunded after payment of final bill and remaining 2% of Security Deposit deducted from the running bill shall be refunded only after the expiry of defect liability period, Audit related procedure and rectification of defects if any found so.

It is clarified that the amount of security deposit shall be collected on the basis of contract price and not on the basis of Estimated Amount put to tender. As initial Security Deposit as mentioned above (A) to (B) accepted by the competent Authority shall have to be paid toward Security Deposit at the time of execution of agreement.

Remaining amount towards SD shall be deducted from the running bills as retention money.

Contractor will be eligible to get interest on FDR (that is deducted from Running Bill and converted in to FDR for initial SD) for One year, after actual completion of work. After that contractor will not be eligible to get interest for any extended period what so ever.

If the Security Deposit is not paid within 15 days from the date of Work Order than penalty at the rate of 0.065% per day of the amount of Security Deposit will be charged. If the Security Deposit is not paid within one month with interest, necessary actions as per condition of contract will be taken.

The successful tenderer shall have to enter into an agreement on a non-judicial stamp paper of Rs. 100/- as per the form of the agreement approved by Dream City Limited, Surat.

The agreement shall be executed on stamp paper worth Rs. 100/-.

The Surety shall be executed on stamp paper worth Rs. 100/-.

Tenderer have to submit additional stamp papers @4.25% of Security deposit paid in FDR

The Bank Guarantee of Scheduled Bank / Private bank, those are approved by RBI, shall be accepted, subject to encashable at Surat

## **Clause 2.**

The time allowed for carrying out the work as entered in the tender shall be strictly observed by the Contractor and shall be reckoned from the date on which the order to commence work is given to the Contractor. The work shall throughout the stipulated period of the contract be proceeded with, all due diligence [time being deemed to be the essence of the contract on the part of the Contractor] and the Contractor shall pay as compensation a percentage amount [shown in the attached

Memorandum] of the tendered cost of the whole work as shown by the tender for every day that the work remains uncompleted or unfinished after the proper days. And further to ensure good progress during the execution of the work the Contractor shall be bound, in all cases in which the time allowed for any work exceeds one month, to complete parts of the work during the period shown in the attached Memorandum.

In the event of the Contractor failing to comply with these conditions he shall be liable to pay as compensation, the amount mentioned above for every day that the due quantity of work remained incomplete, provided always that the total amount of compensation to be paid under the provision of this clause shall not exceed 10 percent of the tendered cost of the work as shown in the tender.

**Clause 3.**

In any case in which under any clause of or clauses this contract the Contractor shall have tendered himself liable to pay compensation amounting to the whole of this security deposit[whether paid in one sum or deducted by installments] or in the case of abandonment of the work owing to serious illness or death of the contractor or any other cause, the Managing Director, Dream City Limited on behalf of the Dream city ltd shall have power to adopt any of the following courses, as he may deem best suited to the interest of Dream City Limited.

- a To rescind the contract [of which rescission notice in writing to the Contractor under the hand of the Managing Director, Dream City Limited shall be conclusive evidence] and in that case that security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of Dream City Limited.
- b To employ labour paid by the Dream City Limited and to supply material to carry out the works, or any part of the work debiting the Contractor with correctness of which cost and price the certificate of the Managing Director shall be final and conclusive against the Contractor and crediting him with the value of the work done, in all respects in the same manner and at the same rates as if it had been carried out by the Contractor under the terms of his contract, and in that case the certificate of the Managing Director as to the value of the work done shall be final and conclusive against the Contractor.
- c To order that the work of the Contractor be in measured up and to take such part thereof as shall be executed out of his hands, and to give it to another Contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original Contractor, if the whole work had been executed by him [as to the amount of which excess expenses the certificate in writing of the Managing Director shall be final and conclusive] be borne and paid by the original Contractor and shall be deducted from any money due to him by the Dream City under the contract or otherwise from his security deposit or the proceeds of sale thereof, or a sufficient part thereof.

In the event of any of the above courses be adopted by Managing Director the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchases or procured any materials or entered into any engagements, or made any advances on account of or with a view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under provision aforesaid, the Contractor shall not be entitled to recover, or be paid any sum for any work thereto actually performed by him under this contract unless and until the Managing Director shall have certified in writing the performance of such work and the amount payable to him in respect thereof, and he shall only be entitled to be paid the amount so certified.

for any work thereto actually performed by him under this contract unless and until the Managing Director shall have certified in writing the performance of such work and the

amount payable to him in respect thereof, and he shall only be entitled to be paid the amount so certified.

**Clause 4:**

If the progress of any particular portion of the work is unsatisfactory Managing Director shall notwithstanding that the general progress of the work is satisfactory in accordance with Clause 2, be entitled to take action under Clause 3 [b] after giving the Contractor 10 days notice in writing and the Contractor will have no claim for compensation for any loss sustained by him owing to such action.

**Clause 5.**

In any case in which any of the powers conferred upon Managing Director by clause 3 and 4 hereof shall have become exercisable and the same shall not have been exercised the non-exercise thereof shall not constitute a waiver of any of the conditions hereof such powers shall notwithstanding be exercisable in any future case default by the Contractor for which by any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his security deposit and the liability of the Contractor for past and future compensation shall remain unaffected.

In the event of Managing Director taking action under the sub-clause (a) or (c) of clause 3, he may, be he so desires to take possession of all or any tools; plant materials and stores in or upon the works, or the site thereof or belonging to the Contractor, or procured by him and intended to be used for the execution of the work of any part thereof, paying or allowing for the same in account at the contract rates, or in the case of contract rates not being applicable at current market rates, to be certified by the Managing Director whose certificate thereof shall be final. In the alternative Managing Director may, by notice in writing to the Contractor or his clerk of the works, foremen or other authorized agent require him to remove such tools, plant, materials, or stores from the premises within a time to be specified in such notice; and in the event of the Contractor failing to comply with any such requisition, the Managing Director, Dream City Limited may remove them at the Contractor's expense or sell them by auction or private sale at the risk and account of the Contractor in all respects and certificate of the Managing Director as to the expense of any such removal, and the amount of the proceeds and expense of any sale shall be final and conclusive against the Contractor.

**Clause 6.**

If the Contractor shall desire an extension of the time for completion of the work on the ground of his having been unavoidably hindered in its execution or on any other ground, he shall apply in writing to Managing Director within 30 days from the date on which he was hindered as aforesaid or on which the cause for asking for extension occurred and Managing Director may, if in his opinion, there are reasonable grounds for granting an extension, grant such extension as he thinks necessary or proper. The decision of Managing Director in this matter shall be final.

**Clause 7.**

On the completion of the work the Contractor shall be furnished with a certificate by the Managing Director [hereinafter called the Engineer-in-charge] of such completion, but no such certificate shall be given nor shall the work be considered to complete until the Contractor shall have removed from the premises on which the work shall have been executed all scaffolding, surplus materials and rubbish, and shall have cleaned of the dirt from all woodwork, doors, windows, walls, floors or other parts of any building, in or upon which the work has been executed, or of which he may have had possession for the purpose of executing the work, nor until the work shall have been measured by the Engineer-in-charge or where the measurement have been taken by his subordinates until they have received the approval of the Engineer-in-charge, the said measurement being binding and conclusive against the Contractor.

If the Contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus materials and rubbish, and cleaning off dirt on or before the date fixed for the completion of the work, the Engineer-in-charge may, at the expense of the Contractor remove such scaffolding surplus materials and rubbish, and dispose off the same as he thinks fit and clean off such dirt as aforesaid; and the Contractor shall forthwith pay the amount of all expenses so incurred, but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realised by the sale thereof.

**Clause 8.**

No payment shall be made for any work, estimated to cost less than Rupees one thousand, till after the whole of the said work shall have been completed and a certificate of completion given. But in the case of works estimated to cost more than rupees one thousand, the Contractor shall, on submitting a monthly bill therefore be entitled to receive payment proportionate to the percentage shown in the attached Memorandum of the part of the work than approved and passed by the Engineer-in-charge, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the Contractor.

All such intermediate payments shall be regarded as payments by way or advance against the final payments only and not as payments for work actually done and completed and shall not preclude the Engineer-in-charge from requiring bad, unsound imperfect or unskillful work to be removed and taken away and reconstructed, or re-erected, nor shall any such payments be considered as an admission of the due performance of the contract or any part thereof in such respect of the accruing of and claim; nor shall it conclude, determine or affect in any way the Powers of the Engineer-in-charge as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary or affect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for the completion of the work, otherwise the Engineer-in-charge's certificate to the measurement and of the total amount payable for the work shall be final and binding on all parties.

**Clause 9.**

The rates for several items of the work agreed to within, shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In cases where the items of works are not accepted and so completed the Engineer-in-charge may make payment on account of such items at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

**Clause 10.**

A bill may be submitted by the Contractor once in each month on or before the date fixed by the Engineer-in-charge for all works executed in the previous months, and the Engineer-in-charge shall take or cause to be taken the requisite measurement for the purpose of having the same verified, and the claim, so far as it is admissible shall be adjusted if possible within fifteen days from the presentation of the bill. If the Contractor does not submit the bill within the time fixed as aforesaid, the Engineer-in-charge may depute a subordinate to measure up the said work in the presence of the Contractor or his duly authorised agent whose counter signature to the measurement list shall be sufficient warrant, and the Engineer-in-charge may prepare a bill from such list which shall be binding on the Contractor in all respects.

**Clause 11.**

The Contractor shall submit all bills on the printed forms to be hand on application at the office of the Engineer-in-charge. The charges to be made in the bills shall always be entered at the rates specified in the tender or in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender at the rates hereinafter provided for such work.

**Clause 12.**

If the specification or estimate of the work provides for the use of any special description

of materials to be supplied from the DREAM CITY Store or if it is required that the Contractor shall use certain stores to be provided by the Engineer-in-charge (such materials and stores and the prices to be charged thereof as hereinafter mentioned being so far as practicable for the convenience of the Contractor but not so as in any way to control the meaning or effect of the contract specified in the schedule or memorandum hereto annexed) the Contractor shall be supplied with such materials and stores as may be required from time to time to be used by him for the purpose of the Contract only and the value of the full quantity of materials and stores so supplied shall be set off deducted from any sums then due, or thereafter to become due to the Contractor under the contract, or otherwise from the security deposit or the proceeds of sale thereof shall be held in Government securities; the same or a sufficient portion thereof shall in that case be sold for the purpose. All material supplied to the Contractor shall remain the absolute property of Dream City Ltd, and shall on no account be removed from the site of the work, and shall at all times be opened to inspection by the Engineer-in-charge. Any such materials unused and in perfectly good condition at the time of completion or determination of the contract shall be returned to the Dream City Limited store, if the Engineer-in-charge so requires by a notice in writing given under his hand, but the Contractor shall not be entitled to return any such materials except with such consent and he shall have no claim for compensation on account of any such materials supplied to him as aforesaid but remaining unused by him or for any wastage in or damage thereto.

**Clause 13.**

The Contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner, and both as regards materials and in every other respect in strict accordance with the specifications. The Contractor shall also conform exactly, fully and faithfully to designs, drawings and instructions in writing relating to the work signed by the Engineer-in-charge and lodged in his office and to which the Contractor shall be entitled to have access for the purpose of inspection at such office, or on the site of the work during office hours, and the Contractor shall, if he so requires, be entitled at his own expenses to make or cause to be made copies of the specifications and of all such designs, drawings and instructions on aforesaid.

**Clause 14.**

The Engineer-in-charge shall have power to make any alterations in, or additions to the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and the Contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the Engineer-in-charge and such alteration shall not invalidate the contract, and any additional work which the Contractor may be directed to do in the manner above specified as part of the work shall be carried out by the Contractor on the same conditions in all respect on which he agreed to do the main work and at the same rates as are specified in the tender for the main work. And if the additional and altered work includes any class of work for which on rates is specified in this contract, then such class of work shall be carried out at the rates entered in the schedule of rates of the Dream city ltd or at the rates mutually agreed upon between the Engineer-in-charge and the Contractor whichever are lower if the additional or altered work for which no rate is entered in the schedule of rates of the Dream city ltd is ordered to be carried out before the rates are agreed upon then the Contractor shall, within seven days of the date of the receipt by him of the order to carry out the work, inform the Engineer-in-charge of the rate which it is his intention to charge for such class of work and if the Engineer-in-charge does not agree to this rate he shall be notice in writing be at liberty to cancel his order to carry out such class of work, and arrange to carry it out in such manner as he may consider advisable provided always that if the Contractor shall commence the work or incur any expenditure in regards thereto before the rates shall have been determined as lastly herein before mentioned, then in such a case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of a dispute, the decision of the Managing Director, Dream

City Limited will be final.

Where, however, the work shall have to be executed according to the designs, drawings and specifications recommended by the Contractor and accepted by the competent authority the alteration above referred to shall within the scope of such designs drawings and specification appended to the tender.

The time limit for the completion of work shall be extended in the proportion that the increase in its cost occasioned by alterations or additions the cost of the original contract work, and the certificate of the Engineer-in-charge as to such proportion shall be conclusive.

**Clause 15 A**

A. If at any time after the execution of the contract documents, the Engineer-in-charge shall for any reason whatsoever, require the whole or any part of the work as specified in the tender, to be stopped for any period or shall not require the whole or part of the work to be carried out at all or to be carried out by the Contractor, he shall give notice in writing of the fact to the Contractor who shall thereupon suspend or stop, the work totally or partially, as the case may be. In any such case, except as provided herein under, the Contractor shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not so derive in consequence of the full amount of the work nor having been carried out, or on account of any loss that he may be put to on account of materials purchased or agreed to be purchased, or for unemployment of labour recruited by him. He shall not also have any claim for compensation by reason of any alteration having been made in the original specifications, drawings, designs and instructions may involve any curtailment of the work as originals contemplated. Where which however, materials have already been purchased or agreed to be purchased by the Contractor, before receipt by him of the said notice, the Contractor shall be paid for such materials at the rate determined by the Engineer-in-charge, whose decision shall be final. If the Contractor suffers any loss on account of his having to pay labour charges during the period during which to stoppage of work has been ordered under this clause the Contractor shall on application be entitled to such compensation on account of labour charges as the Engineer-in-charge, the labour could have been employed by the Contractor elsewhere for the whole or part of the period during which the stoppage of the work has been ordered as aforesaid.

**Clause 15 B.**

The Contractor shall not be entitled to claim any compensation from Dream City Limited for the loss suffered by him on account of delay by Dream City Ltd in the supply of materials entered in schedule A where such delay is caused by ---

- i Difficulties relating to the supply of railway wagons and availability of Government controlled materials.
- ii Force Majored.
- iii Act of God.
- iv Act of the Nation's enemies or any other reasonable cause beyond the control of the Dream city ltd.

In the cause of such delay in the supply of materials Dream City Limited shall grant such extension of time for the completion of the work as shall appear to the Managing Director, Dream City Limited to be reasonable in accordance with the circum stances of the case. The decision of Managing Directoras to the extension of item shall be accepted as final by the Contractor.

**Clause 16.**

The Contractor is to set out and level the work and will be responsible for the accuracy of the same. He is to provide and maintain measuring and surveying instruments including steel tapes, theodolite and dumpy level at all times for proper carrying of the work and for the use of the Managing Director and his representatives including skilled attendance.

**Clause 17.**

The Contractor is to cover up and protect the works from the weather, and is to suspend all wet operations during such weather which, in the Managing Director opinion, will be detrimental to the work.

**Clause 18.**

Samples of each class of material and workmanship shall be submitted by the Contractor for the approval of the Managing Director and after such approval these samples shall be deposited at any place the Managing Director may appoint and the Contractor shall be required to perform all the works of this contract in accordance with the samples.

**Clause 19.**

On completion, all work must be cleaned down; rubbish removed and the works and land cleaned of rubbish; surplus materials and other accumulations, and everything left in a clean and ordinary condition.

**Clause 20.**

The Contractor shall provide, erect and maintain proper sheds and temporary buildings for the storage and protection of materials and goods and for the execution of work which may be fabricated or brought on the site.

**Clause 21.**

The Contractor is to set out and level the works and will be responsible for the accuracy of the same. He shall also be responsible for the correctness of the positions, levels, dimensions and alignment of all parts of the structure as shown in the drawings supplied to him. If at any time any error shall appear during the progress of any part of the work, the Contractor shall at his own expense rectify such error if called upon to the satisfaction of the Managing Director.

**Clause 22.**

The Contractor shall permit the execution of the work not provided for in the tender by artists; tradesman, or others engaged by the Dream city ltd. The Contractor shall allow all reasonable facilities and the use of his scaffolding and water for the execution of such work, but is not required to provide any special scaffolding for the execution of such work except by special arrangement with Dream City Limited.

**Clause 23.**

Under no circumstances whatsoever shall the Contractor be entitled to any compensation from Dream City Ltd on any account unless the Contractor shall have submitted a claim in writing to the Engineer-in-charge within one month of cause of such claim occurring.

**Clause 24.**

If at any time before the security deposit is refunded to the Contractor, it shall appear to the Engineer-in-charge or his subordinate in charge of the work that any work has been executed with unsound imperfect, or unskillful workmanship or with materials of inferior quality; or that any materials or articles provided by him for the execution of the work are unsound, or of a quality inferior to that contracted for, or otherwise not in accordance with the contract, it shall be lawful for the Engineer-in-charge to intimate this fact in writing to the Contractor and then notwithstanding the fact that the work, materials or articles complained of may have been inadvertently passed, certified and



paid for, the Contractor shall be bound forthwith to rectify, or remove and reconstruct the work so specified in whole or in part as the case may require, or if so required, shall remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost; and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in the written intimation aforesaid, the Contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate for every day not exceeding ten days, during which the failure so continues and in the event of any such failure as aforesaid the Engineer-in-charge may rectify or remove and re-execute the work or remove and replace the materials or articles complained or as the case may be at the risk and expense in all respects of the contractor, should the Engineer-in-charge consider that any such inferior work or materials as described above may be accepted or made use of it; shall be within his discretion to accept the same at such reduced rates along with the appropriate penalty as the Managing Director, Dream City Limited may deem fit. The period to be counted from that date of final completion and handing over of the work to Dream City Limited during which the Contractor is so liable for any defects in the work shall be the Defects Liability Period shown in the attached Memorandum.

**Clause 25.**

All works under in cause of execution or executed in pursuance of the contract shall at all time be open to the inspection and supervision of the Engineer-in-charge and his subordinates, and the Contractor shall at all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Engineer - in - charge or his subordinate to visit the work shall have been given to the Contractor, either himself be present to receive orders and instructions, or have a responsible agent duly accredited in writing present for that purpose, Orders given to the Contractor's duly authorised agent shall be considered to have the same force and effect as if they had been given to the Contractor himself.

**Clause 26.**

The Contractor shall give not less than five day's notice in writing to the Engineer-in-charge or his subordinate in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured; and correct dimensions thereof taken before the same is so covered up or placed beyond the reach of measurement any work without the consent in writing of the Engineer-in-charge or his subordinate in charge of the work, and if any work shall be covered up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense, and in default thereof no payment or allowance shall be made for such work or for the materials with which the same was executed.

**Clause 27.**

If the Contractor or his workmen; or servants shall break, deface injure or destroy any part of a building in which they may be working, or any building, road, fence enclosure or grass land or cultivated ground continuous to the premises on which the work of any part thereof is being executed, or if any damage shall be done to the work for any cause whatever while it is in progress of if any imperfection becomes apparent in it within the Defect liability period mentioned above by the Engineer-in-charge the Contractor shall make good the same at his own expense, or in default the Engineer-in-charge may cause the same to be made good by other workmen and deduct the expenses [of which certificate of the Engineer-in-charge shall be final] from any sum that may be due or thereafter become due to the Contractor, or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof.

**Clause 28.**

The Contractor shall supply at his own cost all materials [except such special materials, if any, as may be supplied from the DREAM CITY Stores in accordance with the contract]. Plant tools, appliance implements, ladders, cordage, tackle, scaffolding and any temporary works which may be required for the proper execution of the work, in the original; altered

or substituted from, and whether included in these specification or, other documents forming part of the contract or referred to in these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage there for, to and from the work, the Contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works and counting, weighing, and assisting in the measurement of examination at any time and from time to time of the work or materials, failing this the same may be provided by the Engineer-in-charge at the expense of the Contractor and the expense may be deducted from any money due to the Contractor under the contract, or from his security deposit or the proceeds of sale there for of sufficient portion thereof. The Contractor shall provide all necessary fencing and lights required to protect the public from accident; and shall also be bound to bear the expenses of every suit, action or other legal proceedings, at law, that may be brought by any person for injury sustained owing to negligence of the above precautions, and to pay damages and costs which may be awarded in any such suit, action or proceedings, to any such person, or which may with the consent of the Contractor be paid in compromising any claim by any such person.

**Clause 29.**

The Contractor shall make his own arrangements for drinking water for the labour employed by him.

**Clause 30.**

Compensation for all damage done intentionally or unintentionally or by the contractor's laborers whether in or beyond the limits of the Dream city ltd property shall be estimated by the Engineer-in-charge or such other office as he may appoint and estimates of the Engineer-in-charge subject to the decision of the Managing Director, Dream City Limited on appeal be final and the Contractor shall be bound to pay the amount of the assessed compensation on demand failing which the same will be recovered from the Contractor as damage from the security deposit or deducted by the Engineer-in-charge from any sum that may be due or become due from Dream City Limited to the Contractor under this contract or otherwise.

The Contractor shall bear the expenses of defending any action or other legal proceedings that may be brought by any person from injury sustained by him owing to negligence of precautions to prevent the spread of fire and he shall also pay any damages and cost that may be awarded by the court in consequence.

**Clause 31.**

No work shall be done on Sunday/Holidays without the sanction in writing of the Engineer-in-charge.

**Clause 32.**

The contract shall not be assigned or sublet without the written approval of the Engineer-in-charge, and if the Contractor shall assign or sublet his contract or attempt to do so, or become insolvent or commence any proceedings to be adjudicated an insolvent or make any composition with his creditors, or attempts or attempt to do the Engineer-in-charge may, by notice in writing rescind the contract. Also if any bribe, gratuity gift, load, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised, or offered by the Contractor, or any of his servants or agents to any public officer or person in the employ of Dream City Ltd in any way relating to his office or employment, or if any such officer or person shall become in any way directly or indirectly interested in the contract the Engineer-in-charge may by notice in writing rescind the contract. In the event of contract being rescinded, the security deposit of the Contractor shall thereupon stand forfeited and be absolutely at the deposit of the Dream city ltd and the same consequences shall ensue as if the contract had been rescinded under clause 3 hereof and in addition the Contractor shall not be entitled to recover or be paid for any work thereto for, actually performed under the contract.

**Clause 33.**

All sums payable by a Contractor by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of the Dream city ltd without reference to the actual loss or damage sustained and whether any damage has or has not been sustained.

**Clause 34.**

In the case of a tender by partners any change in the constitution of a firm shall be forthwith notified by the Contractor to the Engineer-in-charge for his information.

**Clause 35.**

All works to be executed under the contract shall be executed under the directions and subject to the approval in all respects of the Managing Director who shall be entitled to direct at what point or points and in what manner they are to be commenced, and from time to time carried on.

**Clause 36.**

Except where otherwise specified in the contract the decision of Managing Director shall be final, conclusive and binding on all parties to the contract upon all questions relating to the meaning of the specifications, drawings, designs and instructions hereinbefore mentioned and as to the quality of workmanship, or materials used on the work, or as to any other question, claim, right, matter, or thing whatsoever in any way arising aloof, or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions, or otherwise concerning the works or the execution or failure to execute the same, whether arising, during the progress of the work or after the completion or abandonment thereof.

**Clause 37.**

When the estimate on which a tender is made includes lump sums in respect of parts of the work the Contractor shall be entitled to payment in respect of the items of work involved or the part of the work in question at the same rates as are payable under this contract or such items or if the part of the work in question is not in the opinion of the Engineer-in-charge capable of measurement the Engineer-in-charge may at his discretion pay the lump sum amount entered in the estimate, and the certificate in writing of the Engineer-in-charge shall be final and conclusive under the provisions of the clause.

**Clause 38.**

In the case of any class of work for which there are no such specifications as are mentioned in Rule 1 such work shall be carried out in accordance with the Municipal or Gujarat Government P.W.D. specifications, and in the event of there being no Municipal or Government P.W.D. specifications, then in such a case the work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer-in-charge.

**Clause 39.**

The expression "works" or "work" where used in these conditions shall, unless there be something in the subject or context repugnant to such construction be construed to mean the work or works the contracted to be executed under or in virtue of the contract, whether temporary or permanent, and whether original, altered, substituted or additional.

**Clause 40.****Taxes and Duties on Material**

All charges on account of Octroi, terminal tax or Sales tax etc. and other duties on material obtain for the works from any source shall be borne by the Contractor. 'P' and 'C' form shall not be supplied by the Dream city Ltd.

The bidder is advised, directed to take into consideration all the Central/State/ Local self-Government

taxes, levies. No tax/nor any Govt. levy shall be paid extra and/or separately. However, the deduction of Tax/Levy, if any, shall be ensured from payment due to be made time to time in accordance with the provisions of Central/State Govt. Laws, orders issued from time to time and remaining in force.

GST (GOODS & SERVICE TAX) has come in existence from 1st July, 2017. Contractor / Successful Bidder is bound to pay any amount of GST prescribed by the Govt. of India as per the Terms of Contract agreed upon during the course of execution of this Contract. However all the quoted rates must be inclusive of GST.

During the course of execution of Contract, if there is any change in rate of GST (Goods & Service Tax) by the Government the same shall be reimbursed / recovered separately by Dream city Ltd., subject to the submission of original Receipt / Proof for the amount actually remitted by the successful Tenderers/ Contractor to the competent Authority along with a certificate from chartered Accountant of Contractor/ Successful Bidder certifying that the amount of GST paid to the Government and the same shall be intimated /submitted / claimed within 30(Thirty) Days from the date of payment Remittance of GST within stipulated period shall be the sole responsibility of the Successful Bidder /Contractor ,failing which, Dream city Ltd. may recover the amount due, from any other payable dues with Dream city Ltd. and decision of Dream city Ltd. shall be final and binding on the Contractor / Successful Bidder in this regard. Further the non payment of the GST to the Government may lead to the termination of contract and forfeiture of Security Deposit /Performance Guarantee Amount.

If any other new taxes / Duties /Levies / Cess or any other incidentals etc. or any increase in the existing taxes / Duties /Levies / Cess or any other incidentals etc. ( Excluding GST) are imposed during the course of the contract, the same shall be borne by contractor / successful Bidder only, in no case Dream city Ltd. shall be liable for the same.

The Contractor will submit the invoice to the Dream city Ltd. having GSTIN of Dream city Ltd. mentioned therein and the taxes shall be shown separately on the face of the invoice so as to claim as ITC by Dream city Ltd.

The Construction labour welfare cess shall be deducted from R.A. bill & Final of the contractor at the prevailing rate. The current rate of labor cess is 1% of the capital amount.

**Clause 41.**

The Contractor shall be responsible for and shall pay any compensation to his workmen payable under the Workmen's Compensation Act 1923 [VIII of 1923] or any statutory modification thereof for injuries caused to workmen. The Workmen Compensation policy and all the insurances pertaining to Plant and Equipment, fire, burglary shall be in the Contractors scope. However, the events such as earthquake and flood shall be considered as a Force Majeure and relevant clauses of the tender shall apply for the same

**Clause 42.**

Quantities shown in the tender are approximate and no claim shall be entertained for quantities of work executed being either more or less than those entered in the tender of estimate.

**Clause 43.**

No compensation shall be allowed for any delay caused in the starting of the work on account of any acquisition of land in the case of clearance work, for any delay in accordance to estimate.

**Clause 44.**

No compensation shall be allowed for any delay in execution of the work on account of water standing in borrow pits or compartments. The rates are inclusive for hard or cracked soil, excavation in mud, sub-soil water or water standing in borrow pits, and no claim for an extra rate shall be entertained, unless otherwise expressly specified.

**Clause 45.**

The Contractor shall not enter upon or commence any portion of work except with the written authority and instructions of the Engineer-in-charge or of his subordinate in charge of the work failing such authority the Contractor shall have no claim to ask for measurements of or payment for work.

**Clause 46.**

No Contractor shall employ any person who is under the age of 18 years. If any contractor found employing person or persons under the age of 18 years, during course of the construction at any stage, legal actions shall be taken against him as stipulated in Child Labour (Prohibition & Regulation) Act 1986 and also, a penalty of Rs.20,000/-(Rupees Twenty thousand) shall be imposed which shall be deposited with District Collector in Child Labour Rehabilitation cum Welfare Fund.

No Contractor shall employ donkeys or other animals with breeching of string or thin rope. The breeching must be at least three inches wide and should be of tape [Nawar].

No animals suffering from sores, lameness or emaciation or which is immature shall be employed on the work.

The Engineer-in-charge or his agent is authorised to remove from work any person or animal found working which does not satisfy these conditions and no responsibility shall be accepted by the Dream city ltd for any delay caused in the completion of the work by such removal.

The Contractor shall pay fair and reasonable wages to the workmen employed by him in the contract undertaken by him in the event of any dispute arising between the Contractor and his workmen on the grounds that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Managing Director who shall decide the same.

The decision of the Managing Director shall be conclusive and binding on the Contractor but such decisions shall not in any way affect the condition in the contract regarding the payment to be made by Dream City Limited at the sanctioned tender rates.

**Clause 47.**

Payment to the Contractors shall be made by cheque drawn on any bank in Surat, provided the amount exceeds Rs. 10. Amounts not exceeding Rs. 10 will be paid in cash.

**Clause 48.**

Any Contractor who does not accept these conditions shall not be allowed to tender for works.

**Clause-49**

The work contract tax shall not be paid to the contractor.

**Clause-50.**

Disputes if any, shall be discussed and mutually settled and in case of disagreement the same shall be referred to Managing Director, Dream City Limited. After referring to Managing Director, Dream City Limited if the said dispute is not solved, the same shall be referred to the court subject to Surat Jurisdiction only.

**Clause-51**

The following condition are being included in this tender and shall be considered as a part of tender document.

In case the total amount of work done is 5% less than the contract value, prorate S.D. to

that extent may be refunded to the contractor while releasing the payment of final bill. In short, the S.D. to be retained by the DCL after payment of final bill shall be equal to 2% of the amount of final bill as per the prevailing norms or as per the norms decided from time to time.

If there is increase in amount of work more than 5% of the Contract value. The Additional S.D. shall be recovered from the running bill. When the total of any of work done by the Contractor upto running bills under consideration is more than 5% of the contract value. However, such S.D. shall be recovered in the round figure of Rs. 1000/- i.e. the amount of work done when it exceeds 5% of the contract value it shall be rounded off to the nearest multiple of Rs.25000/- such additional S.D. shall be recovered for the works amount to Rs. 5 Lacs or more at the rate of 4% of the additional amount.

In many cases, the contractors are stopping the work half-way due to number of reason and when the department has to take actions in accordance to clause 3(a) or (b) or (c) of the contract the remaining work has to be carried out by advertising the tender for the remaining work and the whole administrative process right from inviting tenders to finalizing the tender etc.

In such cases a fixed amount of Rs. 1000/- should be recovered from the original contract towards the cost of advertisement and other administrative charges incurred by the department in finalizing the contract for the remaining work.

In case a separate advertisement is issued for a single work actual cost of advertisement shall be recovered such recovery shall be in addition to the recovery to be made under clause-3 or such other relevant clauses.

**Clause 52.**

The tender is sent to you with one set of conditions of contract, technical specification and one set of Schedule-B with one set of drawings, please return the same duly filled in along with all the set in a sealed cover. The mode of submission of tender shall be as indicated in tender notice

The Tender submission shall be by Registered Post A.D./Speed post/online.

**Clause 53.**

A sum of Rs.12,25,300.00/-on account of Earnest Money should be paid in pay order or demand draft only to the Managing Director, Dream City Limited, Surat. Earnest Money in the form of cheque will not be accepted. The amount will be forfeited in case after his quotation is accepted, the contractor does not complete the contract documents and pay the amount of Security Deposit of 2% of tender amount within the specified time as mentioned in clause 1 of condition of contract, otherwise it will be refunded. The work is to be completed within 12 (Twelve) months [Including monsoon] from the date of written order to commence the work. The Insurance Company's bond will not be accepted against the Security Deposit.

Note:- The contractor are also allowed to pay the 50% amount of earnest money in pay order or demand draft of any Nationalised Bank payable at Surat in favor of the Managing Director, Dream City Limited Dream City Limited only and rest of 50% in form of Bank guarantee of any Nationalised Bank located at surat.

**Clause 54.**

The contractor will quote rate, both in words and figures. The final total as per the rates quoted above shall also be given both in words and figures.

**Clause 55.**

No alteration in the form of quotation and in schedule of quantities and no additions in the shape of special stipulation will be permitted. Quotation which do not fulfill all or any of the above conditions or are incomplete in any respect are liable to be rejected.

**Clause 56.**

The tenderer must obtain for himself on his own responsibility and at his own expense all the information which may be necessary for the purpose of filling this tender and for entering into a contract for the execution of the same from the office of the Managing Director, Dream City, Surat, during the office hours between 11:00 A.M. to 6:00 P.M. on weekdays except Sunday & Holidays and must examine the drawings and inspect site of the work and acquaint himself with all local conditions and matters pertaining thereto before submitting the tender.

**Clause 57.**

Each of the pages (having reference for signature of the contractor) of the tender documents is required to be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with General Conditions etc., as laid down. Any tender with any of the documents not so signed which will be rejected.

**Clause 58.**

The tender form must be filled in English and all entries must be made by hand written in ink, if any of the documents is missing or unsigned, the tender shall be considered invalid.

**Clause 59.**

The rates quoted by the contractor shall include all eventualities such as heavy rain, sudden floods, etc. which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the contractors, DREAM CITY shall not be responsible for such damage or wash out to the construction work.

**Clause 60.**

Time is the essence of the contract. The work should be completed within 12 (Twelve) months [Including monsoon] from the date of the work order issued to the contractor to commence the work. The successful contractor will have to give a schedule of the various items of work to be done so that the work is completed within the stipulated time.

**Clause 61.**

Rate for extra items, as far as possible will be derived from the quoted tender items where it is not possible to do so, the same shall be carried out from the GWSSB S.O.R.2014-2015 & R & B SOR 2015-16 or arrived at by adding 15% towards overhead and profits on the actual cost of labour, material and plant and machinery input as approved by the Engineer-in-charge.

**Clause 62.**

In case of delay in execution of work the penalty at the rate of 0.2% of contract value per day subject to the maximum of 10% of the contract value, shall be payable by the contractor to the Dream city ltd towards compensation.

**Clause 64.**

No claim for any extra or compensation for damage will be entertained on account of such variation, except where the quantity is increased by more than 30%. No claim for any extra or compensation for damages will be entertained on account of such variation where the quantity is decreased to any percentage or where the item is totally deleted.

**Clause 65.**

It should be noted that the contractor shall have to complete the work in stipulated time of 12 (Twelve) months [Including monsoon] as per the terms of the contract. The Contractor shall submit complete CPM/PERT chart and get it approved within one month of the award of the work.

**Clause 66.**

The Contractor shall also arrange to obtain the license from the competent Authority under the contract labour (regulation and abolition) Act 1970.

**Clause 67.**

Before payment of final bill on completion of the work, total amount of that work done at sanctioned rate shall be considered with the total amount of work done, had it been executed at the rate of second tenderer. While comparing total amount, quantity to be taken into consideration will be the quantity executed and not the quantity put to tender and will also include variation of quantity within the limits of quantity executed ie 30% of the estimated quantity. In case the latter is less than the total amount of work done at sanctioned rate; than the amount of difference the two shall be deducted from the final bill before making payment. In other words the work when executed shall not exceed as compared to the rate of second lowest tenderer. It may be noted that extra items shall not be included in comparing the rates with the second lowest tenderer.

**Clause 68.**

The following additional information shall be forwarded by the tenderer along with the submission of the tender:

- a A list of works of comparable nature executed, along with their value and time of completion.
- b A list of works in hand showing the cost of the work to be completed against each with the certificate from the Head of the office concerned.
- c A list of machinery in their possession and which they will bring for the proposed work.
- d Solvency certificate without which such tenders are liable to be rejected. The Solvency certificate should be for the amount equal to 20% of the tender value of the work.
- e Every contractor shall furnish along with the tender, information regarding income-tax the circle of the district in which he is assessed for income-tax the reference No. and year of assessment.

**Clause 69.**

Acceptance of quotation will rest with the competent authority who does not bind himself to accept the lowest and reserves the right to reject any or all quotations/tenders and no reasons will be given for acceptance or rejection thereof. The tenderers whose quotation is accepted will have to enter into a regular contract and abide by all rules and regulations embodied in the tender.

**Clause 70.**

The tender will be liable to be rejected outright, if while submitting it ---

- a The tenderer proposes any alteration in the work specified in the tender or in the time limit allowed for carrying out the work or any other condition.
- b Any of the pages of the tender are removed or replaced.
- c In the case of item rate tender, the rates are not entered in ink in figures and words and the total of each item and grand total are not struck by the tenderer in ink in the last column of Schedule 'B' under his signature.
- d Any errors are made by him in the tender.
- e All corrections and additions or pasted slips are not initiated by tenderers.
- f The tenderer or in the case of a firm each partner thereof does not sign or the signature/signatures is/are not attested by a witness on page of the tender in the space provided for the purpose.
- g The tenderers which do not fulfill any of the conditions of those in the printed form and those tenders which are incomplete.



**Clause 71.**

The contractor has to make all arrangements for procuring the materials required on his own work.

**Clause 72.**

in case of any discrepancy with tender document the contractor may contact the Managing Director, Dream City Limited, Surat.

**Clause 73.**

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

**Clause 74.**

The contractor will have to construct shed for storing valuable materials at works site having locking arrangement. The material will be taken for use in the presence of the DREAM CITY person. No materials will be allowed to be removed from the site of works.

**Clause 75.**

Tender once accepted shall be binding on the contractor even if the formal agreement is not signed.

**Clause 76.**

Tender once offered can not be withdrawn except with the express permission of Dream City Limited.

**Clause 77.**

The successful tenderer may be required to furnish surety of 10% of the contract value on stamp paper if so desired by Managing Director.

**Clause 78.**

The tenderers are requested to give complete specification of prices quoted.

**Clause79.**

For all R.C.C. works such as Footings, Columns, Beams, Slabs, Chhajjas, Pardis, Lintels, etc., a 15 cm x 15 cm x 15cm sizes test cube as per the P.W.D. Standard will have to be taken by the contractor and as per instructions and directions of the Engineer-in-charge. These test cubes will be for 7 days and 28 days respectively. After 7 days, 28 days these test cubes will be tested in the Government approved laboratory by the contractor at his own expense and results will be submitted directly to the respective head of the DREAM CITY.

**Clause 80.**

This tender document contains 242 pages (Technical Bid-Excluding Drawings), which should be furnished along with earnest money deposit, duly filled in and signed. No pages can be removed from the conditions of contract, specifications of drawings, otherwise it will be considered as an intentional fault and the tender will be liable for rejection and the amount of earnest money deposit forfeited.

**Clause-81.**

If the work executed is found to be of inferior quality OR of any substandard quality not conforming to the specifications at any point of time during the inspection of by Engineer-in-charge or any Higher Authority, the contract shall be terminated without assigning any reasons there off and no payment shall be made towards the probable damages or loss caused to the contractor and materials purchased by him for this work and no compensation whatsoever either shall be paid to contract by Dream City.

**Clause-82.**

The Successful contractor shall take "all contract risk insurance policy" for the tendered cost of the work. "Work's man compensation policy" for all workers and labour of contractor and clients working at site and "Third party insurance policy" to fully cover all third party type risk for the whole contract i.e. Construction, supply, installation, testing and commissioning and Operation & maintenance of sewage treatment plant. The insurance policy so taken by the contractor for such purpose shall be in the joint name of the contractor and the client and the policy shall be deposited with the clients.

**Clause-83.**

The Contractor should note that the conditional tenders shall be out rightly rejected.

**Clause-84.**

Out of the amount payable/creditable to contractor's account, the Central Government/State Government tax/taxes shall be deducted at source in accordance with the relevant laws/rules from time to time prevailing.

**Clause-85.**

Now no octroi is to be paid as the same is exempted and therefore the question of reimbursement does not arise. The contractors shall quote their rates considering this aspect of exemption of octroi.

**Clause-86.**

Surat Dream City shall not provide 'C' or 'D' Form for tax purposes.

**Clause-87**

Price variation or escalation shall NOT be paid to the contractor as detailed in the tender.

**Clause-88**

While preparing final bill on completion of the work, the total amount of work done as sanctioned shall be compared with the total amount of work done, had it been executed at the rate of second lowest tenderer and if the later is less than the total amount of work executed by the successful contractor at sanctioned rates, than the amount of difference between the two, shall be deducted before making final payment. In short, the work when executed, shall not cost more to the Dream city ltd, if compared with the rates of the second lowest tenderer.

**Clause-89**

The final bill shall be paid only after the successful commissioning of the total plant.

**Clause-90**

**Special Clause regarding EPF act 1952 and payroll and muster roll.**

All the applicant contractors are required to have their own employer code number under EPF Act, 1952 and are required to comply the applicable provisions of said statute regularly and totally.

Further the contractors for services are required to produce the certified copies of paid challans in respect of employees/workers employed by said contractor in respect of work allotted by Dream City Limited, along with copies of Pay Roll and Muster Roll. If the same are not produced, the bills will not be released.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 15. SCHEDULE -A

### CEMENT AND STEEL :

Dream City Limited shall not issue cement and reinforcement steel to be used for this work. The cement and reinforcement steel required for the above said work shall be procured by contractor at its own cost.

The brands for cement – OPC shall be Ambuja, Ultratech confirming to IS 12269/87 (with its latest amendments) of 53 grade (for OPC cement) only.

Approved make of CRS Fe 500 reinforcement steel :- TATA, SAIL, Rastriya Ispat, Electrotherm (India) ltd. and J.S.W. Steel ltd. If Steel purchased from Electrotherm (India) ltd. and J.S.W. Steel ltd. than purchase bill / testing certificate of the that product shall be obtained from company itself and the name of the contractor /work shall be appeared on the bill /testing report.

Any of the above mentioned brands of Cement and Reinforcement steel shall only be used by the contractor at the time of execution.

The minimum cement content and maximum W/C ratio shall be as per table below.

Concrete Grade	Minimum (Kg/M <sup>3</sup> )	Max. W/C Ratio
M 20	350	0.55
M 25	375	0.50
M 30	410	0.45
M 35	425	0.45

For concrete with volumetric / nominal mix and other items with use of cement the same shall be as per prevailing Dream City Limited standards. The contractor shall not be allowed to use Fly Ash in Cement Concrete.

### WASTAGE OF CEMENT AND REINFORCEMENT STEEL :

As the contractor is to bring the cement and steel, the question of considering the wastage on the basis of issue rate does not arise i.e. no separate payment shall be made for any kind of wastage in the materials. The payment for reinforcement bar will be made on theoretical weight basis. The weight shall be computed on the basis of the length of the steel used in the work multiplied by the standard unit weight of TMT bar as mentioned in IS code No. 1786, IS-432 or IS-226.

The steel consumption lesser than 7.5% of the standard consumption shall be penalised at the double existing corporation issue rate or the prevailing market rate, whichever is more.

Similarly, for cement also, the lesser consumption beyond 5% shall be penalised at the double existing corporation issue rate or the prevailing market rate, whichever is more.

### MINIMUM CONSUMPTION OF CEMENT AND REINFORCEMENT STEEL :

The allowable actual minimum consumption than the theoretical consumption, for cement and steel shall not be more than 5% of theoretical consumption.

### TESTING OF CEMENT AND STEEL :

It should be specifically noted that the cement and steel brought by the contractor at site of work shall be used only after the same is tested at the approved laboratory as per the direction of the Engineer-in-charge. Such approved laboratory may be located at Surat, Baroda, Ahmedabad or Mumbai.

All the charge for the transport and testing of the samples shall have to be borne by the contractor. The frequency of testing such material shall be in accordance to the relevant Indian Standards as directed by Engineer-in-charge.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## **16. SCHEDULE - B**

AS PER SEPARATE PRICE BID uploaded

Note :

1. All works shall be carried out as per Government of Gujarat's P.W.D. Handbook and our specifications contained in this document and as directed.
2. All the columns in the Schedule-B for the quotation as a turn key tender should be filled on line.
3. Rates quoted include clearance of site (prior to commencement of work and at its close before handing over) in all respects and hold good for work under all conditions, site, moisture, weather etc.
4. Rate for each job and the total amount of work shall be filled .

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

**17. IMPORTANT INSTRUCTION TO TENDERER**

1.

Affix latest passport size photo of tenderer
---

\_\_\_\_\_  
Specimen Signature of the Contractor

2.

1	2	3	4
AFFIX LATEST PASSPORT SIZE PHOTOGRAPH OF ALL PARTNERS IN CASE OF PARTNERSHIP AGENCY			

Specimen signature of all partners incase of partnership agency.

- i. \_\_\_\_\_
- ii. \_\_\_\_\_
- iii. \_\_\_\_\_
- iv. \_\_\_\_\_

Submission of Registered Agreement is compulsory in case of partnership agency.

- 3. Submission of income tax clearance certificate of last three years is compulsory for tenderer submitting agency.
- 4. Submission of sale tax certificate, with proof of residence is compulsory for tenderer.
- 5. In case of Government royalty applicable to tenderer, it is compulsory to submit a receipt of royalty payment with tender.
- 6. The Photograph and specimen signature of contractor will be cross checked, whenever contractor receives payment in account section of DREAM CITY.
- 7. The specimen signature of contractor will be cross checked by Account Department of DREAM CITY, in case of representative of Contractor along with letter of authority of a person who signed an agreement, receives payment.
- 8. All partners of tenderer should put their specimen signature at the relevant places in the tender. A Passport size photograph of all partners who have signed the tender shall be affixed in the tender.

The successful tenderer shall be required to execute necessary agreement where in the same partners shall put on their signatures.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 18. MEMORANDUM

I / We \_\_\_\_\_ the undersigned do hereby tender for carrying-out the work described in the schedule subject to the conditions annexed in Schedules attached herewith in tender documents.

- |   |  |
|---|--|
| 1. Name of Work   | <b>Providing and laying of Sewerage Network, Construction of Sewage Pumping Station with Electrical-Mechanical work and Rising main for Phase-1 of dream City Limited with operation and maintenance of whole Sewerage collection system for 5 years.</b>  |
| 2. Estimated Cost   | Rs. 12,25,22,714.16/-  |
| 3. Earnest Money Deposit  | Rs.12,25,300.00/-  |
| 4. Security Deposit:  |  |
| i. Pay order or F.D.R.or D.D.of any Nationalised Bank           |  |
| ii. In form of Bank guarantee of any Nationalised Bank          | 2% of Tender Amount (Shall be released at the time of final bill)  |
| iii.To be deducted from Running Bill in form of Retention Money | 2% of Tender Amount(Shall be released after defect liability period)   |
| 5. Time Limit   | 12 (Twelve) months [Including monsoon]   |
| 6. Penalty for delay  | 0.2% (Zero point two percent) of the contract price per day maximum upto 10% ( Ten Percent ) of the Tender Amount.   |
| 7. The progress of work should confirm to                       | 15% of the work in 25% of the time.<br>35% of the work in 50% of the time.<br>66% of the work in 75% of the time.<br>100% of the work in 100% of the time.<br>However, it shall be revised and modified subjected to various factors affecting progress of the work.   |
| 8. Percentage to be retained from running account bills         | Additional 5% (Shall be released at the time of final bill)  |
| 9. Defect Liability Period                                      | 12 Months (Twelve Months)  |
| 10. Water Charges   | a. Water charges shall have to be paid by the Contractor at the rate of 3% of the amount of work done and shall be deducted from the running account bill, if water supplied by DREAM CITY.<br>b. Exemption shall be granted if the contractor makes its own arrangement of water supply and inform Dream City within one month of commencement of work. |

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 19. DEFECTS LIABILITY PERIOD AND REFUND OF SECURITY DEPOST

The Defects Liability Period shall be as under and the amount of Security Deposit in the form of Bank Guarantee for the works under different items of contract after completion of the works shall be refunded as under:

Sr. No.	Security Deposit & Retention Money	Amount of Retention money to be refunded on completion of work and certification issued by Engineer -In – Charge that effect	Remarks
1	5% of Contract value as <b>Security Deposit.</b> (Construction cost)	Contractor shall provide a Bank Guarantee of 5% of Contract value, valid for 9 months (6 months completion period + 3 months addl.), before start of work as security deposit. The Security deposit shall be released <b>after completion and handing over of works.</b>	
2	5% from each running bill shall be deducted as <b>retention money</b> (Construction cost)	The retention money shall be released at the end of successful completion of <b>five (05) year O&amp;M</b> period commencing on completion of work and certificate issued by Engineer in charge to that effect.	
3	5% of contract value as <b>Performance Bond</b> (Construction cost)	Performance Bond valid for the period of 120 months shall be submitted by the contractor after completion and handing over of work. <b>Security deposit may also be converted into performance</b> bond and shall be released within one month after the completion of defect liability period of 120 months.	
4	5% of Contract value as Security Deposit. (O&M Cost)	Contractor shall provide a Bank Guarantee of 5% of total O & M Contract Value (for 5 years period), valid for 60 months. before start of work as security deposit. The security deposit shall be released after 60 months on successful completion of O&M contract.	
5	Retention Maoney from each running bill / Monthly O&M Bill shall be deducted	The 5% retention money shall be deducted for capital works from each running bill and retention money as described under Cluase 8 on Page no 86 shall be deducted for a particular year of O&M (with first year of O&M considered as commencing on completion of work and certificate issued by Engineer in charge to that effect and so on) shall be released within	



The Defect Liability period shall be 120 months after successful commissioning of entire works, as well as issuance of certificate of completion of Engineer in charge of entire work and certificate of completion to that effect is issued by Engineer-in-charge.

Signature of Contractor

Managing Director

Name :

Dream City Limited

Company's seal :

## 20. SPECIAL CONDITIONS

### 1.1. General

#### Scope of Work

This tender enquiry covers **Providing and laying of Sewerage Network, Construction of Sewage Pumping Station with Electrical-Mechanical work and Rising main for Phase-1 of dream City Limited with operation and maintenance of whole Sewerage collection system for 5 years.**

The schedule of quantities is given separately in tender. The broad scope of work is as follows and shall be carried out strictly in accordance with specifications and instructions of Engineer-in-charge issued from time to time. The contractor shall provide all necessary materials equipment, labour etc. for the execution and maintenance of work till completion unless otherwise mentioned in the tender documents. All materials that go with the work shall be approved by the Engineer in charge prior to procurement and use.

- Providing, Supplying, Lowering & Laying of RCC NP3 / NP4 Class pipe and HDPE Pipe and including all fittings..
- Liasoning with any Government- Semi Government Body Etc. sector should be in the scope of Contractor/ tenderer/ Tenderer for related tender material.
- Excavation of trenches and pits for laying of pipes and construction of manholes etc., in all kinds of soil / soft rock etc., including dewatering whenever and wherever for the work under this contract is necessary and back filling including compacting as per item specification. Excavation of asphalt pavement of any thickness including demolishing the asphalt carpet, metal, soling etc. complete with stacking the materials. Excavation for PCC, granular bedding shall be paid as per relevant excavation depth.
- Providing and laying granular bedding or CC bedding as per item description and tender specifications.
- Laying of HDPE pipes including lowering, handling transportation where necessary and jointing the same
- Construction of Manholes, Valve Chambers etc. as specified in item.
- Testing Valves and manhole frame – covers as per detail specification.
- Construction of Sewage Pumping station with Electrical –Mechanical Works.

### 1.2.Scope of Supply of Material :

#### a] Supply of Material :

All materials,testing appliances,tools, tackles & spares etc. necessary for the successful execution & completion and till plant handing over to DREAM CITY shall be procured and provided by the tenderer. **No material will be supplied to the contractor, either free of cost or at issue rate by the Dream City Limited, for this complete work.**

#### b] Water :

Contractor shall have to make his own arrangement for water required for construction, testing and for his labour/employees too. However, if DREAM CITY accepts to provide water supply, the same shall be on the chargeable basis as per prevailing rate (i.e. 3 % of the total civil cost of the project). Further, if accepted, the water supply shall be given at one point only and necessary arrangements for piping/pumps etc.shall have to be done by the contractor.

**c] Power :**

Power required for the construction, erection and other allied job shall be arranged by the contractor at his own cost.

The Contractor shall have to make his own arrangement for getting electric power for construction. The DREAM CITY will issue only recommendation letter to the contractor if required. No compensation shall be paid for delay in getting power supply. All the rest formalities for getting the power supply, connection charges, deposits, monthly energy bills etc. shall be done and borne by the contractor. The necessary electrical connection for commissioning and operation of the SPS shall be taken by DREAM CITY. However, **during O&M Contract, the energy – electricity bills for all the equipment under this contract shall have to be borne by contractor only.**

**d] Cement :**

Cement required for the construction, erection works shall be procured by the contractor at his own cost. All the cement to be used for the proposed work for any civil engineering activity shall be Ordinary Portland Cement (Fly Ash based), conforming to IS: 269-1976, Part-I (Latest Edition) and from the specified contractors/manufacturers only.

**e] Steel :**

All reinforcement and structural steel required for construction, erection and other allied job shall be procured by the contractor at his own cost. All the reinforcement steel to be used for the RCC work shall be CRS (Corrosion Resistant Steel) type of Fe 500 Grade conforming to IS:1786 and from the specified contractors/manufacturers only.

**1.3.Safety :**

All the safety and factory rules shall be strictly followed. The contractor is fully responsible for the safety of his staff and workmen and must equip them with safety appliances and tools.

The Contractor shall be responsible for provision of safety arrangements & protective clothing for all persons/employees on the site whether or not engaged in actual operation or supervision. The Contractor shall also be responsible for safety arrangements of all equipment used for construction and shall employ trained workmen conversent with safety regulation. The contractor shall use only tested equipment and tools and shall periodically renew tests to the satisfaction of the Engineer. All test certificates shall be made available to the Engineer at the site of the work. If at any time, in the opinion of the Engineer, this provision is not complied with, the contractor shall forthwith replace such equipment and tools.

The contractor shall display notices and arrange proper fencing at such places where hazardous work is being carried out. The contractor shall provide at his own expense on the works to the satisfaction of the Engineer at such places, proper and sufficient fire fighting, first aid appliances etc. which shall at all times be available for use.

**1.4.Time Schedule :**

The work shall be executed strictly as per the time schedule/bar chart submitted and as agreed upon along with price-bid offer. The entire job/project has to be completed within a period of **12 (Twelve) months [Including monsoon]** from the date of placement of order. The time limit includes the time required for testing, rectification, if any, retesting and completion

in all respect to the entire satisfaction of the Engineer-in-charge. The timely completion of this project is very very important for the citizen of Surat City, and hence weightage will be given on strict compliance of work as per the sanctioned schedule of work/bar chart. The time limit of this project is **12 (Twelve) months [Including monsoon]** is Inclusive of commissioning and trial run period. The time period of completion shall be reckoned from the date of notification of award of work. The Tenderer shall have to submit a detailed PERT/BAR chart network, with the time frame consisting adequate number of contractual activities covering key phases of the works such as design, drawing, approval procurement, manufacturing, testing, construction and field erection activities.

Monthly construction programme, progress and financial target achieved shall be drawn up and submitted at every first of calender month. The tenderer shall strictly adhere to the schedule of work by deploying adequate personnel.

### **1.5. Penalty for delay**

The Contractor is bound to do the work as per the sanctioned schedule of work/bar chart. The contractor shall have to submit the progress report with physical and financial achievement at every first of calender month. The Engineer-in-charge will review the same and if the contractor fails to achieve the target set as per the sanctioned bar chart, he shall pay penalty for delay, at one fifth of one percent of financial target set of respective month.

If the contractor fails to complete the work within the stipulated completion date for the work, he shall pay **penalty for delay** at 0.2% (Zero point two percent) of contract value per day of delay in completion and handing over the work or part thereof as the case may be to The Dream City Limited. The amount of **penalty for delay** shall, however, is subjected to a maximum of 10% (ten percent) of the contract value. Delays in excess of one hundred days will be a cause for termination of the contract and forfeiture of all security for performance.

### **1.6. Construction of Stores and Site Office :**

Suitable areas will be allocated by the Dream City Pvt. Ltd. to the Contractor to build storages for storing his equipments, plant, materials etc. and also to build his site offices. He will be solely responsible for watching and guarding of his stores, offices etc.

The contractor shall cover all his equipment and materials at site with requisite insurance against theft, larceny, decoity, fire tempest, flood, earthquake etc. It will the contractor's responsibility till handing over the plant after satisfactory completion of trial run and Operation-maintenance contract. Even though part/full payment is released against supply/ installation/ commissioning.

On completion of the works undertaken by the contractor, he shall remove all temporary works erected by him and have the site cleaned as directed by the Engineer. The Dream City Pvt. Ltd. reserves the right to ask the contractor any time during the pendency of the Contract to vacate the land by giving 7 day's notice on security reasons or on national interest or otherwise.

### **1.7.Labour and Supervisory Camps :**

No land will be provided by the Dream city Pvt. Ltd. to the Contractor for constructing his labour and supervisory camps and other service facility. Contractor shall make his own arrangements outside the plant boundary.

### **1.8.Construction Equipment :**

The Contractor shall make his own arrangement to procure all constructional plant and equipments for his own. He shall also state the type and number of different equipments with their capacities in good working conditions which he will use on the site to ensure completion of the work in the specified time.

All materials, construction plants and equipments once brought by the contractor to the site are not to be removed from there without the written permission of the Engineer--in-charge. Also,the Contractor shall have adequate stock of spare parts for the equipment on the site and work shall not be delayed on this account. Similarly all temporary works built by the Contractor for the main construction undertaken by him, are not to be dismantled and removed without the written authority of the Engineer-in-charge.

### **1.9.Signing Of The Contract**

The successful tenderer shall be required to execute an within ten days of the receipt by him of the notification of acceptance of tender. In the event of failure on the part of the successful tenderer to sign the agreement within the above stipulated period, the acceptance of the tender shall be considered as cancelled and Earnest Money Deposit amount will be forfeited.

### **1.10. Interpretation Of Contract Documents**

Except if and to the extent otherwise provided by the contract, the provisions of the General Conditions of Contract and special conditions shall prevail over those of any other documents forming part of the contract. Several documents forming the contract are to be taken as mutually explanatory, should there be any discrepancies, inconsistencies, errors or commissions in the contracts or any of them, the matter may be referred to the Engineer-in-charge who shall give his decisions and issue to the contractor instructions directing in what manner the work is to be carried out. The decision of the Engineer-in-charge shall be final and conclusive and the contractor shall carry out the work in accordance with this decision.

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

The various documents forming the contract are the essential parts of the contracts and a requirement occurring in one is as binding as though occurring in all, they are intended to be mutually explanatory and complementary and to describe and provide for a complete work.

In the event of any discrepancies, the various documents forming the contract or in any one document, the following order of precedence should apply

- a] Dimensions & quantities ---
  - i Drawings.
  - ii Schedule `B' of the tender form.  
On drawings, figures, dimensions, unless obviously incorrect will be followed in preference to shown dimensions
- b] Description ---
  - i Schedule `B' of the tender form
  - ii Drawings
  - iii Specifications

In case of defective description or ambiguity, the Engineer-in-charge should issue further instructions/ directions in what manner the work is to be carried out, it being understood that the best modern practice is to be followed. The contractor should forthwith comply with such instructions

The contractor should take no advantage of any apparent error or commission in drawings or specifications and the Engineer-in-charge shall make such corrections and interpretations as necessary to fulfill the intent of the plans and specifications.

### **1.11. Force Majeure**

Any delays in or failure of the performance of either part hereto shall not constitute default hereunder or give rise to claims for damages, if any, to the extent such delays or failure of performance is caused by occurrences such as Acts of God or the public enemy; expropriation or confiscation of facilities by Government authorities, compliance with any order or request of any Governmental authorities, acts of war, rebelling or sabotage or fires, floods, explosions, riots or illegal strikes. The contractor shall keep records of the circumstances referred to above and bring these to the notice of the Engineer-in-charge in writing immediately on such occurrences.

### **1.12. Forfeiture Of Retention Money**

Whenever any claim against the contractor for the payment of a sum of money arises out of or under the contract, the Dream City shall be entitled to recover such sum by appropriating in part or whole of the retention money of the contractor. In case, the retention money is insufficient or if no retention money has been taken from the contractor, then the balance or the total sum recoverable, as the case may be, be deducted from any sum then due or which at any time thereafter may become due to the contractor. The contractor shall pay on demand any balance remaining due.

### **1.13. No Compensation For Alteration In Or Restriction Of Work**

If at any time after the commencement of the work, the Dream city ltd shall for any reason whatsoever not require the whole or part thereof as specified in the tender to be carried out, the Engineer-in-charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full, but which he did not derive in consequence of the full amount of the work not having been by reason of any alterations having been made in the original

specifications, drawings, designs and instruction which shall not involve any curtailment of the works as originally contemplated.

#### **1.14. Right Of The Dream city ltd To Determine/Terminate Contract**

The Dream city ltd shall, at any time, be entitled to determine and terminate the contract, if in the opinion of the Dream city ltd the cessation of the work becomes necessary owing to paucity of funds or for any other cause whatsoever, in which case the cost of approved materials at the site as verified and approved by the Engineer-in-charge and of the value of the work done to date by the contractor shall be paid for in full at the rate specified in the contract. A notice in writing from the Dream city ltd to the Contractor of such determination and the reason, thereof shall be the conclusive proof of the fact that the contract has been so determined and terminated by the Dream city ltd.

Should the contract be determined under sub-clause (i) of this clause and the contractor claims payments to compensate expenditure incurred by him in the expectation of completing the whole of the work, the Dream city ltd shall consider and admit such claims as are deemed fair and reasonable and are supported by vouchers to the satisfaction of the Engineer-in-charge. The decision of the Managing Director, Dream City Limited on the necessity and propriety of any such expenditure shall be final and conclusive and binding on the contractor.

#### **1.15. SETTING OUT WORKS**

The Engineer-in-charge shall furnish the contractor with only the four corners of the work site and a level bench mark and the contractor shall set out the works and shall provide an efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.

#### **1.16. RESPONSIBILITY FOR LEVEL & ALIGNMENT**

The contractor shall be entirely and exclusively responsible for the horizontal and vertical alignment, the level and correctness of every part of the work and shall rectify any errors or imperfections therein. Such rectifications shall be carried out by the contractor at his own cost, when instructions are issued to that effect by the Engineer-in-charge.

#### **1.17. DISCREPANCIES BETWEEN INSTRUCTIONS**

Should any discrepancy occur between the various instructions furnished to the contractor, his agents or staff, or any doubt arises as to the meaning of any such instruction or, should there be an misunderstanding between the contractor's staff and the Engineer-in-charge's staff, the Contractor shall immediately report the matter in writing to the Engineer-in-charge whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies between instructions, doubts or misunderstanding shall in any event be admissible.

#### **1.18. INSPECTION OF WORK**

The manufacturer shall have to inform Dream City Pvt. Ltd. at least before 15 days regarding readiness of the lot of pipes. Representatives from Dream City Pvt. Ltd. and / or Third Party Inspection (TPI) Consultant / Project Management Consultant (PMC) (if any) will visit the work site, manufacturer's factory for testing/inspection of the pipes. The manufacturer shall have to make all necessary arrangements for testing/inspection. All the charges towards testing/inspection including travelling charges of Dream City Pvt. Ltd., and / or Third Party Inspection (TPI) Consultant / Project Management Consultant (PMC) representatives shall be borne by the manufacturer.

The Engineer-in-charge and/or Third Party Inspection (TPI) Consultant/ Project Management

Consultant (PMC) representative will have full power and authority to inspect the works at any time wherever in progress, either on the site or at the Contractor's premises/workshops wherever situated, premises/workshop of any person, firm or corporation where materials are being made or are to be supplied, and the contractor shall afford or procure for the Engineer-in-charge and/or Third Party Inspection (TPI) Consultant/ Project Management Consultant (PMC) representative every facility and assistance to carry out such inspection. The contractor shall at all times during the usual working hours and at all other times at which reasonable notice of the intention of the Engineer-in-charge and/or Third Party Inspection (TPI) Consultant/ Project Management Consultant (PMC) representative to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing present for the purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the Contractor himself.

### **1.19. Collection Of Data Tenderers' Responsibility**

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

### **1.20. Royalties :**

Royalties for the construction materials i.e. Sand, Stone, aggregates, Rubble, murrum, gravel as specified from time to time by the State Government shall be paid by the contractor. All ruling regulations have to be strictly adhered to.

### **1.21. Following must be specifically noted;**

- [a] No advance payment terms are accepted.
- [b] No 'D' or 'C' Form or Octroi exemption certificate will be furnished by the Dream city ltd.
- [c] The plant is located within the DREAM CITY Limit.
- [d] Rates quoted must be inclusive of GST, octroi, work contract tax and no dispute at later date will be entertained.
- [e] Applicable sale tax/income tax and surcharge as per Rules, will be deducted from all the payments made to the contractor as a TDS.
- [f] Completion period will remain **12 (Twelve) months [Including monsoon]**. Extension in completion period is not accepted. Further, it is ensured that comments will be offered on the drawings submitted for approval within 15 days of submission of drawing.
- [g] EMD & SD shall be furnished as per tender terms and conditions only
- [h] Tenderer to specifically note that he has to select the contractors from the Contractors List only given in the tender documents. However, for any of the items for which no vendor is mentioned, he must seek prior consent from Dream City while selecting the particular contractor out of Contractor List.
- [i] The defect liability period of 120 (One Hundred Twenty) months shall be considered only after the successful completion of three month trial run and commissioning of the plant.
- [j] It is to note that, it is the responsibility of contractor to watch and ward and make keep security arrangement.

Price Escalation shall not be paid to the contractor by the Dream City Limited in any case.



All the applicable taxes as per the Government Rules and Regulations shall have to borne by the Contractor only, no compensation shall be paid on this account.

Interest of any kind what so ever shall never be paid/entertained in any case including delayed payment of Running bills or final bill or any such or all dues with Dream City Limited.

### **1.22. PROCEDURE OF MEASUREMENT/BILLING OF WORK IN PROGRESS FOR EXTRA ITEMS :**

#### **MEASUREMENTS :**

All measurements shall be in metric system as specified by joints measured by the representative of the Engineer-in-charge and the Contractor's authorised agent progressively. Such measurement will be got recorded in the measurement book by the Engineer-in-charge or his authorised representative and signed in token of acceptance by the contractor or his authorised representative.

All works shall be measured by standard measure and accordance to the rules and custom of the Public Works Department without reference to any local custom.

The measurements of work will be taken according to the usual methods in use in the Public Works Department and no proposals to adept alternative methods will be accepted. The Engineer-in-charge decision as to what is the usual method is use in the Public Works Department will be final.

The rate of any extra item or miscellaneous item to be executed shall be as per Government R&B SOR 15-16, Surat / G.W.S.S.B.,S.O.R. 2014-2015 rate (+) plus or (-) minus percentage or lower stated in the tender.

### **1.23. ACCIDENT LIABILITIES :**

The Contractor shall be solely responsible for all liabilities under workman compensation act, as under :

- a) On occurrence of accident, resulting in death of workman employed by the Contractor which is so serious as is likely to result in death of such workman who meet with accident, the Contractor shall within 24 hours of accident, will intimate in writing to Engineer-in-charge of such incidence. The Contractor shall indemnify client, against all loses/damages sustained by the client resulting directly or indirectly from his failure to give such intimation to client including penalties/fins if any, payable by client as a consequence of client's failure to give notice under workman's compensation act or otherwise to conform the provision of this act in regard to such accidents.
- b) In case when such compensations as above becomes payable under workman's compensation act, whether by contractor or by client as principal employer, it shall be law full for the Engineer-in-charge to retain out of money due and payable to the Contractor, such sum or sums of money as may in the opinion of the Engineer-in-charge be sufficient to meet such a liability, the opinion of the Engineer-in-charge shall be final in regard to all matters arising under this clause.

### **1.24. INSURANCE :**

The Contractor shall take "All Contract Risk Insurance Policy" for the estimated / Tender cost (whichever is more) of this work "Work's Man Compensation Policy" for all workers and labours of contractor and client working at site and "Third Party Insurance Policy" to fully cover all third party type risk.

Contractors shall have to use maximum machinery for the work as per the direction of Engineer-In-Charge.

If possible, space for stacking the surplus excavated earth will be provided by Dream city ltd. Otherwise the contractor shall arrange for the same at no extra cost to Dream city ltd..

### **1.25. TERMS OF PAYMENT**

Billing for the job executed, would be done progressively according to the rules and practice followed by Dream city ltd.

The option for selection of the Make/product/Brand shall rest with Dream city ltd., i.e. the contractor shall have to supply the materials, equipments, plants of a make as approved by the Dream city ltd.

### **1.26. INCOME TAX**

Income tax at the rate of 2% (or at the prevailing rate) on the gross amount billed shall be deducted from the contractor's bills as per section 194C of the Income Tax Act and relevant rules/laws from time to time prevailing.

### **1.27. INCOME TAX CLEARANCE CERTIFICATE**

Attested copy of the latest income tax clearance certificate in the Performa prescribed by the Government of India should accompany the tender. The I.T.C. Certificate should be in the name of the firm/individual, quoting for the tender.

Wherever mentioned in the tender document, "Q.R.O." or "0" quantity means Quote Rates only and "B.O.Q." means Bill of Quantities.

No compensation of any item shall be paid in case any of the item is omitted i.e. not executed at all.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## **21. SPECIFICATIONS FOR CIVIL AND STRUCTURAL WORKS**

### **A. GENERAL**

#### **1. Scope :**

This specification gives the general design requirements and manners of construction of all civil and structural works, the scope of which is given separately.

Placing in position and fixing of all mechanical items, insert plates, sleeves, anchor bolts are also part of work covered by this specification.

Contractor shall be responsible for the designs and construction of all RCC works, structural steel and other relevant civil works.

The contractor shall submit to the Dream city ltd. all the design calculations and drawings for substructure, superstructure and all other connected works for approval. However the approval of the drawings by the Dream city ltd. does not absolve the contractor of his responsibilities regarding the soundness of the structure.

The contractor shall submit a schedule of drawings proposed to make in line with the time schedule included elsewhere in these specifications. The contractor shall submit necessary prints at the time of submissions for approvals and final records.

#### **2. Design :**

The design shall generally be on the basis of structural design specifications enclosed herewith.

All structures/part of structures in contact with water shall be designed as water retaining structures as per IS 3370 parts I to IV [latest revision].

Soil data to be used for the design of the structures shall be as per the enclosed recommendations.

#### **3. Construction :**

The construction shall be done as per latest relevant Indian standards.

### **DESIGN SPECIFICATIONS :**

#### **Scope :**

The design criteria given herein establish the minimum basic requirements for design of reinforced concrete, structures and structural steel works.

**4. IV Codes and Standards :**

- a. Design loads in building : IS : 875.
- b. Concrete Structures :
  - o General Purpose : IS : 456
  - o Raft foundations : IS : 2950
  - o Machine foundations : IS : 2974
  - o Water retaining Structures. : IS : 3370
- c. Steel Structures :
  - o Structural steel in General buidling constn : IS : 800
  - o Steel tubes in general buidling construction : IS : 806
  - o Metal arc welding for general building constn : IS : 816
- d. All other relevant codes specified or referred in the above codes and wherever the reference is made it shall be with latest revisions.
- e. Any exceptions or additions to these specifications, including any mandatory rules or regulations which are to apply, will be indicated on the design drawings/calculations.

**5. Soil and Foundation Data :**

The soil investigation data is enclosed as Annexure with Volume-I-BI of tender. Detailed Soil Investigation Report can be had from the office of the Managing director, if required by the Tenderer.

**GENERAL TECHNICAL SPECIFICATIONS :**

**GENERAL :**

All the items occurring in the work and as found necessary during actual execution shall be carried out in the best workman-like manner as per specifications and the written orders of the Engineer-in-charge.

Extra claim in respect of extra work shall be allowed only if such work is ordered to be carried out in writing by the Engineer-in-charge as extra

The contractor shall engage a qualified Engineer for the Execution of work who will remain present for all the time on site and will receive instructions and orders from the Engineer-in-charge or his authorised representative. The instructions and orders given to the Contractor's representative on site shall be considered as if given to the contractor himself.

A work order book as prescribed shall be maintained on the site of the work by the contractor and the contractor shall sign the orders given by the inspecting officers and shall carry out them promptly.

Quantities specified in the tender may vary at the time of actual execution and the contractor shall have no claim for compensation on account of such variation.

Diversion of road, if necessary, shall be provided and maintained during the currency of the contract by the contractor at his cost.

Figured dimensions of drawings shall supercede measurements by scale. Special dimensions or directions in the specification shall supercede all other dimensions.

All levels are given on drawings and the contractor shall be responsible to take regular level on the approved alignment before actually starting the work. The levels shall be connected to the G.T.S. levels and shall be got approved from the Engineer-in-charge.

If the arrangement for temporary is required to be made during any work of this contract. The same shall be made by the contractor without claiming any extra cost.

#### LOCATION AND ACCESS TO SITE :

The place of the proposed project at Khajod Village is located within the city limit and at the distance of about 16 kmts. from the Surat Railway Station.

#### DESCRIPTION OF WORK :

The work under the contract consists of providing and Laying Sewerage Network, executing civil, mechanical, electrical, instrumentation, PLC works for Pumping station and Providing and Laying Rising Main. The work also includes providing necessary inserts, brackets supports in walls are required for installaing any other facilities to be provided by other agencies.

Painting and colouring operating platforms, leaders, hand railing, rungs etc. with one coat of red oxide primer and two coats of approved enamel.

It is not the intention of this tender to give detailed description and specifications of each and every item. The successful tenderer shall execute each item so as to ensure smooth and efficient working of the total system of which a item is a part. The successful tenderer shall not refuse to carry out any additional items of construction if the same are required for smooth and efficient working of the total system in the opinion of the Dream City or the Engineer-in-charge.

All the items specified in the tender shall be carried out by the successful tenderer as per the practices set out in the relevant latest editions of Indian Standard specifications and IRC specifications.

#### WATER SUPPLY FOR WORK ;

The contractor shall make his own arrangement for supply of proper quantity and quality of water required for construction work and also for consumption of his employees unless otherwise charged as per prevailing Dream City Rules and Regulation.

#### POWER SUPPLY ;

Dream City shall help the contractor by giving a recommendation letter for electric power from G.E.B. / Torrent S.E. Co. not guarantee the supply of electricity and no componsation for non-supply or irregularity of electric power will be entertained. The contractor shall make his own arrangement to get electric power from G.E.B.at his own cost. He shall also keep a generator for power as standly.

#### CEMENT AND STEEL :

Contractor shall make his own arrangement to get cement and steel of the approved quality from any of the approved agencies at his own cost and delay in geting cement and steel from these agencies shall not be taken as a reasons for delay in execution of the various item of work.

#### CLASSIFICATION OF STRATA :

All materials encountered in excavation will be classified in the following ground irrespective of mode of excavating the materials and decision of the Engineer-in-charge in this regard shall be final and binding to the contractor.

#### SOILS & HARD MURRUM :

Soils of all sorts, silt, sand, gravel, soft murrum, stiff clay, kunkar and other excavation not covered in the item mentioned hereunder.

**SOFT-ROCK & HARD-ROCK :**

This shall include all materials which is rock but which does not need blasting and can be removed with a pick-bar, wedges, pavements breakers, penumatic etc.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## 22. SPECIFICATIONS OF MATERIALS

**NOTE: Latest versions of all the I.S. codes mentioned below shall be considered.**

### **M-1 WATER:**

Water shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil and injurious alkalies, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S. 456-2000.

If required by the Engineer-in-charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S. 269-1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 percent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

Hard and bitter water shall not be used for curing.

Portable water shall generally be found suitable for curing mortar or concrete.

Permissible limit for solids:

	Tested as per	Permissible Limit Max.
Organic	IS:3025	200 mg/lit.
Inorganic	IS:3025	3000 mg/lit.
Sulphates (as SO <sub>3</sub> )	IS:3025	400 mg/lit.
Chlorides (as Cl)	IS:3025	2000 mg/lit. for concrete work not containing embedded steel and 500 mg/lit. for pre stressed/reinforced concrete work.
Suspended matter	IS:3025	2000 mg/lit.

### **M-2 LIME:**

Lime shall be hydraulic lime as per I.S. 712-1973. Necessary tests shall be carried out as per I.S. 6932 (Parts I to X) 1973.

The following field tests for limes are to be carried out ---

- a A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime

bears pure white color, lime in form of porous lumps of dirty white color, indicates quick lime, and solid lumps the unburnt lime stone.

- b Acid tests for determining the carbonate content in lime. Excessive amount of impurities and rough determination of class of lime.

Storage shall comply with I.S. 712-1973. The slaked lime, if stored, shall be kept in a weather proof and damp proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.

Field testing shall be done according to I.S. 162-1974 to show the acceptability of materials.

**M-3 CEMENT:**

Fresh quality cement shall be procured only from approved manufacturer/Supplier and shall be subject to prior approval of the Engineer-in-charge. Following types of cement shall be used:

- i. All cement used for the work shall ordinary Portland cement or such other cement as may be permitted by the Engineer-in-charge. Portland cement shall comply with the requirements of the latest issue of IS 269. High alumina cement, rapid hardening cement and Portland slag cement etc., can be used only when permitted by the Engineer-in-charge. Such cements shall be in accordance with relevant IS Codes. Ordinary Portland cement shall conform to IS 269-1976
- ii. Cement which has remained in bulk storage at the mill for more than 6 months, or which as remained in bags at the dealer's storage for over 3 months, or which has been stored at project site for more than 3 months shall be re-tested before use. Cement shall also be rejected if it fails to conform to any of the requirements of these specifications.
- iii. Different types of cement shall not be mixed.

Cement shall be ordinary Portland slag cement as per I.S. 269-1976.

**M-4 WHITE CEMENT:**

The white cement shall conform to I.S. 8042-1978.

**M-5 SAND:**

Sand shall be natural sand, clean, well graded, strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soft or flaky particles, shale, alkalis, salts, organic mater, loam, mica or other deleterious substances and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8% of silt as determined by field tests. If necessary the sand shall be washed to make it clean.

Coarse Sand: The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse shall be as under ---

I.S. Sieve Designation	% by weight passing sieve	I.S. Sieve Designation	% by weight passing sieve
4.75 mm	100	600 Micron	30-100
2.36 mm	90-100	300 Micron	5-70
1.18 mm	70-100	150 Micron	0-60



Fine Sand : The finess modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under

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I.S. Sieve Designation	% by weight passing thru'	I.S. Sieve Designation	by weight passing thru'
4.75 mm	100	600 Micron	40-85
2.36 mm	100	300 Micron	5-50
1.18 mm	75-100	150 Micron	0-10

**M-6 STONE GRIT:**

Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean, of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar. Grit shall generally be cubical in shape and as far as possible flaky elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970. Unless a special stone of a particularly quarry is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious reaction with cement.

The grit shall conform to the following gradation as per sieve analysis :

I.S. Sieve Designation	% passing thru' sieve	I.S. Sieve Designation	% passing thru' sieve
12.50 mm	100%	4.75 mm	0.20%
10.00 mm	85-100%	2.36 mm	0.25%

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

The necessary tests for grit shall be carried out as per the requirements of I.S. 2338 (Parts I to VIII)1963, as per instruction of the Engineer-in-charge. The necessity of test will be decided by the Engineering-in-charge.

**M-7 LIME MORTAR:**

LIME: Shall conform to specification M-2. WATER: Water shall conform to specification M-1. SAND : Sand shall conform to specification M-6.

**PROPORTION OF MIX:**

Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and shall be measured by volume.

**PREPARATION OF MORTAR :**

Lime mortar shall be prepared by wet process as per I.S. 1625-1971. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for 180 revolutions with sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

**STORAGE :** Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.

**USE:**

All mortar shall be used as soon as possible after grinding. It should be used on the day on which it is prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

**M-8 CEMENT MORTAR :**

Water shall conform to specification M-1. Cement shall conform to specification M-3. Sand shall conform to M-5.

**PROPORTION OF MIX:** Cement and sand shall be mixed to specified proportions, sand being measured by measuring boxes. The proportion of cement shall be by volume on the basis of 50 Kg./Bag of cement being equal to 0.0342 Cum.

The mortar may be hand mixed or machine mixed as directed.

**PREPARATION OF MORTAR** In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

**M-9 STONE COARSE AGGREGATE:**

Coarse aggregate shall be of machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement concrete shall generally be as per the table given below. However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6mm. less than the cover whichever is smaller.

TABLE

I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size			I.S. Sieve Designation Normal Size	Percentage passing for single sized aggregates of		
	40 mm	20 mm	16 mm		40 mm	20 mm	16 mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10 mm	0.5	0.20	0.30

40 mm	85-100	100	-	4.75mm	-	0.50	0.50
20 mm	0-20	85-100	100	2.35mm	-	-	-
16 mm	-	-	85-100				

NOTE: This percentage may be varied somewhat by the Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests indicated in I.S. 383-1970 and I.S. 456-2000 shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the inter mixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

**M-10 BLACK TRAP OR EQUIVALENT HARD STONE COARSE :**

Aggregate for Design Mix Concrete : Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

The aggregates shall generally be cubical in shape, unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved. Aggregate shall have no deleterious reaction with cement.

The necessary tests indicated in I.S. 383-1970 and I.S. 456-1978 shall have to be carried out to ensure the acceptability of the material.

If aggregate is covered with dust it shall be washed with water to make it clean.

**M-11 BRICK BATS AGGREGATE :**

Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt of any other foreign material. The brick bats shall be of 40 mm to 50 mm size unless otherwise specified in the item. The under burnt or over burnt brick bats shall not be allowed.

The brick bats shall be measured by volume by suitable boxes as directed.

**M-12 BRICKS:**

The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws not nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform color. The bricks shall be molded with a frog of 100mm x 40mm and 10mm to 20mm deep on one of its flat sides. The bricks shall not break when dropped on the ground from a height of 600 mm.

The size of modular bricks shall be 190mm x 90mm x 90mm.

The size of conventional bricks shall be as under --- 225 x 110 x 75mm.

Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.

Length : 3.00 mm

Width : 1.50 mm  
Height : 1.50 mm

The crushing strength of the bricks shall not be less than 35 Kg./Sq.Cm. The average water absorption shall not be more than 20% by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 (Part I to IV)-1976.

#### **M-12A FLYASH BUILDING BRICKS:**

The Fly ash building bricks shall conform to Grade-5 of IS-13757. The frog of the 80 to 100 mm x 40 mm x 10 to 20 mm size.

The size of modular bricks shall be 190 mm x 90 mm x 90 mm.

The size of conventional brick shall be 230 mm x 110 mm x 70 mm.

Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work:

Length:  $\pm 4$  mm  
Width :  $\pm 2$  mm  
Height:  $\pm 2$  mm

The physical characteristics of bricks shall be as follows.

The minimum compressive strength of Fly ash building bricks shall not be less than 70 Kg/Sq.Cm. and the test shall conform to IS-3495 (Part-I).

The average water absorption not more than 20 percentage by weight and the test shall conform to IS-3495(Part-3). Sampling of Fly ash building bricks and criteria for conformity shall be as per I.S.:5454.

#### **M-13 STONE:**

The stone shall be of the specified variety such as Granite/ Trap stone/Quartzite or any other type of good hard stones. The stones shall be obtained only from the approved quarry and shall be hard, sound, durable and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects or imperfections tending to affect their soundness and strength. The stone with round surface shall not be more than 5% of dry weight. When tested in accordance with I.S. 1134-1974. The minimum crushing strength of the stone shall be 200 Kg./Sq.Cm. unless otherwise specified.

The samples of the stone to be used shall be got approved before the work is started.

The khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of the stone shall be so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm nor shall it have depressions more than 10 mm from the average wall surface.

#### **M-14 MILD STEEL BARS:**

Mild steel bars reinforcement TMT/ CRS Bars for R.C.C. work shall conform to I.S. 432 (Part-II)-1966 and shall be of tested quality. It shall also comply with the relevant part of I.S. 456-2000.

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

For the purpose of payment the bar shall be measured correct up to 10 mm length and weight payable worked out as per the rate specified below :

i	6mm	0.22 Kg/Rmt.	viii	20mm	2.47 Kg/Rmt.
ii	8mm	0.38 kg/Rmt.	ix	22mm	2.98 kg/Rmt.
iii	10mm	0.62 kg/Rmt.	x	25mm	3.85 kg/Rmt.
iv	12mm	0.89 kg/Rmt.	xi	28mm	4.83 kg/Rmt.
v	14mm	1.21 kg/Rmt.	xii	32mm	6.31 kg/Rmt.
vi	16mm	1.58 kg/Rmt.	xiii	36mm	7.31 Kg/Rmt.
vii	18mm	2.00 Kg/Rmt.	xiv	40mm	9.86 Kg/Rmt.

#### **M-15 HIGH YIELD STRENGTH STEEL DEFORMED BARS :**

High yield strength steel deformed bars shall be Thermo Mechanically Treated Bar and shall conform to I.S. 1786 with its latest publication.

Other provision and requirements shall conform to specification No. M-14 for Mild Steel Bars.

Reinforcing steel shall not be stored directly on the ground. These shall be stored under cover and shall be protected from rusting, oil, grease and distortions as directed by the Engineer-in-charge.

#### **M-16 HIGH TENSILE STEEL WIRES :**

The high tensile wires for use in pre stressed concrete shall conform to I.S. 2090-1962.

The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength and minimum strength shall be taken as per Para 6-1 of the I.S. 1785-1962. Testing shall be done as per I.S. requirements.

The high tensile steel shall be free from loose mill scale, rust, oil, grease or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing carborundum.

The high tensile wire shall be obtained from manufactures in coils having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled.

#### **M-17 MILD STEEL BINDING WIRE :**

The mild steel wire shall be of 1.63mm or 1.22mm (16 or 18 gauge) diameter and shall conform to I.S. 280-1972.

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

#### **M-18 STRUCTURAL STEEL :**

All structural steel shall conform to I.S. 226-1965. The steel shall be free from the defects mentioned in I.S. 226-1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.

When the steel is supplied by the contractor test certificates of the manufacturers shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

#### **M-19 SHUTTERING:**

The shuttering shall be either of wooden planking of 30mm minimum thickness with or without steel lining or of steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical ballies properly cross bracked together so as to make the centering rigid. In places of ballie props, bricks pillar of adequate section built in mud mortar may be used.

The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of concrete, live load of men working with it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall not permit leakage of cement grout.

If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work. The complete form work shall be got inspected by and approved from the Engineer-in-charge, before the reinforcement bars are placed in position.

The props shall consists of bullies having 100mm minimum diameter measured at mid length and 80mm at thin end and shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq.m. laid on sufficiently hard base.

Double wedges shall further be provided between the sole plate and wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.

The timber used in shuttering shall not be so dry so as to absorb water from concrete and swell or bulge nor so green or wet so as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.

As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.

The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution. In case of steel shutteirng either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.

The shuttering for beams and slabs shall have camber of 4mm per metre (1 in 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers, the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

#### **M-20 TEAK WOOD:**

The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.

Teak wood shall generally be free from large, loose, dead or cluster knots, flaws, warps, twists,

shakes, bends or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. It shall be free from rot, decay, harmful fungi and other defects of harmful nature, which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting, using any adhesive or resinous materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.

All scantlings, planks etc. shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.

The tolerances in the dimensions shall be allowed at the rate of 1.5 mm per face to be planed.

**First Class Teak Wood:**

First class teak wood shall have no individual hard and sound knots, more than 6 sq.cm. in size and the aggregate area of such knots shall not be more than 1% of area of piece. The timber shall be closed grained.

**Second Class Teak Wood:**

No individual hard and sound knots shall be more than 15 sq.cm. in size and aggregate area of such knots shall not exceed 2% of the area of piece.

#### **M-21 NON-TEAK WOOD:**

The non teak wood shall be chemically treated, seasoned as per I.S. Specifications and of good quality. The type of wood shall be got approved before collecting the same on site. Fabrication of wooden members shall be started only after approval. For this purpose wood of Bio, Kalai, Sires, Saded, Behda, Jamun, Sisoo will be used for door frames whereas only Kalai, Siras, Halda, Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

The non teak wood shall be free from large, loose dead or cluster knots, flows, shakes, warps, bends, or any other defect. It shall be uniform in substance and of straight fibers as far as possible. It shall be free from rots, decay, harmful fungi and other defects of similar nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour of the wood shall be uniform as far as possible. The scantlings, planks etc. shall be sawn in straight lines and planes in the direction of grain and of uniform thickness.

The department will use the Agency to produce a certificate from the Forest Department in the event of a dispute and the decision of the Department shall be final and binding to the contractor.

The tolerance in the dimension shall be allowed at 1.5 mm. per face to be planed.

#### **M-22 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE):**

The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S. 2202-(Part-I) - 1980. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members.

The commercial plywood, cross bands shall conform to I.S. 303-1275.

The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or corss bands, and face veneers. The lipping, rebating, opening of glazing, venetion etc. shall be provided if specified in the drawing.

All edges of the door shutters shall be square. The shutters shall be free form twist or warp in its plane. Both faces of the shutters shall be sand papered to smoot even texture.

The shutters shall be tested for ---

- i End Immersion Test: The test shall be carried out as per I.S. 2202 (Part-I) 1980. There shall be no delamination at the end of the test.
- ii Knife Test: The face panel when tested in accordance with I.S. 1659-1979 shall pass the test.
- iii Glue Adhesion Test : The flush door shall be tested for glue adhesive test in accordance with I.S. 2202 (Part-I)-1980. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single delamination more than 80 mm. in length and more than 3 mm. in depth has occured in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continously around the corner. Delamination at the knots knot, hole and other permissible wood defects shall not be considered in assessing the sample.

The tolerance in size of solid core type flush doors under:

In nominal thickness # 1.2 mm. In nominal height # 3 mm. The thickness of the shutters shall be uniform throughout with a permissible variation of not more than 0.8 mm. when measured at any two points.

### **M-23 ROLLING SHUTTERS:**

The rolling shutters shall conform to I.S.6248-1979. Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters upto 3.5 m. Width not less than 1.25 mm. thick and 80 mm. wide for shutters 3.5 m. in width and above unless otherwise specified.

Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) joint less construction. The thickness of sheet used shall not be less than 3.15 mm.

Hood covers shall be made of M.S. sheets not less than 0.92 mm. thick. For shutters having width 3.5 mts. and above, the thickness of M.S. sheet for the hood covers shall be not less than 1.25 mm.

The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire or strip of adequate strength to balance the shutters in position. The spring pipe shaft etc. shall be supported on strong M.S. or malleable C.I. brackets. The brackets shall be fixed on the or under the lintel as specified with rawl plugs and screws bolts etc.

The rolling shutters shall be of self rolling type up to 8 sq.m. clear area without ball bearing and up to 12 sq.m. clear area with ball bearing. If the rolling shutters are of larger then gear operated type shutters shall be used.

The locking arrangement shall be provided at the bottom of shutter at both ends. The shutters shall be opened from outside.

The shutters shall be completed with door suspension, shafts, locking arrangements, pulling hooks,



handles and other accessories.

#### **M-24 COLLAPSIBLE STEEL GATE:**

The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball bearings shall be provided in every double channel. Unless otherwise specified the particulars of collapsible gate shall be as under ---

- i Pickets : These shall be of 20 mm. M.S. channels of heavy sections unless otherwise shown on drawings. The distance centre to centre of pickets shall be 12 cms. with an opening of 10 cms.
- ii Pivoted M.S. flats shall be 20 mm. x 6 mm.
- iii Top and bottom guides shall be from tee or flat iron of approved size.
- iv The fittings like stoppers, fixing hold fasts, locking cleats, brass handles and cast iron rollers shall be of approved design and size.

#### **M-25 GLASS:**

All glass shall be of the best quality, free from specks, bubbles, smokes, veins, air holes blisters and other defects. The kind of glass to be used shall be as mentioned in the item or specification or in the special provisions or as shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications for different kinds of glass shall be as under ----

##### **Sheet Glass:**

In the absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet glass shall be weighing 7.5 Kg./Sq.m. for panes upto 600 mm. x 600 mm.

For panes larger than 600 mm. x 600 mm. and upto 800 mm. x 800 mm. glass weighing not less than 8.75 Kg./Sq.m. shall be used. For bigger panes upto 900 mm. x 900 mm. glass weighing not less than 11.25 Kg./Sq.m. shall be used.

Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I.S.761-1960. Sheet glass of the specified colours shall be used, if so shown on detailed drawings or so specified. For important buildings and for panes with any dimensions over 900 mm. plate glass of specified thickness shall be used.

##### **Plate Glass:**

When plate glass is specified it shall be "Polished Patent Plate Glass" of best quality. It shall have both the surface ground flate and parallel and polished to obtain clear undistured vision and reflection. The plate glass shall be of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In the absence of any specified thickness, the thickness of plate glass to be supplied shall be 6 mm. and a tolerance of 0.20 mm. shall be admissible.

##### **Obscured Glass:**

This type of glass transmits light so that vision is partially or almost completely obscured. Glass shall be plain rolled, figured, ribbed or fluted, or frosted glass as may be specified as required. The thickness and type of glass shall be as per details on drawings or as specified or as directed.

##### **Wired Glass:**

Glass shall be with wire netting embedded in a sheet of plane glass. Electrically welded 13 mm. Georgain square mesh shall be used. Thickness of glass shall not be less than 6 mm. wired glass

shall be of type and thickness as specified.

## **M-26 FIXTURES & FASTENINGS:**

General ---

- i The fixtures and fastenings, that is, butt, hinges, tee and strap hinges, sliding door bolts, tower bolts, door latch, bath-room latch, handles, door stoppers, casement window fasteners, casement stays and ventilator catch shall be made of the metal as specified in the item or its specifications.
- ii They shall be of iron, brass, aluminum, chromium plated iron, chromium plated brass, copper oxidised iron, copper oxidised brass or anodised aluminum as specified.
- iii The fixtures shall be heavy, medium or light type. The fixtures and fastenings shall be smooth finished and shall be such as will ensure ease of operation.
- iv The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.
- v Brass and anodised aluminum fixtures and fastenings shall be bright finished.

Holdfasts:

- i Holdfasts shall be made from mild steel flat 30 cm. length and one of the holdfasts shall be bent at right angle and two nos. of 6 mm. dia. holes shall be made in it for fixing it to the frame with screws. At the other end, the holdfast shall be forked and bent at right angles in opposite directions.

Butt Hinges:

- i Railway standard heavy type butt hinges shall be used when so specified.
- ii Tee and strap hinges shall be manufactured from M.S. sheet.

Sliding Door Bolts (Aldrops):

- i The aldrops as specified in the item shall be used and shall be got approved.

Tower Bolts (Barrel Type):

- i Tower bolts as specified in the item shall be used and shall be got approved.

Door Latch:

- i The size of door latch shall be taken as the length of latch.

Bathroom Latch:

- i Bathroom latch shall be similar to tower bolt.

Handle:

- i The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm. more than the size of the handle.

Door Stoppers:

- i Door stoppers shall be either floor door stopper type or door catch type. Floor stopper shall be of overall size as specified and shall have a rubber cushion.

Door Catch:

- i Door catch shall be fixed at a height of about 900 mm. from the floor level such that one part

of the catch is fitted on the inside of the shutter and other part is fixed in the wall with necessary wooden plug arrangements for appropriate fixity. The catch shall be fixed 20 mm. inside the face of the door for easy operation of catch.

**Wooden Door Stop With Hinge:**

- i Wooden door stop of size 100 mm. x 60 mm. x 40 mm. shall be fixed on the door frame with a hinge of 75 mm. size and at a height of 900 mm. from the floor level. The wooden door stop shall be provided with 3 coats of approved oil paint.

**Casement Window Fastener:**

- i Casement window fastener for single lead window shutter shall be left or right handed as directed.

**Casement Stays (Straigot Peg.Stay):**

- i The stays shall be made from a channel section having three holes at appropriate position so that the window can be opened either fully or partially as directed. Size of the stay shall be 250 mm. to 300 mm. as directed.

**Ventilator Catch:**

- i The pattern and shape of the catch shall be as approved.

**Pivot:**

- i The base and socket plate shall be made from minimum 3 mm. thick plate, and projected pivot shall not be less than 12 mm. dia. and 12 mm. length and shall be firmly riveted to the base plate case of iron pivot and in single piece base in the case of brass pivot.

**M-27 PAINTS:**

**Oil Paints:**

Oil paints shall be of the specified colour and shade, and as approved. The ready mixed paints shall only be used. However, if ready mixed paint or specified shade or tint is not available white ready mixed paint with approved stainer will be allowed. In such a case, the contractor shall ensure that the shade of the paint so allowed shall be uniform.

All the paints shall meet with the following general requirements ---

- i Paint shall not show excessive setting in a freshly opened full can and shall easily be redispersed with paddle to a smooth homogeneous state. The paint shall show no curdling, livering, caking or colour separation and shall be free from lumps and skins.
- ii The paint as received shall brush easily, possess good leveling properties and show no running or sagging tendencies.
- iii The paint shall not skin within 48 hours in a three quarters filled closed container.
- iv The paint shall dry to a smooth uniform finish free from roughness, grit un evenness and other imperfections.

Ready mixed paint shall be used exactly as received from the manufacturers and generally according to their instructions and without any admixtures whatsoever.

**Enamel Paints:**

The enamel paint shall satisfy in general requirements as mentioned in specification of oil paints. Enamel paints shall conform to I.S. 2933-1975.

**M-28 FRENCH POLISH:**

The French polish of required tint and shade shall be prepared with the below mentioned ingredients and other necessary materials :

- i Denatured spirit of approved quality.
- ii Shellac.
- iii Chandras.
- iv Pigment.

The French polish so prepared shall conform to I.S. 348-1968.

#### **M-29 MARBLE CHIPS FOR MARBLE MOSAIC TERRAZZO:**

The marble chips shall be of approved quality and shades. It shall be hard, sound, dense and homogeneous in texture with crystalline and coarse grains. It shall be uniform in colour and free from stains, cracks, decay and weathering.

The size of various colours of marble chips ranging from the smallest up to 20 mm. shall be used where the thickness of top wearing layers is 6 mm. in size. The marble chips of approved quality and colours only as per grading as decided by the Engineer-in-charge shall be used for marble mosaic tiles or works.

The marble chips shall be machine crushed. They shall be free from foreign matter, dust etc. Except as above the chips shall conform to I.S. 2114-1962.

#### **M-30 FLOORING TILES:**

A Plain Cement Tiles -

The plain cement tiles shall be of general purpose type. These are the tiles in the manufacture of which no pigments are used. Cement used in the manufacture of tiles shall be as per Indian Standards.

The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture, the tiles shall be subjected to a pressure of not less than 140 Kg./Sq.cm. The proportion of cement to aggregate in the backing of the tiles shall be not leaner than 1:3 by weight. The wearing face, though the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm size. The proportion of cement to the marble chips aggregate in the wearing layer of the tiles shall be three parts of cement to one part of chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist condition continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S. 1237-1980 requiring resistance to wear and water absorption.

The wearing face of the tiles shall be plain, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right angle and all edges shall be sharp and true.

The tile sizes shall generally be square shape 24.85cm. x 24.85cm. or 25cm. x 25cm. The thickness of the tiles shall be 20 mm.

The tolerance of length and breadth shall be plus or minus 1 mm. The tolerance on thickness shall be plus 5 mm.

The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water

absorption as per I.S. 1237-1980.

#### B Plain Colored Tiles:

These tiles shall have the same specifications as for plain cement tiles as per (A) above except that they shall have a plain wearing surface wherein pigments are used. They shall conform to I.S. 1237-1980.

The pigment used for coloring cement shall not exceed 10% by weight of cement used in the mix. The pigments, synthetic or otherwise, used for coloring tiles shall have permanent colour and shall not contain materials detrimental to concrete.

The colour of the tiles shall be specified in the item or as directed.

#### C Marble Mosaic Tiles:

These tiles have the same specifications as per plain cement tiles except the requirements as stated below ---

The marble mosaic tiles shall conform to I.S. 1237-1980. The wearing face of the tiles shall be mechanically ground and filled. The wearing face of tiles shall be free of projections, depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.

Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall be 6 mm. For pattern of chips to be bad on the wearing face, a few samples with or without their full size photographs as directed shall be presented to the Engineer-in-charge for approval.

Any particular samples, if found suitable shall be approved by the Engineer-in-charge, of he may ask for particular sized chips to be more or less in the sample presented. The samples shall have to be made by the contractor till a suitable sample finally approved for use in the work. The contractor shall ensure that the tiles supplied for the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, colour shade, chips, distribution etc. required.

The tiles shall be prepared from cement conforming to Indian Standards or colored Portland cement generally depending upon the colour of tiles to be used or as directed.

#### D Chequered Tiles:

Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below.

The tiles shall be of nominal size of 250mm x 250mm or as specified. The centre to centre distance of the Chequer shall not less than 25mm. and not more than 50mm. The overall thickness of the tile shall be 28mm.

The grooves in the Chequer shall be uniform and straight. The depth of the grooves shall not be less than 3mm. The chequered tiles shall be plain, colored or mosaic as specified. The thickness of the upper layer measured from the top of the Chequer shall not be less than 6mm. The tiles shall be given the first grinding with machine before delivery to site.

Tiles shall conform to relevant I.S. 1237-1980.

#### E Chequered Tiles for Staircases:

The requirements of these tiles shall be the same as chequered tiles as per (D) above except in following respects:

- i The length of a tile including nose shall be 330 mm.
- ii The minimum thickness shall be 28 mm.
- iii The nosing shall have also the same wearing layer at the top.
- iv The nosing edge shall be rounded.
- v The front portion of the tile for a minimum length of 75mm. from and including the nosing shall have grooves running parallel to nosing and at centers not exceeding 25mm. Beyond that the tiles shall have normal Chequer pattern.

#### M-31 ROUGH KOTAH STONE:

The kotah stones shall be hard, even, sound and regular in shape and generally uniform in colour. The colour of the stone shall generally be green. Brown colored stones shall not be allowed for use. They shall be without any soft veins, cracks or flaws.

The size of the stones to be used for flooring shall be size 600 mm. x 60 mm. and/or size 600 mm. x 450 mm. as directed. However, smaller sizes will be allowed to be used to the extent of maintaining the required pattern. Thickness shall be as specified.

Tolerance of minus 30 mm. on account of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be plus 3mm.

The edges of stones shall be truly chiselled and table rubbed with coarse sand before paving. All angles and edges of the stone shall be true, square and free from chipping and the surface shall be true and plain.

When machine cut edges are specified, the exposed edges and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform.

#### M-32 POLISHED KOTAH STONES:

Polish kotah stone shall have the same specifications as per rough kotah stone except as mentioned below.

The stone shall have machine polished smooth surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. the stones to be used for dedo, skirting, platforms sink, veneering, sills, steps etc. where machine polishing after the stones are fixed in situ is not possible shall be double polished.

#### M-33 WHITE GLAZED TILES:

The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape. They shall be free from cracks, crazing, spots, chipped edges and corners. The glassing shall be of uniform shade.

The tiles shall be of nominal size of 150mm. x 150mm. unless otherwise specified. The maximum variation from the stated sizes, other than the thickness of tile, shall be plus or minus 1.5mm. The thickness of the tile shall be 6mm. except as above the tiles shall conform to I.S. 777-1970.

**M-34 GALVANISED IRON PIPES AND FITTINGS:**

Galvanised iron pipe shall be of the medium type and of required diameter and shall comply with I.S. 1239-1979.

The specified diameter of the pipes shall refer to the inside diameter of the bore. Clamps, screw and all galvanised iron fittings shall be of the standard 'R' or equivalent make.

**M-35 BIB COCK AND STOP COCK:**

A bib cock is a draw off tap with a horizontal inlet and a free outlet. A stop cock is a valve with a suitable means of connection for insertion in a pipe line for controlling or stopping the flow.

They shall be of screw down type and or brass chromium plated and of diameter as specified in the description of the item. They shall conform to I.S. 781-1977 and they shall be of best Indian make. They shall be polished bright.

The minimum finished weight of bib cock and stop shall be as given below ---

Dia.	Bib Cock	Stop Cock	Dia.	Bib Cock	Stop Cock
8 mm.	0.25 Kg.	0.25 Kg.	15 mm.	0.40 Kg.	0.40 Kg.
10 mm.	0.30 Kg.	0.35 Kg.	20 mm.	0.75 Kg.	0.75 Kg.

**M-36 GUN METAL WHEEL VALVE:**

The gun metal wheel valve shall be of approved quality. These shall be of gun metal fitted with wheel and shall be of gate valve opening full way and of the size as specified. These shall conform to I.S. 778-1971.

**M-37 WHITE GLAZED PORCELAIN WASH BASIN:**

Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556-(Part-IV)-1972 and I.S. 771-1979. The size of the wash basin shall be as specified in the item. The wash basin shall be of one piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole or two holes as specified. Each basin shall have a circular waste hole which is either rebated or bevelled internally with 65 mm. dia. at top and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the under side of the basin shall be provided. Basin shall have an internal soap holder recess which shall fully drain into the bowl.

White glazed pedestal of the quality and colour as that of the basin shall be provided where specified in the item. It shall be completely recessed at the back for reception of supply and water pipe. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from the floor to top of the rim of basin 750 mm. to 800 mm. as directed.

**M-38 CAST IRON PIPES AND FITTINGS:**

All soil, waste, vent and antisiphonage pipes and fittings shall conform to I.S. 1729-1964. The pipes shall have spigot and socket ends with head on spigot end. The pipes and fittings shall be true to shape, smooth, cylindrical their inner and outer surfaces being as nearly as practicable concentric. They shall be sound and nicely cast and shall be free from cracks, laps, pin holes or other imperfections and shall be neatly dressed and carefully fettled.

The end of pipes and fittings shall be reasonably square to their axis.

The sand cast iron pipes shall be of the diameter as specified in the description and shall be in length of 1.5 M., 1.8 M. & 2.0 M. including socket ends of the pipe unless shorter length are either specified or required at junction etc. The pipes and fittings shall be supplied without ears unless specified or directed otherwise.

Tolerances: The standard weights and thickness of pipes shall be as shown in the table below. A tolerance up to minus 10% may however be allowed against these standard weights.

Sr. No.	Nominal Dia. of bore	Overall Thickness	Weight of Pipe Excluding Ears		
			1.5M.long	1.8M.long	2M.long
1.	75 mm.	5.0 mm.	12.83 Kg.	16.52 Kg.	18.37 Kg.
2.	100 mm.	5.0 mm.	18.14 Kg.	21.67 Kg.	24.15 Kg.
3.	150 mm.				
4.	250 mm.				

A tolerance up to minus 15% in thickness and 20 mm. in length will be allowed. For fittings tolerance in lengths shall be plus 25 mm. and minus 10 mm.

The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes. The tolerance in weights and thickness shall be the same as for straight pipes.

**M-39 ASBESTOS CEMENT PIPE (A.C. PIPE):**

The asbestos cement pipe of diameter as specified in the description of the item shall conform to I.S. 1926-1980. Special like bends, shoes cowls, etc. shall conform to relevant Indian Standards. The interior of pipe shall have a smooth finish, regular, surface and regular internal diameter. The tolerance in all dimensions shall be as per I.S. 1926-Part-I-1980.

**M-40 BITUMEN FELT FOR WATER PROOFING AND DAMP PROOFING:**

Bitumen felt shall be on the fibre bases and shall be of type 2, self finished felt grade-2 and shall conform to I.S. 1322-1970.

**M-41 SELECTED EARTH:**

The selected earth shall be that obtained from excavated material or shall have to be brought from outside as indicated in the item. If item does not indicate anything, the selected earth shall have to be brought from outside.

The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and shrinkable soil shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50 mm. or less. Contractor shall make his own arrangements at his own costs for land for borrowing selected earth. The stacking of materials shall be done as directed by the Engineer-in-charge in such a way as not to interfere with any constructional activities and in proper



stacks.

When excavated material is to be used, only selected stuff got approved from the Engineer-in-charge shall be used. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above.

#### **M-42 MARBLE SLAB:**

Marble slabs shall be white or of other colour and of best quality as approved by the Engineer-in-charge. Slab shall be hard, close, uniform and in texture. They shall also be free defects and cracks. The surface shall be machine polished to an even and perfectly plane surface and the edges, machine cut true and square. The rear face shall be rough enough to provide key for the mortar.

Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slabs shall be minimum 450mm. x 450mm. and preferably 600mm. x 600mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.

The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the contractor in the office for reference.

Except as above, the marble slabs shall conform to I.S.1130-1969 or as revised from time to time.

#### **M-43 INDIAN TYPE WATER CLOSET:**

The Indian type white glazed water closet of first class quality, size as specified in the item and conforming to I.S. 771-1979 and I.S. 2556-(Part-II)-1981. Each pan shall have integral flushing ring of suitable type with adequate number of holes all around as directed to have satisfactory flushing. It shall also have an inlet at back of front for connecting flush pipe as directed. The inside of the bottom of the pan shall have sufficient slope from the front towards the outlet and the surface shall be uniform and smooth. Pan shall be provided with 100 mm. diameter 'P' or 'S' trap with approximately 50 mm. water seal and 50 mm. diameter vent horn.

#### **FOOT RESTS:**

A pair of white glazed earthen ware rectangular foot rests of minimum size 250 mm. x 130 mm. x 20 mm. shall be provided with the water closet.

#### **M-44 GLAZED EARTHEN WARE SINK:**

The glazed earthenware sink shall be of specified size, colour and quality. The sink shall conform to I.S. 771-Part-II-1979. The brackets for sinks shall conform to I.S. 775-1970.

The pipes shall conform to I.S. 1239-Part-I-1973 and I.S.404-1962 for steel and lead pipes respectively. 32 mm. brass waste coupling of standard pattern with brass chain and rubber plug shall be provided with sink.

#### **M-45 GLAZED EARTHEN WARE LIPPED TYPE FLAT BACK URINAL/CORNER TYPE URINAL:**

The lipped type urinal shall be flat back or corner type as specified in the item and shall conform to I.S. 771-1979. It shall be of best Indian make and size as specified and approved by the Engineer-in-charge. The flat back or corner type urinal must be of first class quality, free from any defects, cracks etc.

**M-46 FLUSH COCK:**

Half turn flush cock (heavy weight) shall be of gun metal chromium plated of diameter as specified in the description of the item. The flush cock shall conform to relevant Indian Standards.

**M-47 NAHNI TRAP:**

Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability. The thickness of the base metal shall not be less than 6.5 mm. The surface shall be smooth and free from crack, chips and other flaws or any other kind of defects which affect serviceability. The size of nahni trap shall be as specified and shall be of self cleansing design.

The nahni trap shall be of quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.

The nahni trap provided shall be with deep seal, minimum 50 mm. except at places where trap with deep seal can not be accommodated. The cover shall be cast iron. Perforated cover shall be provided on the trap of appropriate size.

**M-48 GULLY TRAP:**

Gully trap shall conform to I.S. 651-1960. It shall be sound, free from defects such as fire cracks or hair cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters. The size of the gully trap shall be as specified in the item.

Each gully trap shall have one C.I. grating of square size corresponding to the dimensions, of inlet of gully trap. It will also have a water tight C.I. cover with frame inside dimensions 300mm. x 300mm. the cover weighing not less than 4.53 Kg. and the frame not less than 2.72 Kg. The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

**M-49 GLAZED STONE WARE PIPE AND FITTINGS:**

The pipes and fittings shall be of best quality as approved by to the Engineer-in-charge. The pipe shall be of best quality manufactured from stone-ware of fire clay, salt glazed thoroughly burnt through the whole thickness, of a close even texture, free from air blows, fire blisters, cracks and other imperfections, which affect the serviceability. The inner and outer surfaces shall be smooth and perfectly glazed. The pipe shall be capable to withstand pressure of 1.5 m. lead without showing signs of leakage. The thickness of the wall shall not be less than (1/12)th of the internal dia. The depth of socket shall not be less than 38 mm. The socket shall be sufficiently large to allow a joint of 6 mm. around the pipe. The pipes shall generally conform to relevant I.S. 651-1980.

**M-50 CRYDON BALL VALVE:**

Ball valve of screwed type including polythene float and necessary lever etc. shall be of the size as mentioned in the description of item and shall conform to I.S. 1703-1977.

**M-51 CRACKSEAL:**

Crackseal manufactured by Chemistic/Chemisol Indian Ltd., is an acrylic base ready application compound.

**M-52 BARBED WIRE :**

The barbed wire shall be of galvanized steel and it shall generally conform to IS : 278. The barbed wire shall be of type –I, whose nominal diameter for line wire, shall be 2.5 mm and for point wire shall be 2.24mm. The nominal distance between two barbs shall be 75mm, unless otherwise specified in the item. The barbed wire shall be formed by twisting together two lines wires, one of them containing the barbs. The size of line and point wires and barbs spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed +0.08 mm.

The barbs shall carry four points and shall be formed by twisting two point wires, each two turns, lightly round one line wire, making altogether four complete turns. The barbs shall be so finished that the four points are set locked at right angle to each other. The barbs shall have length of not less than 13 mm and not more than 18 mm. The points shall be sharp and cut an angle not greater than 35° of the axis of the wire, forming the barbs.

The line and point wires shall be of circular section, free from scale and other defects and shall be uniformly galvanized. The line wire shall be in continuous length and shall not contain any weld other than those in the rod before it is drawn. The distance between two successive splices shall not less than 15m.

The length per 100kg of barbed wire, IS type –I, shall be as under :

Nominal 1000m.

Minimum 934 m.

Maximum 1066 m.

#### **M-53 ASBESTOS CEMENT SHEET**

Asbestos cement sheet plain, corrugated or semi corrugated and curved shall be from Everest or equivalent as approved by the Architect or Engineer-in-charge. It shall conform to IS :459. The thickness of the sheet shall be as specified in the item. The sheet shall be free from all the defects such as cracks, holes, deformation, chipped edge or otherwise damaged.

It shall be manufactured by reinforcing Asbestos in cement, in such a manner that every fibre is covered with fine particles of cement to ensure maximum strength. It shall be alkali resistance and anti-corrosive. It should not break during transportation, handling, laying etc. and should be non-destructible, non-inflammable and non-organic. It shall have high tensile strength and high slenderness ratio.

The minimum nominal thickness of sheets shall be 6mm, having covering efficiency of about 90% and weight 1518 kg/ cm<sup>2</sup>. The sheet shall be free from all defects such as cracks, holes, deformation, chipped edge or otherwise damaged. The permissible bending stress shall be 130 kg/ cm<sup>2</sup>

The accessories shall be same thickness that of AC sheets. They shall be suitable for all types of sheets and locations. They also shall be from approved manufacturer and shall be free from any defects. The fixing of AC sheets and accessories shall conform to IS : 730.

Ridges & Hips :

Ridges & hips shall be of same thickness as that of AC sheets. The different types of ridges shall be suitable for its corresponding type of sheets and locations.

Other accessories to be used in roof such as flashing piece, coves, filer pieces, valley gutters, north light and ventilator curves, barge boards etc. shall be from standard manufacture and shall be suitable for the different types of sheet location.

#### **M-54 POLYPROPYLENE STEPS:**

The polypropylene steps shall be clean, well-cast and they shall be free from air and sand holes, cold shuts and warping which are likely to impair the utility of the castings. The portion of the step which projects from walls of the manhole shall have a raised required designed above the general plane of the top surface of the step along the edges of the tread to provide adequate non-slip grip. The steps shall be of dimensions 263 mm x 165 mm x 25 mm (as shown in drawings) with necessary holding arrangement and carting minimum weight of 0.90 Kg. confirming to an ASTM D-4101.

#### **M-55 HDPE PIPES AND FITTINGS**

Providing and laying HDPE pipes with necessary fittings, specials, tee, bends, gaskets, etc. as required and as per the direction of Engineer-in-charge.

#### **Specification**

These pipes have been used for carrying the effluent from distribution boxes to Feeding boxes of the Reactors. These pipes shall be confirming to IS:4984. GI fasteners shall be used for erection purpose whereas SS 304 fasteners shall be used for under water body and shall be paid separately.

#### **Jointing**

HDPE pipe shall be jointed properly with HDPE socketted specials to get smooth inner side surface without any extrusion to avoid any obstruction to the flow of wastewater. If in any particular case butt welding has to be done, smooth inner surface of pipe without intrusion inside shall be ensured.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## **23. DETAILED SPECIFICATION OF CIVIL WORKS**

### **1. EXCAVATION: -**

**Excavation including stacking excavated stuff up to lead 90.0 mt.**

- A) up to 1.5 mt. depth**
- B) 1.5 mt to 3.0 mt. depth**
- C) 3.0 to 4.5 mt. depth**
- D) 4.5 to 6.0 mt. depth**
- E) 6.0 to 7.5 mt. depth**
- F) 7.5 to 9.0 mt. depth**
- G) 9.0 mt to 10.50 mt. depth**

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as directed. The contractor shall do the necessary shoring and shuttering in required. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by removing and watering as required. No earth filling will be allowed for bringing it to level, if by mistake or any other reason excavation is made deeper or wider than that shown on the plan or as directed. The extra depth or width shall be made up with concrete of the same proportion as specified for the foundation concrete at the cost of the contractor.

### **DISPOSAL OF EXCAVATED MATERIALS :**

No materials excavated from the foundation trenches, of whatever kind they may be, are to be placed even temporarily, upto 1.5 mts. or at the distance prescribed by the Engineer, from the outer edge of excavation. All materials excavated shall remain the property of the Corporation. Materials suitable and useful for backfilling or other use shall be stacked in convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach upon the area required for constructional purposes. The site shall be left clean of all debris on completion.

Disposal of excavated materials is subject to the following Unsuitable materials obtained from clearing site and excavation shall be disposed off within City Limit area as directed. Useful materials obtained from clearing site and excavation shall be stacked at convenient place as directed. Materials suitable for backfilling shall be stacked at convenient places as directed.

### **2. REMOVING METALLED / ASPHALT ROAD SURFACE**

Item includes breaking and removing of the road surface upto the bottom of the base course, rubble soling etc. Item also includes stacking of useful material upto the lead of 90 meters.

### **3. CARTING OF SURPLUS EXCAVATED EARTH**

The contractor has to convey the surplus excavated stuff from the site to the place as directed by Engineer-in-charge within the Municipal limit, (maximum distance of 5 KM. from work site) should be dumped and/or spread in such a way as not to obstruct the path of vehicles but it should also make approach to lay the earth beyond that dump.

The conveying of earth shall be done in such a manner that it shall not cause any delay in the progress of the work.

During the conveying of the earth due care shall be taken that the earth should not be misused or wasted. The contractor shall have arranged to collect the mis-spread earth with his own cost

The earth should be loaded, unloaded and spread or dumped in the presence of the Engineer-in-charge or his representative.

#### **4. BARRCADING**

The tenderer shall at his own cost make all proper provision for protecting the work by fencing and red flags by watching and lighting at night, or otherwise as may be directed by the Engineer. The posts of the fencing shall be of timber, securely fixed in the ground, not more than 3.0 meter apart, they shall not be less than 3" in diameter and approximately 2.0 mt. above the surface of the ground. There shall be two rails of horizontal members. One near top of the posts & the other about 0.50 mt. above the ground and each shall be from 2" to 3" in diameter and sufficiently long running from post to post, to which they shall be bound with G.I. Sheets. The G.I. sheets shall be marked with painting of 'Danger' or 'Caution' notice, which should be clearly visible in nights indicating the work is under progress. Red flags shall be tied to the posts for the guidance of the vehicular traffic at all turning points and conspicuous intermediate points. The method of projecting rails beyond the posts and tying them together where they meet will not be allowed on any account. All along the edges of the excavated trenches a bank of about 1.0 mt. High shall be formed where required by the Engineer for further protection at free of cost. Proper provision shall be made for lighting at night and watchmen shall be kept to see that this is properly done. In the event of the tenderer not fully complying with the provisions of this clause, the Engineer, may with or without notice to the tenderer, put up fencing or improve the fencing already put up, or provide or improve the lighting, provide suitable number of red flags or adopt such other measures as he may deem necessary. All the cost of such measures as may be adopted by the Engineer shall be borne by the tenderer.

The fencing along the trenches with red flags shall be maintained, and lighted during night hours by the tenderer until the road surface has been reinstated to the satisfaction of the Engineer.

Arrangements shall be made by the tenderer to divert traffic whenever work in thorough fares is in progress. Entire work shall be carried out in such a manner that flow of traffic shall not be obstructed in any way. If any extra policemen required for the management of the traffic at the junction, the same shall be employed at the cost of the tenderer.

The trench shall be barricaded and warning boards shall be fixed as directed. Red lights shall be hanging at night time at sufficiently closed intervals to indicate the danger and the chowkidar shall be employed to see that the lights are properly burning. The contractors shall be solely responsible for any accident due to any default in barricading, sign posting or red lights and shall bear the consequences.

#### **5. SHORING AND STRUTTING**

##### **GENERAL:**

This item is applicable only when the trench having more than 1.50 mt. depth and if the sides of trenches cannot be sloped or stepped due to any reason and the Engineer-in-charge feel the necessity for safety of trench and adjacent property and traffic. The Contractor should have to take previous approval from Engineer-in-charge before commencing this item.

##### **MATERIALS:**

Sheeting, planks, Wales, struts etc. required for shoring and strutting shall be of approved quality of wood or structural steel as per requirements of IS-3764-1966.

##### **WORKMANSHIP:**

The Contractor before execution shall get approval of design of shoring from Engineer-in-charge. The shoring shall be of sufficient strength to resist side pressure and ensure safety from slips and below and to prevent damage to work and to prevent injury to persons. It shall be removed after getting permission of Engineer-in-charge, after all items for which it is required area completed. Shoring and strutting shall conform to IS - 3764 - 1966 or its latest version.

The sheeting shall be placed against the side of trench so that length of each piece of sheeting is vertical. The sheeting shall be held securely in place against the Wales by ensuring that sheeting is kept firmly placed against the wall of the trench. Where the trench is excavated in loose, sandy or soft soil or soil

which has been previously excavated or soil which is under hydrostatic pressure, each piece of sheeting shall be driven into the bottom of trench so has to be firmly held in place.

Where two or more pieces of sheeting are used one above another, the sheeting shall be so arranged that the lower piece of sheeting overlap the lowest Wales supporting the pieces of sheeting next above next above it. These pieces of sheeting shall be firmly driven in to the soil and securely supported by Wales and struts as the trench is made deeper.

The Wales shall be supported parallel to the bottom or the proposed bottom of the trench. Each wale shall be supported on cleats spliced to the sheeting or by posts set on the Wales next below it and in the case of lowest wale on the bottom of the trench itself. Where necessary, wedges may be provided between a wale and sheeting is supports to that roughly uniform support is given to all individual pieces of sheeting.

Struts shall be horizontal and at right angles to the Wales of sheeting supported thereby. Struts shall be cut to the proper length required to fit in tightly between Wales, where necessary, the struts shall be held securely in place by wedges, driven between struts and the Wales. Struts shall be placed on cleats spliced or bolted to posts supporting Wales.

The sizes and spacing of sheeting, Wales's struts and wedges used for shoring and timbering for different depth shall conform the requirement of IS-3764-1966 or its latest version.

The extra width of excavation that may be deemed necessary for the purpose of shoring and strutting will be under-stood to be covered in the rate for item of shoring and strutting for drain side.

The contractor shall have to make all the necessary arrangements while removing shoring strutting. However, if contractor fails to remove the shoring strutting safely, the corporation shall not be responsible for any type of damages and contractor shall have to bear all the cost for the same and the corporation shall not pay any extra payment for the same.

## **6. DEWATERING**

The contractor shall arrange bailing out of water in the foundation or trenches, accommodated due to rains or by springs subsoil water, canal or river seepage end broken water mains or drains. The excavation shall be kept free from water and moisture content.

- (i) During inspection.
- (ii) When concrete work is in progress and will come above the natural water level.

Pumping from the interior of any foundation enclosure shall be done in such a manner as not to produce the possibility of the movement of water through any fresh concrete.

No pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter unless it is done from a suitable sump separated from the concrete work by a water tight wall or similar other means or by any other method.

The operations of removal of water from trenches shall be so conducted by the contractor that there is no danger to foundation or stability of adjoining earth or structure.

In no case the dewatering should be stopped or failed during the work in progress.

The contractor has to arrange his own machinery, motor, engine, pump and other mechanical equipment with all the maintenance and labour as required for full efficiency of the work.

Necessary fuels and/or electrical power will be arranged by the contractor with all expenditure due to that on his part.

## **7. PLAIN CEMENT CONCRETE (M10 (1:3:6) & M15(1:2:4))**

### **MATERIALS:**

Water shall conform to M-1, Cement shall conform to M-3. Sand shall conform to M-5. Stone aggregate 40-mm nominal size shall conform to M-9.

### **WORKMANSHIP:**

#### **General:**

**Before starting concreting the bed of foundation trenches shall be cleared of all loose materials, leveled, watered and rammed as directed.**

#### **Proportion of Mix:**

The proportion of cement, sand coarse aggregate shall be 1 part of cement, 3 parts of sand 6 parts of stone aggregate measured by volume.

The proportion of cement, sand coarse aggregate shall be 1 part of cement, 2 parts of sand 4 parts of stone aggregate measured by volume.

#### **Mixing:**

The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by Engineer-in-charge. When hand mixing is permitted by The Engineer-in-charge in case of breakdown of machinery and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However, in such case 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period of 1 ½ to 2 minutes. The quantity of water shall be just sufficient to produce dense concrete of required workability for the purpose.

#### **Transporting and placing the concrete:**

The concrete shall be handed from the place of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences. The concrete shall be laid in layers of 15 cms to 20 cms.

#### **Compacting:**

The concrete shall be rammed with heavy iron rammer and rapidly to get the required compaction and to allow the interstices to be filled with mortar.

#### **Curing:**

**After the final set, the concrete shall be kept continuously wet, if required by ponding for a period of not less than 7 days from the date of placement.**

## **8. REINFORCEMENT CEMENT CONCRETE**

The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the concrete of the form.

For reinforced concrete work, coarse aggregate having a nominal size of 20 mm are generally considered satisfactory.



For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5 mm. main bars, or 5 mm. less than the minimum cover to the reinforcement whichever is smaller.

Where the reinforcement is widely spaced as in solid slabs, limitations of size of the aggregate may not be so important, and the nominal maximum size may sometimes be as great as or greater than the minimum cover.

Admixture may be used in concrete only with approval of Engineer-in-charge based upon the evidence that with the passage of time, neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixture.

Form work shall conform to the shape lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor to safeguard against any settlement of the form work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

**Cleaning and Treatment of forms**

All rubbish, particularly chippings shaving and saw dust shall be removed, from the interior of the form before the concrete is placed and the form work in contact with concrete shall be cleaned and thoroughly wetted or treated. The surface shall be then coated with soap solution applied before concreting is done. Soap solution for the purpose shall be prepared by dissolving yellow soap in water to get consistency of paint.

Alternatively a coat of raw linseed oil or form oil of approved manufacturer may be applied in case of steel shuttering in used. Soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get on constructing joint surface and reinforcement bars.

**Stripping Time**

In normal circumstances and where ordinary cement is used forms may be struck after expiry of following period

a	Sides of wall columns and vertical faces of beams	2-4 Days
b	Beam soffits [crops left under]	7 Days
c	Removal of props slabs	
	i] Slabs spanning up to 4.5 Mts.	7 Days
	ii] Spanning over 4.5 Mts.	14 Days
d	Removal of porops to beams and Arches	
	i] Spanning up to 6 Mts.	14 Days
	ii] Spanning over 6 Mts.	21 Days

**Procedure when removing the form work**

All form work shall be removed without such shock or vibration as would the reinforced concrete. Before the soffit form work and struts are removed, the soffits and the concrete surface shall be where necessary in order to ascertain that the concrete has sufficiently hardened.

**Centering**

The centering shall be sufficiently strong to ensure absolute of the form work and concrete work before, during and after pouring concrete. Watch should be kept to see that behavior of centering and form work is satisfactory during concreting erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the form to be removed.

**Scaffolding**

All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion of the work by the contractor. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to with stand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge.

However, the contractor shall be wholly responsible for the safety to the scaffolding, hoisting arrangements, ladders, work and workman etc.

The scaffolding, hoisting arrangements and ladders shall allow easy approach to the work spot and afford easy inspection.

### **Re-use**

Before re-use, all forms shall be inspected by the Engineer-in-charge and their suitability ascertained. The forms shall be scarred, cleaned and joints gone over, repaired where required. Inside surface shall be retreated to prevent adhesion of concrete.

### **Reinforcement**

The bars shall be kept in position by the following methods-

[ i] In case of beam and slab construction, sufficient number of precast cover blocks in cement mortar 1:2 (1 Cement, 2 coarse sand) about 4 x 4 cms. section and of thickness equal to the specified cover shall be placed between the bars and shuttering as to secure and maintain the requisite cover of concrete over the reinforcement.

[ii] In case of columns and walls, the vertical bars shall be kept in position by means of timber temphtes with slots accurately cut in them, the temphtes shall be removed after concreting has been done below it. The bars may also be suitably tied by means of annealed steel wires to the shuttering to maintain their position during concreting.

All bars projecting from pillars, columns beams slabs etc. to which other bars and concrete are to be attached or bounded to later on, shall be protected with a coat of thin neat cement grout, if the bars are not likely to be incorporated with succeeding mass of concrete within the following days. This coat of thin neat cement shall be removed before concreting.

### **Mixing**

For all works, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction.

Measured quantity of aggregate, sand and cement required for each batch shall be poured into the drum of the mechanical mixer while it is continuously running. After about half a minute of dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and a half minute. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass obtained and each individual particle of the coarse aggregate shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons, it shall be done on a smooth watertight platform large enough to allow efficient turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign materials gets mixed with concrete not does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Specified quantity of water shall then be added gradually through a rose

can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10% above that specified.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-charge the first batch of concrete from the mixture shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

### **Consistency**

The degree of consistency which shall depend upon the nature of the work and methods of vibration of concrete, shall be determined by regular slump tests in accordance with I.S. 1199- 1959. The slump of 10 mm to 25 mm shall be adopted when vibrators are used and 80 mm when vibrators are not used.

### **INSPECTION**

Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness but such inspection shall not relieve the contractor of his responsibility for the safety of men, machinery, materials and for results obtained. Immediately before concreting, all forms shall be thoroughly cleaned. Centering design and its erection shall be got approved from the Engineer-in-charge. One carpenter with helper shall invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited from reinforcement laid in position. For access to different parts, suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover mortar blocks of suitable size shall be cast and tied to the reinforcement timber, kapachi or metal pieces shall not be used for this purpose.

### **TRANSPORTING AND LAYING**

The method of transporting and placing concrete shall be as approved. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes place.

All form work shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

Concreting shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the Engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meters when internal vibrators are used and not exceeding 0.30 meters in all other cases.

Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into placed from a height exceeding 2 meters. When trunking or chutes are used they shall be kept close and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened swept clean, thoroughly wetted, and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all fresh water removed and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm. in thickness and shall be well rammed against old work, particular attention being given to corners and close spots.

All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators cannot be used.

Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns. Concrete shall be judged to be compacted when the mortar fills the spaces between coarse aggregate and begins to cream up to form an even surface. Compaction shall be completed before the initial setting starts i. e. within 30 minutes of addition of water to dry mixture. During compaction, it shall be observed that needle vibrators are not applied on reinforcement which is likely to destroy the bond between concrete and reinforcement.

### **COMPACTING**

Concrete shall be properly compacted by use of vibrators or by rodding and spacing as directed by the Engineer, tamping as above shall be continued until all the entrained air is removed and the concrete has been compacted and completely fills the form. The sides of the form work shall be gently tapped by spades during concreting.

Concrete shall be compacted during placing, with approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures, Particular care shall be taken to ensure that all concrete placed against the form faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and caution exercised not to over vibrate the concrete to the point that segregation results.

#### **(i) Types of vibrators**

Vibrators shall conform to IS specification. Types of vibrator to be used shall depend on structure where concrete is to be placed. Shutter vibrators to be effected, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators shall have "no load" frequency, amplitude and acceleration as per IS 2505 depending on the size of the vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.

#### **(ii) Use of Vibrators**

The exact number of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall Immersion vibrators be used to transport concrete inside the forms. Particular attention shall be paid to vibrations at the top of a lift e.g. in a column or wall.

#### **(iii) Melding Successive Batches**

When placing concrete layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending and melding of the concrete between the succeeding layers.

#### **(iv) Penetration Vibrator**

The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below while the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

#### **(v) Vibrating against Reinforcement**

Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.

**(vi) Use of Form Attached Vibrators**

Form Attached Vibrators shall be used only with specific authorization of engineer in charge

**(vii) Use of Surface Vibrators**

The Use of Surface Vibrators will not be permitted under normal conditions. However, for thin slabs such as highways, runways and similar constructions, surface vibration by specially designed vibrators may be permitted upon approval engineer in charge.

**(viii) Stone Pockets and Mortar Pondages**

The formation of stone pockets or mortar pondages in corners and against faces of forms shall not be permitted. Should these occur they should be dug out, reformed and refilled to sufficient depth and shape for thorough bonding as directed by engineer in charge.

**Placement Interval**

Except when placing with slip forms, each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.

**Special Provision in Placing**

When placing concrete in walls with openings, in floors of integral slab and beam constructions and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in walls or bottom horizontal surface of the slab, as the case may be.

Placing shall be resumed before the concrete in place takes initial set, but not until it has had time to settle as determined by the engineer in charge.

**Placing Concrete through Reinforcing Steel**

When placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregate. Where the congestion of steel makes placing difficult, it may be necessary to temporarily move the top steel aside to get proper placement and restore reinforcing steel to design position.

**Bleeding**

Bleeding or free water on top of concrete being deposited into the forms shall because to stop the concrete pour and the conditions causing this effect corrected before any further concreting is resumed.

**CURING OF CONCRETE**

All concrete work shall be protected from direct rays of the sun and be kept wet for a minimum period of 10 days or for longer directed by Engineer-in-charge. Concrete laid shall not be disturbed and shall be suitably protected from any injury until completely set, particular care shall be taken at all corners and edges of the member. All horizontal concrete surface shall be kept constantly wet by ponding or any other manner. Concrete surface shall be cured either by sprinkling or by spraying water.

Flat or fine vertical surfaces may be covered with damp gunny bags and watered frequently. In order to ensure adequate quantities of water for curing, the contractor shall make necessary arrangement such as providing sufficient lengths of temporary pipe line of suitable sizes, storage of water in tanks and/or use of bhisties.

**CONCRETING THOROUGH WATER :**

Concrete shall not be deposited under water without the prior consent in writing of the Engineer. In the event of permission being given, the amount of cement in every batch shall be increased by twenty five percent entirely at the expense of the contractor and he shall take every reasonable precaution to ensure that cement or fine aggregate is not washed out of any concrete so deposited by any flow of water.

### FINISH OF CONCRETE :

- [a] On removal of the shuttering and after the approval of the Engineer, honey combed surfaces shall be made good immediately by the method approved by the Engineer and superficial water and air holes shall be filled in. Unless instructed to the contrary, the faces of exposed concrete placed against shuttering shall be rubbed down with a carborandum stone immediately upon removal of the shuttering to remove fins or other irregularities. The face of concrete for which shuttering is not provided other than a slab, shall be smoothed with a wooden float to give finished equal to that of the rubbed down face where shuttering is provided. No cement wash, mortar or print may be applied to any concrete surface without the express instruction or permission of the Engineer.
- [b] All floors, slabs and inverts shall be laid to the required depths, thickness inclinations and curvatures, shown on the detail drawings Subsequently, and just before settling the concrete shall be finish off to a smooth and even surface with metal floats, unless otherwise ordered.
- [c] Laying of concrete floors and inverts in two courses will not be permitted, except where specified or special permission of the Engineer in writing. Where screeds are required or approved, the structural concrete shall be keyed and prepared as specified for construction joints and the screeding properly bonded.
- [d] First class plane surface free from ripples, hollows airholes or exposed aggregate is required.

### SAMPLING & TESTING OF CONCRETE

Samples from fresh concrete shall be taken as per I.S. 1199-1959 and cubes shall be made, cured and tested at 7 days or 28 days as per requirements in accordance with I.S. 516-1959. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with the following---

Quantity of Concrete in the work	No. of Samples
1 - 5 Cmt.	1
6 - 15 Cmt	2
16 - 30 Cmt	3
31 - 50 Cmt.	4
51 & above	4 + 1 additional sample for each addition 5 Cmt or part thereof

**Note :** Atlest one sample shall be taken from each shift. Ten test specimens shall be made from each sample, five for testing at 7 days and the remaining five at 28 days. the samples of concrete shall be taken on each day of the concreting as per above frequency. The number of specimens may be suitable increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

The average strength concrete in proportion 1:4:8; 1:3:6; 1:2:4 & 1:1.5:3; 1:1:2 of the group of cubes cate for strength of 75, 100, 150, 200 & 250 Kg/Sq.cm. respectively at 28 days. 20% of the cubes cast for each day may have value less than the specified strength provided the lowest value is not less than 85% of the specified strength. If the concrete made in accordance with the proportions given for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the proportions given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

## **STRIPPING**

The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike the form work. While fixing the time for removal of form work, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. In normal circumstances (generally where temperatures are above 20 degrees centigrade) and where ordinary concrete is used, forms may be struck after expiry of periods specified for respective item of form work.

All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soffit and struts are removed, the concrete surface shall be and struts are removed, the concrete surface shall be exposed, where necessary in order to ascertain that the concrete has sufficiently hardened, centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal parts shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge. After removal of form work and shuttering, the Engineer-in-charge shall inspect the work and satisfy by random checks that concrete produced is of good quality.

Immediately after the removal of forms, all exposed bolts etc. passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar. All fine caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in proportions used in the grade of concrete that is being finished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which are pointed shall be kept moist for a period of 24 hours.

If rock pockets/honeycombs in the opinion of the Engineer-in-charge are of such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and required the removal and replacement of the portions of the structure affected.

### **Expansion And Construction Joints :-**

#### **General:**

The item of providing expansion joints and construction joints in concrete includes all the material, labour, tools and plants necessary for completing the work in best workmanlike manner .

#### **Materials:**

The materials to be used in the joints shall be ribbed PVC water stop of specified width approved by the engineer, bitumen impregnated fiber board as filler conforming to IS:10566 and approved sealant material(In case of movement joint only).In addition,IS:12220-1987 and 1838 shall also be adhered.

#### **Joints In Floor:**

Joints in floor shall be provided as specified on drawings or as directed by engineer in charge. In case of PVC water stops to be provided horizontal positions flat-footed PVC water stop shall be used. The water stop shall be provided in such a way that half the portion of water stop (width wise) is embedded in the concrete and half remains exposed for next concrete. Steel reinforcement shall not be discontinued where construction joints in floor are provided.

#### **Joints In Wall**

#### **Expansion Joints**

Expansion joints shall be provided in the walls at positions shown on drawings or as directed by the Engineer In-Charge. Water stops shall be kept in position with the help of bitumen impregnated fiber board fillers. Concrete shall be laid in such a way that half the portion of water stops remains exposed for next concreting. Steel reinforcement shall be discontinued as shown on the drawings or as directed by the Engineer In-Charge.

Expansion joint consists of a fiber board impregnated with bituminous material to render it durable and waterproof. It is compressible, resilient and non-extrudible. It shall conform to IS:1838-P(1)/1983 with latest amendment.

**(a) Purpose:**

To permit free movement of the concrete slabs during expansion and contraction. To provide a water proof seal. To resist entry of foreign matter into the joint space.

**(b) Physical Characteristics:**

Consists of a fiber board impregnated with bituminous materials.

Compressible. Possesses a high degree of recovery once compression is relaxed. Available in thicknesses of 12 mm, 18 mm and 25 mm (1/2", 3/4" and 1" respectively).

**(c) Sealing Compound:**

IS :1834-1984, Grade A (Physical Characteristic/Purpose) Dispuurs good adhesion towards concrete.

Has the ability to withstand extension without cracking.

Low susceptibility to flow during hot weather conditions. Is durable and plastic.

Offers resistance to ingress of foreign substance. Durable, compressible and non-extruding materials.

Horizontal joints shall, where used in water-retaining structures be sealed with a cold pouring poly sulphide rubber sealing compound of quality equal to, or better than serviced "Paraseal". Horizontal joints in roofs, floors and other non-water retaining structures shall be sealed with an approved sealant with properties equal to or better than serviced "Para plastic 41". Vertical joints and joints in the soffits of slab in both water retaining as well as non-water retaining structures shall be sealed with a trowel or gun applied poly sulphide rubber sealing compound such as serviced "Vertiseal" or equivalent. Sealing compounds shall be fully cured before water is permitted to come in contact. At 40°C ,the curing time would be approximately 7 weeks for poly sulphide compound.

**(d) Application Methodology:**

Before applying SHALITEX SEALING COMPOUND, the sces of the joints should be cleaned of dust etc. by a jet of dry air, followed by through drying.

The sides should be sprayed or brushed with PRIMER of approved make as per the instruction of Engineer-in-charge.

Requirements : Primer should be based on a consumption of 78 running meters per liter, for 25 mm depth of joint.

Once the primer has dried completely, SEALING COMPOUND is poured into the joint. The working temperature is 170°C-185°C (345°-365°F). SEALING COMPOUND should be cut into small pieces before adding to the heater, whose bottom should always remain covered with the molten sealing compound when firing is in progress.

During the pouring process, spillage can be minimized if wooden boards are laid on each side of the joint. The pouring should be done from can with extended spouts.

The quantity of SEALING COMPOUND requires per 100 meters of running joint of 25 mm depth, with the following thickness:

9.5 mm thickness	-	29.5 Kg.
12.0 mm thickness	-	40.2 Kg.



18.0 mm thickness - 59.0 Kg.  
25.00 mm thickness - 82.0 Kg.  
(An allowance of 5% should be made for wastage during application.)

### **Construction Joints**

Construction joints shall be provided between two lifts of concrete as shown on drawings or as directed by the engineer in charge.

A groove shall be formed around exposed portion the PVC water stop for proper jointing. Care shall be taken during concreting to keep the water stop in vertical position. In no case shall the water stop be punctured or nailed with the binding wire to keep it in position. Wherever required to be jointed the water stop shall be welded in T,X or L pattern as per the instruction of the Engineer.

A construction joints is defined as a joint in the concrete introduced for convenience in construction at which special measures are taken to achieve subsequent continuity without provision for further relative movement.

No concrete shall be started until the Engineer-in-Charge has approved the method of placing the positions and form of the construction joints and lifts. The construction joints shall be so located as not to impair the strength of the structure.

Concrete placed to form the face of a construction joint shall have all Laitance removed and the aggregate exposed prior to the placing of fresh concrete. The laitance shall wherever practicable be removed by spraying the concrete where it is still green. The whole of the concrete surface forming part of the joint shall be hacked to expose the aggregate. Where aggregate is damaged during hacking, it shall be removed from the concrete face by further hacking. All loose matter shall be removed and the exposed surface thoroughly cleaned by wire brushing, air blasting or washing, leaving the surface clean and damp. Immediately before fresh concrete is placed, a 12 mm thick layer of sand/cement mortar mixed in the same proportions as in the concrete shall be spread in the horizontal face of the construction joint. A drier mix shall be used for the top lift of horizontal pours to avoid Laitance. The new concrete shall be well worked against the prepared face before the mortar sets. Special care shall be taken to obtain through compaction and avoid segregation of the concrete along the joint plane.

### **Complete Construction Joints**

These joints are provided in the top layer of the floor of the reservoir with a view to localize shrinkage cracks at these joints. These joints are characterized by complete discontinuity of steel without any initial gap as in the case of expansion joints. The joints between the adjacent panels of the floor shall be provided with a groove at top of dimension 12 mm x 12mm and shall be filled with poly sulphate sealant and they shall be provided with water stops as specified earlier.

The joints between top layer of the floor and the walls or between the top layer of the floor and the column footing, shall also be provided with a groove of 12mm x 12 mm which shall be filled with sealant material as per specification given below:

**Joints Fillers:** Joint fillers shall be durable, compressible and non-extruding material, It shall be non-staining, non-absorbent and compatible with sealant material used.

**Sealant material:** The joint sealing compounds should be capable of properly ensuring water tightness in vertical, horizontal and inclined joints in water retaining and other structures having severe service conditions in respect of anticipated movement or exposure to weather. Typical uses include expansion joints in the walls of water tank, and in roof and deck slabs exposed to the weather.

The compound should be flexible, durable and weather proof and should have sufficient elasticity to allow joints movements of the concrete components wherever necessary.

The sealant shall be poly sulphide rubber sealing compound conforming to BS 4254 of 1967 or ASA-A 116-1-1960 or any other equivalent specifications. It shall be capable of cold pour application for horizontal joints and cold application of vertical and inclined joints. The sealing compound shall be suitable for the use in the tropics where it will be subjected to high ambient temperatures, humidity and very strong sunlight. It shall not degrade under these conditions and shall be suitable for use with raw and treated water including water dosed with chlorine. The sealant shall be odor and taint free from lead. It shall be available in choice of colors and shall give a thorough, permanent seal, be waterproof, non-staining and remain resilient. Sealing compound for vertical and horizontal joints shall be used complete with the appropriate quantity of primer as per manufacturer's instructions for use. The primers should ensure good adhesion to the concrete and should be specially developed for respective sealing compound. The sealants shall be applied with pressure guns or without guns as specified by the manufacturers. Sealing compound shall be fully cured before water is permitted to come in contact.

The sealant material should be formulated as to have a storage period of one year at a temperature of 40° C.

### **Movement Joints**

Movement Joints are defined as all joints intended to accommodate relative movement between adjoining parts of a structure, special provision being made where necessary for maintaining the water tightness of the joint. The contractor shall comply with the instruction of manufacturers of proprietary jointing materials and shall, if required by the Engineer-in-Charge, demonstrate that the jointing materials can be applied satisfactorily.

The surface of set concrete in a movement joint shall, as shown on the drawings, be painted with two coats of bituminous paint and new concrete shall be placed against it only when the paint is dry. Expansion joints shall be formed by a separating strip of approved performed joint filler.

Caulking grooves shall be provided. At all joints where a caulking groove is formed, immediately prior to caulking, the groove shall be wire brushed and loose material removed and blown out by compressed air. After the groove has dried it shall be primed and caulked with approved sealing compound applied in accordance with the manufacturer's instructions. At all caulked joints, the face of the caulking strip and a width of concrete on either side shall be painted with two coats of paint having the same base as the sealing compound

### **Water Stops And Joints Fillers**

#### **1. Water stops**

At all construction, contraction and expansion joints in the water retaining structure and wherever specified or directed by the Engineer in-Charge, water stops shall be provided. The water stops shall be PVC type or of any other equivalent material as approved by the Engineer-in-Charge. PVC water stops shall have a tensile strength of not less than 14 MN/m<sup>2</sup> and elongation at break of not less than 300%. Water stops shall not be exposed to direct sunlight for long period. Before being concreted in water stops shall be cleaned of all foreign materials. Wherever provided, water stops shall be placed in such a manner that they are embedded in the adjacent section of the panels for equal width.

As far as possible, jointing on site shall be confined to the making of butt joints in straight runs of water stops and all the joints should be monolithic. Where it is agreed with the Engineer-in-Charge that it is necessary to make an intersection or change of direction of any joint, other than a butt joint in a straight run on site, a preliminary joint, intersection or change of direction piece shall be made and submitted to such tests as the Engineer-in-Charge may require.

Flexible water stops shall be fully supported in the formwork, free of nail and clear of reinforcement and other fixtures. Damaged water stops shall be replaced and during concreting care shall be taken to place the concrete so that water stops do not bend or distort.

The different types of water stops to be used in liquid retaining structures will be as follow as:

**Types of Water Stops:**

Sr. no	Types of Joints	Types of water stops
1	Partial/complete contraction joint in walls and slabs	230 mm wide, ribbed with hollow center bulb & 10 mm minimum thickness
2	Expansion joints in walls and slabs	230 mm wide, ribbed with hollow center bulb & 10 mm minimum thickness
3	Construction joints in raft	230 mm wide, ribbed with hollow center bulb & 10 mm minimum thickness
4	Construction joints in wall	230 mm wide, ribbed with hollow center bulb & 10 mm minimum thickness
5	Expansion joints in raft	230 mm wide, ribbed with hollow center bulb & 10 mm minimum thickness

The water stopper shall be 10mm thick either “sinecos/arti” and equivalent PVC Water Stoppers or any other make as approved by the Engineer-In-Charge

**CONSTRUCTION JOINTS :-** Concreting shall be carried out continuously up to construction joints, or predetermined by the Engineer-in-charge.

When the work has to be resumed on a surface which has hardened, such surface shall be roughened. The surfaces shall then be thoroughly cleaned, and all laitance removed with wire brushes and compressed air. In addition to that, the surface shall be completely wetted and slushed with a coat of neat cement grout immediately before placing of new concrete. The first layer of concrete to be placed on these surfaces shall not exceed 150 mm in thickness and shall be well rammed against old work, particular attention being paid to corners and close sports. Shear keys shall be provided to all construction joints.

Reinforcing rods shall be extended 35 diameters beyond construction joints unless otherwise indicated.

Joints in beams shall be kept at places where the shear force is minimum and these shall be at right angles to the direction of main reinforcement. In the case of columns, the joints shall be horizontal and about 150 mm below the bottom of the deepest beam framing into the column head, and the portion of the column between the stopping off level and the top of the slab shall be concreted with the beam. Joints in the R.C.C. slab shall be provided parallel to main reinforcements, or slabs supported thereon. Beams, girders, brackets, columns capitals and branches shall be considered as part of the floor system and shall be monolithically placed therewith.

Construction joints in water retaining structure :

Construction joints for the water retaining structures and underground storage area and lift pits in water logged areas shall be constructed as directed by the Engineer-in-charge prior to taking up any work of this type. Work shall conform to I.S. 3370 unless shown otherwise.

Standard key joints should, however, be provided if so directed, in addition to the water stoppers in the concrete.

The water stoppers shall be PVC or rubber type. Whenever required the transverse joints of the sheets shall either be welded or brased, or overlapped. In case of overlapping of the stoppers the overlap should be minimum and equal to the width of stoppers, the stoppers can be of approved make.

Deposition and compaction of concrete prior and after the construction joint should be very carefully done, so as to avoid internal honey combing. Before the next pour of concrete, the joints should be cleaned of the loose mortar, aggregates dust, preferably by hosing down the water. The surface of the old concrete which is coming in contact with the next pour should be wire brushed and reasonably sprinkled with thick cement slurry so as to ensure proper bond.

### **PROTECTION OF CONCRETE**

- a) Concrete placed below ground level shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances shall be kept free from contact with such ground and with water draining there during placing for a period of three days or as otherwise instructed thereafter.
- b) No load of any kind, however light, shall be allowed on concrete which has not properly set, and unless it has been pronounced by the Engineer.
- c) Immediately after the compaction of the concrete has been completed contractor shall ensure that it is adequately protected from the weather. Protective materials shall be kept continuously damp and in position for a minimum period of fourteen days or such other times as the Engineer may direct.
- d) Where large sections of concrete are poured special precautions as approved by the Engineer shall be taken to reduced and dissipate the heat generally by the settling and hardening of the concrete.

### **CONCRETE ADDITIVE**

- a) The use of retarders will not be permitted.
- b) Other activities shall only be used if written permission has been obtained from the Engineer. They shall be obtained from a manufacturer approved by the Engineer and shall be used strictly in accordance with the manufacturer's and the Engineer's instruction.

### **PERMISSION FOR STARTING THE CONCRETE WORK**

The surface whether concrete or rock or form work etc. on which concrete is to be placed, shall be got inspected and approved by the Engineer, who shall then issue the permission for starting the work. Any concrete work done without such a permission shall be cut and removed at the cost of contractors. If concreting is to be done on concrete previously laid, the surface of the old concrete shall be cleaned with wire brushes and all laitance removed to expose the original surface of metal and sand particles, etc. It shall then be covered with a 7 mm thick layer of cement mortar [1:2] before laying the fresh concrete.

### **B] FORM WORK**

#### **1] Material :**

All form work for concrete works shall be made either of planned and matched timber or M.S. plates. The timber for the form work shall be hard wood dry and well-seasoned. It shall not be so dry to absorb water from concrete nor shall it be so green as to shrink after erection. When steel plate are used for forms, the plates shall be free from wrinkles, dents, lumps or other imperfections. The timber boards or steel plates shall have sufficient thickness to withstand the construction loads and the pressure exerted by the wet concrete as well as vibration during placing of concrete.

Normally the thickness shall not be less than 38 mm for timber and 18 gauge for M.S. plates. However, in case where the depth of concrete to be poured in the form work is small, the thickness of timber planks may be reduced in consultation with the Engineer.

#### **2] Arrangements :**

All the forms shall conform to the shape, lines dimensions as shown on the drawings. The form work shall include all wedging, bracing, tie rod, clamps, stop off boards and other devices necessary to

mould the concrete to the desired shape. The form work shall be so constructed as to remain sufficiently rigid during the placing and compacting of concrete.

The use of bolts passing through concrete members which form parts or any water retaining structures shall be permitted for the purpose of securing and aligning the form work. The form work shall be so arranged as to permit easy erection initially and later easy removal without disturbing the concrete.

Before concrete is placed all rubbish shall be removed from the interior of the forms and the surfaces of the work in contact with concrete shall be cleaned and thoroughly wetted, and inside surface treated with lime, oil or any other material. The slab centering shall be covered with double wax' water proofing paper' or tar paper or polythene sheet as directed by the Engineer.

### **3] Removal of form work :**

In no circumstances shall forms be struck off until the concrete reaches adequate strength as required, without obtaining permission of the Engineer. All the form work shall be removed without such shock or vibration as would damage the concrete. Removal of the form work whether whole or in part, shall rest entirely with the contractor who must never the less be guided by the opinion of the Engineer in this regard.

### **4] Surface treatment and finish :**

When the form work is struck, all the faces of concrete shall be smooth and sound, free from voids and air holes, If any roughness filled up while the concrete is still green, with cement wash and/or 1:1/2 cement mortar properly towolled and finished as directed by Engineer. If the concrete shall be dismantled and fresh concrete of proper quantity be reinstated at contractor's cost.

## **CONCRETE IN WATER RETAINING STRUCTURES :**

### **General**

- a] The specifications define the materials, constructional and performance requirements for water tight concrete necessary for following structures.  
The work shall be done in accordance with this specification together with IS:3370 [PART-I to IV].
- b] The water retaining structure is to be constructed as per the general design indicated in the drawings supplied/However, necessary for piping and electric conduits are to be provided during construction without any extra cost to owner.
- c] After construction, the structure has to be tested for water tightness as detailed hereunder and as per relevant Indian Standard Specifications, which is also included in the scope of this contract.
- d] For such structures where water tightness in addition to structural strength is of prime importance, special care shall be taken to get the most suitable grading of aggregate so as to produce the densest possible concrete. Water cement ratio shall also be controlled, consistent with the requirement of workability, to produce an impervious concrete.
- e] Concrete shall have at least the minimum cement required as per IS:3370.
- f] The concrete between the reinforcement and the form work on the water face shall be well compacted and the board joints made tight so that seepage of water shall not take place.

Shutter vibrators at a rate of one vibrator per 2.5 m<sup>2</sup> of shutter area shall be used to produce a compact concrete with dense skin. however it is not possible to use shutter vibrators, pin vibrator shall be used. No extra payment will be made for use of shutter vibrators. The form work must also be so designed that shutter vibrators can be fixed and dismantled quickly.

### **Admixture :**

Admixture shall be used in concrete only with the approval of the Engineer-in-charge. Normally approved compounds like "CICO", "PIDIPROOF" or equivalent of proven quality shall be permitted.

It shall be used as per manufacturers specifications and the direction of the Engineer-in-charge. Contractor shall provide test certificates from recognized laboratories before use of admixture, if so desired by the Engineer-in-charge. Calcium chlorides shall not be used in admixture.

**Construction, contraction and Expansion joints :**

Joints are potential positions of leakage. It is also advantageous to avoid horizontal joints by using continuously moving forms or by providing sufficient form work of ordinary type to enable the entire wall to be concrete without interruption. Where days' work joints are formed whether horizontally or vertically, they shall be rebated as called out on drawings. Care shall be taken to remove from the carrier lift all loose pieces of gravel/stone chips, wooden, country nails or any other foreign materials. All laitance shall also be thoroughly removed. If necessary the face of the old concrete shall be well hacked to expose the aggregate and after washing the surface, a thin coat of mortar or grout [1 Cement: 1 Sand] shall be applied immediately before resuming concreting. A water stop shall be placed through the joint specifically where the tank walls bond into the floor. Where an effective bond cannot be assumed at horizontal joints, a method that has been successful is to form a socket and spigot joint well caulked with asphalt or a bitumen filler and arrange to ensure that the water pressure tends to force the filling into rather than out of the joint. joints shall not be made at changes of concrete section if they can be conveniently placed elsewhere. Moving them even a few cms is often sufficient to prevent the secondary stresses being concentrated in one place leading to cracks. In long reservoir walls the design often incorporates permanent joints which assist in preventing cracks due to shrinkage and temperature changes. When these joints are not indicated in drawings, it is best to concrete the wall in short section and provide spaces as per drawings between sections. As far as possible after completing the sections, the intervening spaces shall be filled in taking care to bond the old with the new work.

**WATER STOPPER :**

The quality of water stoppers shall be of 150 mm wide ribbed type or approved by the Engineer-in-charge, before bring the same to the site of work. It shall be either "Cali Plast" "Omal" or "Chem Plast", AARTI or any other make as approved by the Engineer-in-charge.

At every horizontal and vertical joints of water retaining structure, water stopper of approved quality is to be provided as directed by Engineer-in-charge.

The water stops shall be thoroughly examined before putting it to use. It shall be placed in position carefully so as not to damage the same. Half of the width shall be embedded on each side of the joints between the adjacent sections, when embedding the first half of the width of the water stops great care should be taken to protect the other half from coming into contact with concrete by means of a suitable covering. After the concrete on the first half of the water stop sets, the protecting cover on the other half shall be removed and concrete poured to embed it.

It is essential that the water stop is properly aligned and placed in position during embedding. Where necessary the water stops shall be welded so as to have water proof joints.

The instructions for welding and/or vulcanizing as prescribed by the manufacturer shall be strictly adopted. It shall be seen that during the welding and vulcanizing of two pieces alignment of the central bulb is taken care of as this is essential for the correct finishing of the water stop.

The concrete shall not be poured from excessive height so as not to damage the water stops to prevent bending of the water stops.

**RENDERING :**

Rendering of cement mortar with addition of water proofing compound or equivalent shall be used with the object of covering weak patch in the concrete which still fresh the form work being struck as early as possible and the rendering applied immediately. The concrete surface shall be well wetted and if necessary, hacked or otherwise treated to form a key. If the rendering is applied in two coats, the joints shall be broken. The mortar shall be steel trowelled, but finished with a wooden flat.

#### **HYDRAULIC TESTING :**

Testing shall be restricted to underground, on ground and overhead structure only. These structures shall be tested strictly in accordance with IS : 3370 [PART-I] for water tightness. For underground structure the total maximum drop in water surface level over seven days shall not exceed 40 mm.

#### **TREATMENT OF SUSPENSION OF WORK :**

Whenever work is suspended on any section for more than one hour, the horizontal edges of the concrete next to the forms on surface which will be exposed shall be brought to a horizontal plane perpendicular to the plane of the forms and treated so that the finished work will show smooth straight line.

#### **FITTINGS :**

Pipes or other fittings passing through the walls and bottoms of water retaining structures are another potential source of weakness, and shall be on site in time to erect them in position in the shuttering before concreting commences. They shall be well embedded in the concrete and if provided with normal water bar flanges, there is little risk or leakage. An objection to building in fittings is that of the flanges aren't in line with connecting flanges extra labour is required in making adjustments. Some Engineers prefer to have holes and fix the pipes fittings subsequently after completing the concrete work, however this difficult to ensure that this construction shall definitely be leak proof.

Fittings built into concrete shall preferably be of non-corrosive material, so as to avoid frequent replacement leading to water leakage. If made of ferrous metals, the sections should be sufficiently substantial to prevent weakening by small corrosions. Care shall be taken that corrosive metal coming in contact with portland cement shall receive a bitumen or equivalent corrosion preventing paint.

#### **GROUTING :**

##### **i] Grouting of Pockets -**

The grouting shall be done with C.M. in proportion of one part of portland cement plus one part of sand and one part of grit (mix. size 6 mm). Adequate quantity of water shall be added. The pockets shall be thoroughly cleaned before fixing the holding-down bolts. In cases where the anchor bolts with sleeves are provided, it should be the responsibility of the contractor to keep them clean. Similarly, the treated portion of the bolts shall be greased to protect them from damage. Grout shall be gradually poured in the pockets without disturbing the holding down bolts, and shall be tamped with a steel rod for proper compaction.

##### **[ii] Grouting under baseplates & machine bases -**

The grouting shall be done in C.M. of one part of Portland cement and 2 parts of sand mixed with adequate quantity of water, unless otherwise specified. It shall be worked in and compacted, so that the entire space under baseplates and around the anchor bolts is thoroughly filled with the dense grout. Care should be taken that no air bubbles are left inside the grout. The grout shall be cured for a minimum period of 7 days by wetting the exposed areas. The shin plates under the bases should be left undisturbed while grouting is undertaken, prior to grouting, the space under the steel shall be thoroughly cleaned and watered without disturbing the shin plates. No grouting work shall be carried out all the basis are properly aligned and plumbed. After the grouting is done, anchor bolts should be tightened, while the grout is green till all the air bubbles cease and cement slurry comes out to ensure that the surface of bearing plate is entirely in contact with the grout.

**REINFORCED CEMENT CONCRETE [R.C.C.] :**  
**MIX DESIGN [M-30 & M-20]**

The Contractor shall get the concrete mix designed confirming to various design parameters given in these specifications and latest revision of IS:10262 for each grade of concrete mentioned above by a Government approved laboratory. The cost / charge of the MIX DESIGN work shall be borne by the Contractor.

The MIX DESIGN shall be got approved from the Structural Consultant. No volume batching shall be allowed at site. The concrete mix at site shall be **WEIGH BATCHED OR READY MIX CONCRETE.** The proportion of cement, sand and coarse aggregates, water and admixtures if any shall be determined by weight. The Contractor shall make arrangements to weigh water by an electronic device at the site.

The Contractor shall follow the following specifications for mix design reinforced cement concrete work.

**Proportioning Mix:**

The mix of fine and coarse aggregate, cement and water as per the DESIGN MIX shall give the most dense concrete confirming to minimum quantity of cement paste and maximum water cement ratio for binding the materials to give required strength, Water content and the water cement ratio shall give the specified strength with the materials proposed for use in actual work carried out before the work is started, adopting the consistency suitable for the work and method of compaction that will be actually used on site subject to the water cement Ratio as Tabulated separately.

**Test:**

Tests shall confirm to the specifications laid down in I.S. 456 – 2000. These tests shall be got done in an approved laboratory at the cost of Contractor.

**a) Preliminary tests:**

In preliminary test, three separate tests shall be carried out on samples collected from different stacks. Each test shall be carried out with six samples of 15 cm. (About 6”) cubes and 3 of these shall be tested at 7 days and 3 at 28 days. In preliminary tests the average crushing strength attained shall be 33 percent higher than that required on work tests.

**b) Work test:**

For each of the work test, 6 samples shall be prepared from the concrete being used on the site, 3 samples being tested at 7 days and the remaining 3 samples at 28 days. Work tests shall be carried out on each of the first six days and subsequently once in three working days or for every 60 cu.m. of concrete whichever is less and also whenever the quality or grading of the materials is changed. When a relation between the strengths at 7 days and 28 days is established, only 3 samples may be prepared and tested at 7 days only. This number of controlled specimen tests may be increased if the Engineer-in-charge considers it necessary.

**Field Mix:**

In the work tests, bulking of sand due to moisture, if any, should be allowed for different batches according to the moisture actually present at the time of mixing. The moisture will be taken into account in controlling the mixing water also. The proportions once fixed by preliminary tests shall not be changed so long as the materials are the same, subject only to the quantities of fine aggregate and water being adjusted to compensate for bulking due to the moisture in sand and free water in fine aggregate at the time of use.

No change of materials shall be allowed unless fresh tests with new materials show satisfactory results.

Water and cement content per batch or concrete as determined MIX DESIGN shall be maintained constant except for suitable allowances to be made for surface moisture of the aggregates at the time of actual use. Immediately upon the receipt of the award of the contract, the Contractor shall inform the



Engineer-in-charge the exact location of the sources of the acceptable materials which he proposes to use and get approved materials to be used. The CONCRETE MIX shall be got designed in an approved laboratory by the Contractor with minimum water cement ratio to give specified strength in the preliminary tests and the proportions got approved by the Engineer-in-charge in writing. These proportions shall be used so long as the materials contains to be of the same quality and from the same source subject only to slight changes in the relative quantities of fine and coarse aggregates for the purpose of promoting workability provided the works tests require the same. If during the progress of the work, the Contractor wishes to change the materials, the proportion shall be fixed on the basis of fresh MIX DESIGN to give the required strength after the Engineer-in-charge is satisfied that the materials satisfy the specifications. No adjustment of cost shall be made for change of proportions of cement fixed in the original preliminary tests.

**Maximum Water Cement Ratio:** As per Schedule A

#### **DETAILED SPECIFICATONS FOR CONCRETE: INGREDIENTS**

##### **1. Cement:**

The cement shall be ordinary Portland Cement confirming to IS:269. Under special circumstances other cements may be used with prior approval of Engineer-in-charge. Cement shall conform to M-3

##### **2. Aggregate:**

Aggregates shall comply with the requirements of IS:383. Generally, aggregates having a nominal size of 20 mm shall be used. Coarse and Fine aggregate shall be weigh batched separately. Sand shall conform to M-5, Grit shall conform to M-6, Graded stone aggregate of design size shall confirm to M-9

##### **3. Water:**

Water shall conform to M-1. Water used for mixing and curing shall be as per Clause 5.4 of IS:456-2000.

##### **4. Admixtures:**

Admixtures such as plasticizer / super plasticizer shall be used with prior approval of the Engineer-in-charge.

Grades of concrete to be used shall be M10, M15, M20, M25, M30.

Minimum cement content for different grades of concrete shall be as provided in Schedule A.

All reinforcement shall be free from loose mill scale, loose rust, and coats of paints, oil, mud or other coatings. The Contractor shall get the reinforcement cleaned by using wire brush, rubbing with gunny bags, light acid itching etc. as required.

Workability of concrete shall be as per Clause 6.0 of IS:456.

##### **Durability:**

In order to provide / produce durable concrete with low permeability, it must have an adequate cement content and a low water cement ratio. By using strong dense, aggregates, sufficient low water cement ratio, ensuring thorough compaction and sufficient hydration of cement through proper curing methods, a sufficient low permeability is achieved. Therefore, cement content shall be sufficient to provide adequate workability with a low water cement ratio so that concrete can be completely compacted with the means available.

The permissible limits of chlorides and sulphate in concrete shall be as per Table 1 of IS-456-2000.

#### **CONCRETE MIX PROPORTIONING**

The Concrete mix should be so proportioned that when the concrete is hardened it shall be of the required strength, durability and surface finish. For this purpose, the Contractor shall establish a well-equipped concrete testing laboratory at site. The results of these shall be sent to Consultant for their comments / approval / suggestion for modification of Design Mix.

**Strength Requirement of Concrete:**

Where ordinary Portland cement conforming to IS:269 or Portland blast furnace cement conforming to IS:455 is used, the compressive strength requirements for various grades of concrete, controlled as well as ordinary shall be as given in Table-1. Where rapid hardening Portland cement is used, the 28 days compressive strength requirement specified in Table-1 shall be met at 7 days. For controlled concrete, the mix shall be so designed as to attain in preliminary tests, a strength at least 33 percent higher than that required on work tests, for concrete mix up to and including M-250 and 25 percent higher for higher strengths. Preliminary tests need not be made in case of “ordinary concrete”.

**TABLE-1**

Grade of concrete	Compressive work strength in Kg/cm <sup>2</sup> on 150 mm cubes as per Testing conducted in accordance with IS:516.	
	min.at 7 days	min.at 28 days
M-100	70	100
M-150	100	150
M-200	135	200
M-250	170	250
M-300	200	300
M-350	235	350

Note: In all cases, the 28 days compressive strength specified in Table-1 shall be the criterion for acceptance or rejection of the concrete.

When the strength of a concrete mix as indicated by test, lies in between the strength for any two grades specified in Table-1 such concrete shall be classified for all purpose as concrete belonging to the lower of the two grades between which its strength lies.

Field Test cubes shall be taken as per IS 456 required / or directed by Engineer in Charge. The same shall be tested in approved laboratory & results shall comply with required strength of mix used. The cost of taking cubes and testing shall be included in rates quoted.

**Nominal Mix Concrete:**

Under special circumstances nominal mix concrete for grades of M20 or lower may be used with prior approval of Engineer-in-charge. Nominal Mix concrete shall be as per Table 9 of IS 456:2000

**READY MIX CONCRETE:**

Concrete mix shall be design for 33% higher strength than the grade of concrete specified. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work in question and can be properly compacted with the means available.

Except where it can be shown to the satisfaction of the Engineer-in-charge that a supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate should be strictly controlled. The different sizes, shall be stocked in separate stock piles. Required quality of material shall be stock-piled several hours, preferably a day, before use. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequency for a given job being determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the design mix.

The quantity of both cement and aggregate shall be determined by weight. Water shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean, and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water-cement ratio constant and at its correct value. To this end, the moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates, IS:2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates to allow for the variation in weights of aggregates due to variation in their moisture content.

**The special conditions/ Specifications regarding RMC are as follows.**

1. The details like location, capacity, experience, delivery schedule etc. of the RMC agency shall be submitted by the successful tenderer for prior approval of the undersigned.
2. The RMC shall be conforming to IS 4926 with its latest amendments.
3. All the responsibility of RMC i.e. procurement of all materials, operation of plant and machinery, transit mixers, pumping machineries relevant piping etc. shall be on the account of the contractor.
4. The Dream city ltd. Shall not be held responsible for any delay/damage/loss due to deployment of RMC for this project.
5. The octroi for the RMC shall have to be borne by the contractor as per prevailing rates.
6. RMC process shall be fully automatic and computerized.
7. When a transit mixer is used for transportation of concrete, no extra water should be added to the concrete from elsewhere after initial introduction of mixing water from the batch, except when on arrival at the site of the work, the slump of the concrete is less than that specified: such additional water to bring the slump within required limits shall be injected into that specified: such additional water to bring the mixer under such pressure and direction of flow that requirements for uniformity are met.
8. Records and Certificates: The contractor shall keep from the manufacture batch records of the quantities by mass of all the solid materials, of the total amount of water used in mixing and of the results of all tests. If required by the Dream city ltd., the contractor shall furnish certificates, at agreed intervals, giving this information.
9. The contractor shall supply the following information for guidance of the manufacturer:
  - a. The type of cement to be used
  - b. Details Specifications of aggregates to be used.
  - c. Type of admixture to be used, if specified
  - d. Min. acceptable strength
  - e. Slump of concrete or compacting factor
  - f. Ages at which the test cubes or beams are to be tested, and the frequency and number of test to be made
  - g. Any other requirement
10. **Tolerance:** Unless otherwise agreed to between the architect and the contractor, the concrete shall be deemed to comply with the requirements of this, if there results of testes where applicable lie within the tolerance specified below.
11. **Consistency of workability:** The slump average of two test shall not differ from the specified value by + 10 mm for a specified slump of 75 mm. The compacting factor average of two tests shall be within + 0.03 of the value specified. If any other method of determining consistency to be used a suitable tolerance shall be agreed to be between the purchaser and the manufacture. The tests for consistency or workability shall be complete within 15 minutes of the time of receipt of the ready-mix concrete at the site.
12. **Aggregate:** When tested in accordance with IS 2386 (part-I) 1963, the quantity of aggregate larger than the max size specified by the purchaser shall not exceed 5% of the qty. of coarse aggregate and all such excess shall pass sieve of next higher size.

The water cement ratios shall be not more than those specified in the Schedule-A. The cement content of the mix specified in the Schedule-A shall be increased if the quantity of water in a mix has to be increased to overcome the difficulties of placement and compaction so that the water-cement-ratio specified in the Schedule-A is not exceeded.

Workability of the concrete shall be controlled by maintaining a water-cement-ratio that is found to give a concrete mix which is just sufficiently wet to be placed and compacted without difficulty with the means available.

The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.

For reinforced concrete work, coarse aggregate having a nominal size of 20 mm. are generally considered satisfactory.

For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5mm. main bars, or 5 mm. less than the minimum cover to the reinforcement whichever is smaller.

Where the reinforcement is widely spaced as in solid slabs, limitations of size of the aggregate may not be so important, and the nominal maximum size may sometimes be as great as or greater than the minimum cover.

No materials other than the essential ingredients, i.e., cement, aggregates and water, shall ordinarily be used in the manufacture of concrete or mortar. But the Engineer-in-charge may permit the use of approved admixtures for improving the workability of the concrete, if so specified, on satisfactory evidence that its use does not in any way adversely affect the properties of concrete particularly its strength, volume changes, durability and has no deleterious effect on the reinforcement. Admixtures where allowed shall conform to relevant IS:9103.

Chloride content in admixture shall be independently tested for each batch before acceptance.

## CONSTRUCTION TOLERANCES

### (a) Length

(i)	Members up to 3 mt length	+ 3mm to -6mm
	3 mt to 4.5 mt length	+ 3mm to -8 mm
	More than 4.5 mt length	+ 3 mm to -10mm

### (b) Cross-Sectional Dimensions

Dimensions up to 15 cm	+ 2mm
Dimensions between 15 cm and 23 cm	+ 3mm
Dimensions greater than 23 cm	+ 4mm

**Straightness:** When a straight edge or line is applied to the member it shall not show concavity or convexity exceeding.

For length upto 4.5 mt	4.5 mm
For length between 4.5 mt	6.0 mm
For length exceeding 6 mt	8.0 mm

Shape of Cross Section – No line on the cross section of a member shall deviate from its correct position by an angle exceeding 1 Degree. Vertical members shall not deviate in verticality from its true position by more than 5% of vertical length subject to maximum of 20 mm.

Member which do not confirm to above mentioned constructional tolerances shall be removed and redone or modified / strengthened as per instructions of Engineer-in-charge / Consultant.

## SPECIFICATIONS FOR FORMWORK, CENTERING & SCAFFOLDING

### Materials:

Formwork shall be in plywood, sawn timber or steel as required for shaft, container walls, stairs, slab, beams, columns, parapets, etc. for all concrete work.

### Workmanship:

The formwork shall conform to the shape, lines and dimensions as shown on the drawings and shall be so constructed so as to remain sufficiently rigid and water-tight, during placement and compaction of the concrete. Adequate arrangement shall be made by the Contractor to safe guard against any settlements of the formwork during the course of concreting and after concreting.

**Centering:**

The centering, which has been got approved should be sufficiently strong and safe before, during and after pouring concrete and should be so erected that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.

The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads, without any settlement.

**Scaffolding:**

All scaffolding, hoisting arrangements and ladders etc., required for facilitating of concrete shall be provided and removed on completion work by Contractor, at his own expense. The scaffolding, hoisting arrangement, ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act. The Contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workmen etc.

The scaffolding, hoisting arrangement and ladders shall allow easy approach to the work spot and afford easy inspection.

**9. REFILLING**

**WORKMANSHIP**

The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.

As soon as the work of pipe laying has been completed and measured the site of drain shall be cleared of all debris, brick bats, mortar droppings etc. and filling with earth in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron or wooden rammers where feasible and with the butt ends of crow bars, where rammer cannot be used. When filling reaches finished level, the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated and then rammed and consolidated the finish level of filling shall be kept the shape intended to be given to road surface. In short after the refilling is done the settlement of the trench shall be sole responsibility of the Contractor only.

In case where Engineer-in-charge feels necessary the consolidation may be done by power rollers. The extent of consolidation required shall be specified or as directed.

The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

**10. SAND FILLING**

The sand to be use for filling shall be free from salts, organic or other foreign matter. All clods of sand shall be broken.

As soon as the work in foundation has been completed the site of foundation shall be cleared of all debris, brick bats, mortar dropping etc. sand filled with sand in layers not exceeding 20 Cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The sand shall be rammed with iron rammers where feasible and with the butt ends of crowbars, where rammer cannot be used.

The plinth shall be similarly filled with sand in layers not exceeding 20 cms. adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level,

the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

The finished level of filling shall be kept to shape intended to be given to floor.

The sand shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

## **11. RUBBLE FILLING**

### **Scope of work:**

The work covered under this specification includes all type of soling work either by bricks or by rubble stones laid under floors/foundations, hand packed, complete as per under mentioned specification and applicable drawings.

The rubble stone shall be of best variety of black trap/granite/basalt or other approved variety of stone available locally. The stone shall be hard, durable, free from defects and of required size and shall be approved by the Engineer-in-Charge before incorporation in the work.

### **Preparation of Surface:**

The bed on which rubble soling is to be laid shall be cleared of all loose materials, levelled, watered and compacted and got approved by the Engineer-in-Charge before laying rubble soling. Cable or pipe trenches if shown in the drawing and as required by the Engineer-in-Charge shall be got done before the soling is started.

### **Workmanship:**

Over the prepared surface, the stone shall be set as closely as possible and well packed and firmly set. The stones shall be of full height and shall be laid so as to have their bases of the largest area resting on the sub-grade. Soling shall be laid in one layer of 230 mm. or 150 mm. or other specified thickness and no stones shall be less than 230 mm. or 150 mm. depth or specified thickness of soling with a tolerance of 25mm.

After packing the stones properly in position, the interstices between them shall be carefully filled with quarry spoils or stone chips of larger size possible, to obtain a hard, compact surface. Spreading of loose spoils or stone chips is prohibited.

The entire surface shall be examined for any protrusions and the same shall be knocked off by a hammer and all interstices shall be filled with approved murrum. Excess murrum if any over the surfaces shall be removed. Unless otherwise specified, the murrum shall be supplied by the contractor at his own cost from the selected areas. The surfaces shall then be watered and consolidated with mechanical or sufficiently heavy wooden tampers and log-rammers as approved by the Engineer-in-Charge to give the required slope or level and dense sub-base. After compaction, the surface shall present clean look. Adequate care shall be taken by the contractor while laying and compacting the rubble soling to see that concrete surfaces in contact with soling are not damaged.

## **12. BRICK WORK (1:6)**

### **MATERIALS**

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-5, Fly ash Bricks shall conform to IS 13757, IS 5454, IS 3495, IS 12894 Cement mortar shall conform to M-8.

**Proportion:** The proportion of cement mortar shall be 1:6 (1 cement: 6 fine sand) by volume.

**Wetting of bricks:** The bricks required for masonry work shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water, is an indication of thorough wetting of bricks.

**Laying:** Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete the bond. Closures in such case shall be cut to required size and used near the ends of the walls.

A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar. The walls shall be taken up truly in plumb. All courses shall be truly horizontal, and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of brick course shall be kept uniform. Thickness of mortar bed shall be 6 to 8mm.

The brick shall be laid with frogs up wards. A set of tools comprising of wooden straight edges, Manson's spirit level square, half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

Both the faces of walls of thickness greater than 23 cms. shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

All fixtures, pipes, outlet of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

**Joints:** Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 12 mm. The face joints shall be raked out as directed by raking tool daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to be done.

**Curing:** Green work shall be protected from rain suitably; Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

**Preparation of Foundation Bed:** If the foundation is to be laid, directly on the excavated bed, the bed shall be levelled, cleared of all loose materials, cleaned and wetted before starting masonry.

If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The Contractor shall obtain the Engineer's approval for the foundation bed, before foundation masonry is started. When puccas flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

Fixtures – The frames of doors, windows, cup-boards etc. shall be housed into the brick work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with brick work, but for ordinary steel doors and windows required opening for frames, hold – fasts etc. shall be left in the wall and frames embedded later on in order to avoid damage to the frames.

Scaffolding –Necessary scaffolding shall be provided. The supports shall be sound and strong tied together with horizontal places, over which the scaffolding planks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal course only. Minimum number of holes shall be left in brick work for supporting horizontal scaffolding poles. The Contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

Packing out of joints – For the face of brick work, where plastering is to be done, joints shall be raked out to a depth not less than thickness of joints. The face of brick work shall be cleaned and mortar dropping removed on very same day that brick work is laid.

### **13. 15MM THICK INSIDE PLASTER(1:3)**

#### **MATERIALS:**

Water shall confirm to M-1 Cement mortar shall conform to M-8.

#### **WORKMANSHIP.**

The work shall be carried out in two coats. The backing coat (basecoat) shall be 12 mm. thick in C.M. 1:3. The relevant specifications shall be followed except that the thickness of back coat shall be 12 mm. average and the proportion shall be of cement mortar 1:3 (1 cement: 3 sand). Before the first coat hardens its surface shall be beaten up by edges of wooden tappers and close dents shall be made on the surface. Subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

The second coat shall be completed to 8 mm thickness in C.M. 1:1 as described above, including raising, sand facing by brushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per approved sample.

#### **CURING:**

The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.

The relevant specifications shall be followed except that the sand face plastering up to 10 mt. above ground level shall be measured and paid under this item.

Scaffolding - Wooden ballies, bamboos, planks, treatles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

Preparation of Background - The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, afflorescence and other foreign matter by water or by brushing. Smooth surface be roughened by wire brushing if it is not hard and hacking if it is hard. In case of concrete surface, if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

Raking of joints in case of masonry work where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such areas shall be moistened again.

15 mm thick inside smooth cement plaster shall be applied in all parts of super-structure and inside the buildings on wall, as per above specifications.

10 mm thick inside smooth cement plaster shall be applied underneath of ceilings & soffits etc., of slabs, stair-cases, as per above specifications.

#### **14. 20 MM THICK SAND FACE PLASTER**

Materials :-

Water shall conform to M-1 cement mortar shall conform to M-8.

Workmanship :-

The work shall be carried out in two coats. The backing coat [basecoat] shall be 12 mm. thick in C.M. 1:3. The relevant specifications of Item No.14 shall be followed except that the thickness of back coat shall be 12 mm. average and the proportion shall be of cement mortar 1:3 [ 1 cement:3 sand]. Before the first coat hardens its surface shall be beaten up by edges of wooden tappers and close dents shall be made on the surface subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.



The second coat shall be completed to 8 mm thickness in C.M. 1:1 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.

For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

#### **APPLICATION OF PLASTER**

The plaster about 15 x 15 Cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surface gauges shall be truly in place of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished, Rounding or chamfering, corners, junctions etc. shall be carried out with proper templates to the size required.

Cement plaster shall be used within half an hour after addition of water. Any mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scrapped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer that 15 cms. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arrises. Horizontal points in plaster work shall not also occur on parapet tops and copings as those invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

Each coat shall be kept damp continuously till the next coat is applied for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking or walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air to dry weather shall be prevented by hanging mattings or gunny bags on the outside of the plaster and keeping them wet.

#### **15. WATER PROOFING PLASTER(1:2)**

Providing water proofing plaster 20 mm. thick in C.M. 1:2 using "CICO" or equivalent water proofing compound of approved quality as per I.S. 2645-1975 in cement mortar in proportion of 100 gms/.50 Kgs. cement bag or recommended by the manufacturers including finishing even and smooth with a floating coat of neat cement slurry etc. complete.

#### **MATERIAL & WORKMANSHIP**

The relevant specification of shall be followed except that the water proofing materials as cement or approved make as per I.S. 2645-1975 shall be added to the cement at the rate specified or as directed by the Engineer-in-charge. The proportion of water proofing materials to be mixed with 50 Kgs. bags shall be 100 gms. or as recommended by the manufacturer of the water proofing material.

#### **16. REINFORCEMENT : CRS (corrosion resistant steel) bars conforming to IS 1786**

**General :**

Requirement specified here in provided for reinforcing work, complete as indicated, specified and required and including supply and delivery of reinforcing bars, and mesh, bending, wire brushing and cleaning, steel fixing and the attendance of a fitter during concreting, to inspect fixed reinforcing bars and maintain bars in correct position at each four locations. Whenever mention of I.S. code is made, the latest editions thereof shall be applicable.

**Quality Assurance :**

**Code requirement -**

Unless otherwise stated herein all work specified herein and as shown on the drawings shall conform to be applicable requirement of IS-456-latest edition. In case of water retaining structure IS-3370 Part-I and IV shall be applicable.

**Standards :**

Steel for reinforcing shall be of the following kinds as may be specified in the drawings. Mild steel plain bars conforming to IS:432-1960 and its latest edition. Corrosion Resistant Steel (CRS) bars conforming to IS:1786 and its latest edition.

**Field quality control :**

All continuous inspections shall be performed by the Engineer-in-charge's representative or his authorized assistant or a specialist called by the dream city ltd. or the Engineer-in-charge. Reports as required by code or authorities concerned shall be prepared and submitted to the Dream city ltd. and such authorities. The steel brought by the contractor when tested should comply with the test specifications in IS:1521 and IS:1608-1960.

**Submittals :**

**Drawing :**

The Engineer-in-charge will supply detail drawing of reinforced concrete work and bar bending schedules. The contractor shall check the drawing and the schedules and satisfy himself that these complement each other. In the event of a discrepancy the Engineer-in-charge shall be notified in writing and his ruling obtained.

**Materials :**

**A] Reinforcing bars :**

Reinforcement bars shall have to be brought by the Contractor as laid down in the tender condition.

**B] Welded Wire mesh :**

Mesh reinforcement, where specified shall conform to IS:1566-1967.

**C] Binding wire :**

Steel fixing shall be by 1.65 mm dia soft annealed wire.

**D] Supports and Accessories :**

Supports, cover or spacer for reinforcement shall be provided by precast mortar [1:2] blocks made with embedded wire ties. The cover blocks shall be made so as to provide the exact specified cover to reinforcement. Stays, blocks, ties, spacers or other supports as approved by Engineer-in-charge shall be provided at appropriate intervals to avoid sagging of bars between supports. Broken stones, bricks pieces, wooden blocks shall not be allowed.

**E] Dowels :**

Where and as designated on the drawings, steel bars dowels shall be provided for anchorage to previously cast concrete for anchorage where shown or required to existing construction, an approved non-shrink epoxy type grout or approved deferred bolting devices shall be used.

**Execution :**

**A] Bending :**

Unless otherwise indicated or specified bars shall be bent and fixed in accordance with the provisions of IS:2502. All bending shall be done with the use of an approved bending tool. Rebinding of incorrectly bent bars shall not be permitted.

**B] Cleaning :**

Before placing reinforcement and again before concrete is placed, reinforcement shall be wire-brushed and cleaned of loose mill scale, oil, or other coating that might destroy or reduce bend.

**C] Concrete cover :**

Cover over reinforcing bars shall be as indicated. Correct concrete cover to reinforcement shall be maintained with the aid of approved cover blocks. Top reinforcement in slabs shall be maintained in position by means of chairs made out of mild steel, the diameter and quantity bending sufficient to ensure security of the reinforcement in shape and position.

**D] Securing in place :**

All reinforcement shall be securely and accurately fixed in positions shown on the drawings, care being taken to prevent contact with coated shuttering and forms. All intersection of bar should be secured with approved clips or with wire, the ends being turned into the body of concrete.

**E]** Splices shall be wired contract lap splices unless otherwise indicated or approved. Splices at points of maximum tensile stress shall be avoided and shall be staggered elsewhere, lap length and other provisions shall conform to IS:456. Splicing of vertical bars in concrete be at approved positions.

Unless otherwise shown in case of horizontal bars lap splices shall be made with at least one continuous bar between adjacent splices, where double mats of bars occur in walls, lap splices in opposite mats shall offset at least 1.5 m.

**Welding :-**

When permitted or required joints of reinforcement bars shall be welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subjected to more than 75% of the maximum permissible stresses and welds so staggered that at any one section not more than 20% of the rods are welded. Only electric welding using a process which excludes air from molten and conforms to any or all other special provisions of or the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to IS:814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

**17. FABRICATION WORK**

The structural steel work shall conform to M-18, red lead paint primer shall conform to I.S.-102-1962.

The steel sections as specified or required shall be cut, square and to correct lengths. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member, except as permitted prior to starting of work as directed. All straight-tening and shaping to form shall be done by application of pressure and not by

hammering. Any bending or cutting shall be carried out in such a manner so as not to impair the strength of the metal. All operations shall be done in cold state unless otherwise directed/permited.

The steel structure as per direction of the Engineer-in-charge shall be laid out on a level platform to full scale and in size or parts. A steel tape shall be used for measurements to ensure maximum accuracy.

Welding shall generally be done by electric process. Gas welding shall be resorted to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work.

The welding work shall conform to I.S. 816-1969.

**Preparation of surfaces :** Surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed oil shall be permitted.

**Assembly for welding :** Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.

**Precautions :** All operations connected with welding and cutting equipment shall conform to safety requirements given in I.S.-1118-1968.

The following points shall be borne in mind during the process of welding ---

- a) Welds shall be made in flat position wherever practicable.
- b) Arc length, voltage and amperage shall be suited to the thickness of material type of groove & other circumstances of the work.
- c) The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.

The defective welds which shall be considered harmful to the structural strength shall be cut out and rewelded.

Finished welds and adjacent parts shall be protected with clean boiled lined oil and after all slag has been removed welds and adjacent parts shall be painted after the same are approved.

All the members shall be thoroughly cleaned, of rust, scales, dust etc. and given a priming coat of red lead paint before fixing them in position. Testing of welding to be added in the specification I.N. 12.2.2.12-(i) to (viii).

## **18. R.C.C. WELL: -**

### **GENERAL:**

This specification pertains sinking of well through all strata like sand, gravel, pebbles, loose boulders, clay, soft and hard murrum and such other similar strata to the required level as may be directed by Engineer preliminary open excavation or dressing required for laying the cutting edge and curbs and providing island shall be included in this item.

### **WORKMANSHIP:**

#### **Sinking of Well:**

The method to be adopted for sinking of well shall be first got approved by the Engineer-in-charge/for any change in the method required during execution, the Contractor shall first obtain the written permission of the Engineer-in-charge.

The Contractor may at his own cost, bore holes to ascertain the exact depths to which the particular wells may have to be sunk. If bore results are indicated by the Department, they shall be taken only as general guide. Corporation do not bind itself for the accuracy of the same. The Contractor shall not be entitled to any compensation on account of variation in strata during the sinking.

If the bed is dry open excavation shall be carried out to the actual subsoil water level before the cutting edge is laid. The cutting edge or the curb shall be laid in the exact position on blocking timber. The blocking timber shall be removed individually in such a manner as to maintain equality of pressure without any till of the cutting edge. The blocking timber shall be pulled out after loosening the soil underneath. Material within the curb shall be excavated methodically and evenly over the whole internal area excavating first in the center and then working towards the circumference uniformly till the curb sinks to about 15 cm (about 6") above the bed. Sand or soil excavated shall then be back filled to keep the pitched curb in place and stable. The form work on steining shall then be set up to and the first lift poured.

The well may be adjusted and guided regard to its direction of sink by temporary frame work or staging. The staging may be used as platform for handling materials and fixing the dredging equipment thereon. The design and the layout of the staging shall require prior approval of the Engineer although the Contractor will not be thereby relieved of his responsibility for its safety and suitability.

Sinking must not be started till the concrete steining to be sunk had set properly and until the steining has been passed by the Engineer and commencement of sinking approved.

The well shall be sunk by excavating the material from the interior methodically and evenly and removing the material and building up additional sections of steining as the well sinks. The excavated materials shall be stacked within a lead of 50 m. (about 164') or as directed. It is essential to see that the curb and the first two lengths of the steining are kept perfectly vertical and that they do not go out of place or plump materially. The subsequent sinking to plump is cashier. Any neglect in the initial stages will make it more difficult to correct errors.

The contractor shall adopt his own arrangement and method of sinking consistent with the magnitude of the work, its nature, site conditions, speed required etc. and failing the required process, the sinking shall be done as ordered by the Engineer. Normally one of the following methods or combination of two or more of them will be found to work satisfactorily according to the site condition.

- (1) Manual excavation.
- (2) Excavation by Divers.
- (3) Excavation by inch and grab heavy chisels etc.
- (4) Excavation by dredgers.
- (5) Sinking by applying kentledge.
- (6) Using light blast with the approval of the Engineer.
- (7) Dewatering.
- (8) Jetting.

Manual excavation aided by tools to suit the strata may be conveniently resorted to where there is not much of water or where the water can be easily pumped out.

In deep water, the excavation will have to be done by the aid of winch and grab or a dredger. Harder strata shall have to be loosened by heavy chisels.

In case of manual excavation under water or removal of obstructions such as boulders, logs, etc. divers may have to be employed to successfully excavated or remove the obstacles.

When the well does not sink, even after dredging or excavation, kentledge shall be applied judiciously

to affect the sink.

Great care shall be taken from the commencement of sinking operations to ensure that the well is continuously kept in exact position and perfectly vertical, checking frequently with the plump bobs hanging on the inside faces of the steining. Daily records of tills and shifts shall be kept on site in the requisite proforma. If there are sand blows in the wells they shall be removed after establishing stable conditions and no claim shall be entertained regarding removal of the material of difficulties connected therewith.

The tendency of the well to lean to one side over defining hard strata or in soft soil shall be countered by providing suitable supports etc. The levels of the excavation in the well shall be constantly checked so as keep the bottom as nearly level as practicable.

Dewatering to the extent necessary shall be done as and when required. Balancing the water level inside and outside the well shall also be arranged whenever necessary. Jetting on outside may be resorted to when advisable with the approval of the Engineer. All these and any other measures required to sink the well are included in the item.

In sinking groups of wells joined together the excavation in all the wells in one cluster should be carried out simultaneously and equally to facilitate even sinking.

**Obstacles :**

When obstacles such as large boulders, logs, hard clay, compacted material etc. are met with, they shall have to be removed by grads, dredgers, etc. after breaking, cutting, jetting, etc. or by sending divers inside the well if necessary. If this is not successful, small charges of explosives may have to be used with the permission of the Engineer to break to boulders by sending divers. In no case blasting of ANY sort shall be done without the permission of the Engineer in writing and before the concrete in steining has hardened. Sufficiently and is more than 7 days old. The Contractor shall include in his tendered rate, the eventuality of the cost of the services of divers and all other of the cost of the services of divers and all other costs ancillary for removing boulders, dislodging obstructions below cutting edge and such other operations as may be required for sinking the well. The method of removal of the obstades shall be got approved by the Engineer.

**Kentledge :**

Kentledge may be used with advantage in sinking the well to overcome skin friction and buoyancy but shall not be excessive so as to damage to cutting edge or steining or arranged in such a way as to interfere with the interval excavation.

**Explosive :**

When other measure is not successful sinking of well held up by skin friction etc. is sometimes aided by tremor and vibration caused by exploding a small charge of 28 grams or 56 grams. (about one or two OZS) of dynamite in the center of the well. But such explosives shall not be used without the specific approval of the Engineer. Any damage to the well or adjoining structures due to the blasting shall be made by the Contractor at his own cost.

**Righting :**

If the well tilts during sinking it may be righted by:

- (1) Putting on eccentric loading on the high side of the wells.
- (2) One side excavation at bottom of wells which is on the higher side.
- (3) Jetting on the higher sider to reduce skin friction.
- (4) Pulling or pushing the well by approved methods.
- (5) Any other suitable method.

Methods adopted for righting a well shall require the approval of the Engineer. This shall however, not

relieve the contractor of his responsibility for obtaining satisfactory results.

**Last Sink :**

When the well is approaching its final depth and before the last length of the steining is poured in, the exact length required should be decided and the steining should be built up preferably just less than this length with a view to build it up to the correct level after the well has been sunk to its final depth.

**Tolerance :**

The complete well shall not have

- (i) tilt of more than 1 in 60 in any direction.
- (ii) A shift of more than 200 mm at the top from designed vertical axis at the well in any direction

Any tilt and/or shift beyond the permissible means such referred to above, shall be removed by all available means such as strutting acentric kentledge railing by wire ropes or by any other approved method. The maximum allowable till and shifts shall not exceed the following limits. The completed well shall not have tilt of more than 1 in 60 in any direction and a shift of more than 200 mm at the top from the designed vertical axis of the well in any direction.

If under any circumstances, the tilt and shift exceed the above limit for well, but do not exceed the extreme limits of 1 in 40 tilt and 300 mm shift in any direction, the well sinking so done shall be regarded as substandard and such well as accepted for one or other reason shall be penalized to the following extent.

Sr. No.	Amount of tilt and/or shift	Lumpsum deduction per Mt. of well measured from the top of pump house floor or cap to the bottom of the outing edge.
1.	Tilt exceeding 1 in 60 but below 1 in 50.	Rs.1650/-
2.	Tilt exceeding 1 in 60 but below 1 in 40.	Rs.2475/-
3.	Tilt exceeding 1 in 40.	Rs.3300/-
4.	Shift exceeding 200 mm but less than 250 mm.	Rs.825/-
5.	Shift exceeding 250 mm but less than 300 mm.	Rs.1650/-

If the tilt and shift exceed the above limit for any well that well shall be liable to rejection at the discretion of the Engineer-in-charge at the entire risk and cost to the Contractor.

**Precautionary measures :**

Following precautionary measures shall be taken by the contractor at his own risk and cost.

All exposed reinforcement bars shall be carefully bent down along the steining and temporarily embeded in lean concrete 1:4:8.

All precautionary measures shall also be taken prevent damage of shift or tilt to the well due to mention.

The above measures shall not however, absolve the contractor term any responsibility in the even of any damage occurring to the incomplete well and he shall have to rectify to same at no extra cost to owner, to the entire satisfaction of the Engineer-in-charge.

The foundation levels as shown in the detailed drawings are tentative and are not taken as first but are liable to alternation by Engineer-in-charge depending upon the actual site conditions and as required by the circumstances. The decision of the Engineer-in-charge regarding the foundation and its variations during execution of the work shall be binding to the contractor.

**Cleaning :**

After the well is finally and properly seated, the bottom shall be cleaned, and all loose materials removed if necessary, by sending divers before laying of concrete for the bottom is permitted. This will be the time to check and verify the levels and record the depth.

**Safety :**

The Contractor shall be responsible to take all measures for the safety of the work and workmen and also for any compensation due to injury to persons or damage to work and property well sinking shall be done in such a way as not to cause any damage to adjoining structures. The contractor shall be responsible for any such all the damage.

**Item to Include :**

- (i) Sinking of well through all strata by excavation.
- (ii) Providing island if required.
- (iii) Righting.
- (iv) Dewatering, balancing water levels.
- (v) Trial bores for deciding the actual depth if required by the Contractor.
- (vi) Removing boulders, obstacles etc.
- (vii) Clearing the bottom.
- (viii) Redrawing if the work is no completed before monsoon.
- (ix) Use of divers if needed.
- (x) Collecting samples of materials of the foundation strata.
- (xi) All labours, materials, staging, use of equipment, tools and plant and other incidental items necessary for the satisfactory completion of sinking the well.
- (xii) Safety measures and compensation for injury to persons and damage to work and property.

**MODE OF MEASUREMENT AND PAYMENT :**

Sinking of a well shall be measured per running meter basis and paid as mentioned below correct to 5 mm from the water level at the time of casting the curb or from the level at which the bottom of the cutting edge is laid initially whichever is lower to the bottom of cutting edge in final position. In case of R.C.C. well, any scooping of bottom of foundation or kundi below the level of the cutting edge shall not measure or paid. The water level at the time of casting the curb and level at which the bottom of cutting edge is actually laid, if this level is lower than the water level at the time of casting the curb and level at which the bottom of cutting edge is actually laid, shall be recorded by the Engineer-in-charge or his representative and shall be countersigned by the Contractor or his representative in taken of is acceptance.

If for any valid reason in some very rare case, it becomes impracticable to lay the curb at or below the subsoil level, the contractor will be permitted by lay higher than the subsoil level but as low as possible the curb at a level subjected to the previous approval of the Engineer-in-charge in writing.

In this case, the sinking will be measured from the level at which the bottom of the cutting edge, which was initially laid to the level reached by the bottom of the cutting edge in final position.

For the purpose of payment, that rate of sinking will vary according to the range of depths as given in the Schedule 'B' from this item to Zero of the range or depth shall be taken from the level at which the cutting edge is initially laid or the water level whichever is lower.

**19. SEWER TRAP**

Providing and fixing 10cms. x 15cms. (4" x 6") S.W. trap with 0.45 x 0.60 mts. clear opening sewer trap chamber with 23 cms. thk. B.B. masonry walls in G.M. 1:5 with cement plaster inside and outside to exposed faces and fixing C.I. cover of 50 Kgs. on top, etc.



General:

The item refers to provide and fix 10cms. x 15cms. S.W. trap with 0.45 x 0.60 mts. clear opening sewer trap chamber with 23 cms. thick B.B. masonry walls in C.M. 1:5 with cement plaster inside and outside to exposed faces including fixing C.I. cover of 50 Kgs. on top sewer trap.

#### MATERIALS

The stone wall sewer trap shall be of 10cms. x 15cms. size conforming to relevant I.S.

#### WORKMANSHIP

Necessary excavation shall be done as required. The foundation cement concrete of 1:4:8 shall be laid for a thickness of 15cms. The S.W. trap shall be fixed into the position on the main sewer side of the chamber as directed. Brick masonry chamber of one brick thickness in C.M. 1:5 shall be constructed with the inside dimensions 60cms.x 45cms.

The inside of the chamber shall be plastered in 12mm. thick C.M. 1:3 and shall be finished smooth with cement slurry. The outside of the chamber shall be plastered to a depth of 30 cms. from the top of the chamber. The item also includes providing and laying 1:2:4 cement concrete for fixing the C.I. frame and cover. The C.I. frame and cover shall be of the specified size and it shall not weigh less than 50 Kgs. including frame and cover.

### **20. DOORS, WINDOW & VENTILATION**

Providing & fixing 35 mm. thick shutters for doors, windows, ventilators including Indian teak frames 10 cm. x 7 cm. size including black enameled iron oxidized fixtures and fastenings including primer coat of approved quality and two coats of oil paints etc. comp. for ---

- a Fully paneled doors.
- b Partly paneled and partly glazed windows.
- c Fully glazed ventilators.

#### MATERIALS

First class Indian teak wood for frame & shutters shall conform to M-19, glass shall conform to M-25, black enamelled iron oxidised fixtures and fastenings shall conform to M-26.

#### WORKMANSHIP

The item covers the requirement of frames and shutters for doors, windows, clearstory windows, their supply and fixing.

Frames - All members of frames shall be exactly at right angles. The right angle shall be checked from inside surfaces of the respective members.

All members of frames shall be straight without any warp or bow and shall have smooth surfaces well planned on the three sides exposed at right angles to each other. The surfaces touching the wall may not be planned unless it is required in order to straighten up the member or to obtain the overall sizes within the tolerances as specified.

Frame shall have dovetail joints. When windows is included, it shall be provided by having full length one piece post for door or windows and clearstory window extending the frame on top at eh head to the required extent. Horns shall not be provided in the head of the frame. When no sills are provided, the vertical posts of the frame in the ground floor shall be embedded in the sill masonry for 10 cm. on upper floors, the vertical posts shall be fixed in the floor or masonry by forming notches 10 mm. deep. Sight adjustment of spacing as necessary shall be done to have the holdfasts in the joints of masonry course. The frame shall be erected in position and held plumb with strong support iron both sides and built in masonry as it is being

built. The transom shall be through tenoned in the mortices of the jamb post to the full width of the jamb post and the thickness of the tenon shall be not less than 15 mm.

Tolerance - Unless specially mentioned otherwise tolerance of 01 # 1.5 mm. shall be allowed for each wrought face.

The tenons shall be closely fitting into the mortices and suitably pinned with wood dowels not less than 10 mm. dia. meter. The depth of rebates for housing the shutter shall be as shown in the detail drawing or as directed.

The contact surface of tenon and mortise shall be treated before putting together with an adhesive of approved make.

Minimum number of three holdfasts shall be fixed on each side of door and window frames, one at the centre point and the other two at 30 cms. from the top and the bottom of the Frames. In case of window and ventilator frames whose height is less than 1 M. two holdfasts, in each side shall be fixed at quarter points of the frames. The size of each holdfasts shall be 300 x 25 x 6 mm. and of mild steel with split end. The holdfasts shall be fixed with screws to frames.

Mild steel hold fasts shall be protected with a coating of coal asphalt tar. The surface of frame abutting the masonry or concrete faces shall be properly treated by applying a coat of approved coating.

Shutters - Pannelled shutters shall be constructed in the form of timber frame work of styles and rails with panel inserted of type as specified in the detailed drawings. Panel shall be fixed by providing grooves in the styles and rails. The styles and rails shall be joined to each other by mortise and tenon joints at right angles.

All members of the shutters shall be straight without any warp or bow and shall have smooth, well planned faces at right angles to each other.

The size of styles and rails shall be as per drawings or as directed. Styles and rails of shutters shall be made of one piece only.

Timber Panelling - Thickness of the panel shall be as specified in the drawings or as directed. If the panel is made from more than one piece, the piece shall be finished as shown in the detailed drawings and shall be joined with continuous groove with specified size. The end pieces of the panel and the top and the bottom of the panel shall be provided with continuous tongue to frame into groove of the frame shutter. An air space of 1.5 mm. shall be left in the groove of frame of shutter while framing the panel in it.

The faces of the panel as well as various pieces of the panel shall be closely fitted to the sizes of the grooves.

Finishing of the corners or raised panel edge shall be done as shown in drawings or as directed.

The thickness specified shall be finished thickness and no tolerance will be permitted.

Glazing - The glass panels shall be embedded in putty and secured to the rebate by wooden bends, or mouldings shape and size as approved with counter sunk screws of suitable size.

The glass panel shall be properly cut to fit the rebate of the frames and sashes fully with a slight minus margin of about 1.5 mm. of all sides. Before glazing the frame shall be primed and prepared for painting so that wood may not draw oil out of putty. The rebate shall be putted to an extent to provide bedding all round the glass.

The glass shall than be bedded in putty and fitted to frames with wooden beads or moulding as directed and screwed with wooden beads or moulding as directed and screwed with counter sunk screws. The screws shall be spaced not more than 100 mm. from each corner and nor more that 200 mm. apart.

The size of the rebate in the frame and size and shape of beads or moulding shall be as per detailed drawing or as directed. The beads or mouldings shall have mitred corners.

Fixtures & Fastenings - All fixtures and fastening of approved quality shall be provided with necessary screws.

The hinges, bolts and other items of iron mongery with moving part shall be properly oiled by the contractor before handing over the building.

Painting - The surface shall be cleaned and rubbed with sand paper to bring it in the one place. When finished, no scratches from the sand paper should show. After preparing the surface, one coat of white paint shall applied as priming coat.

After priming coat, all small holes, cracks, open joints and similar other minor defects of every kind shall be stopped with putty made from pure whitenin mixing to the appropriate consistency with raw linseed oil.

Little white lead being worked in other mixing to help hardening of putty. The work shall be rubbed down smooth with sand paper and the consequent coats of paint of the specified shade approved by the Engineer-in-charge shall be applied.

The paints shall be applied with brush. It shall be spread as smoothly as possible. Final coat shall be very crossed and laid off, so that brush marks are not visible.

Each coat of paint shall be allowed to dry thoroughly and shall be little rubbed in before the next one is laid.

Finish surface shall not show any hair marks ridges or dry patches of paint and no puddles shall be left in the corners of panels, angles of the mouldings etc.

## **21. ROLLING SHUTTER**

Providing and fixing rolling shutter of approved make made of 80 mm. wide M.S. plates inter locked together entire length and jointed together at the end by locks mounted on specially designed pipe shafts with bracket plates. Guide channels and arrangements for inside and outside locking with push pull operation complete including the cost of hood cover and spring.

**Rolling Shutter** - The rolling shutter shall conform to I. S. 6248-1979. Rolling shutter shall be supplied of specified type with accessories. The size of the rolling shutter shall be as required & as directed. The shutter shall be constructed with interlocking plate sections formed from cold rolled steel strupesnot less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 m. width and not less than 1.25 mm. thick and 80 mm. wide for shutters 3.5 m. in width and above unless otherwise specified.

Guide channels shall be of mild steel deep channel section & of rolled pressed or built up(fabricated)jointless construction. The thickness of sheet shall not be less than 3.15 mm.

The rolling shutter shall be of self-rolling type up to 8 Sq.M. clear are without ball bearing and up to 12 Sq.M. clear area with ball bearing. If the rolling shutters are of larger than gear operated type shutters shall be used.

The locking arrangements shall be provided at the bottom of shutters at both ends. The shutter shall be opened from the outside.

The shutters shall be completed with door suspension shafts locking arrangements, pulling hooks, handles and other accessories.

## **22. COLLAPSIBLE STEEL SHUTTERS :**

### **Materials:**

The collapsible gate shall conform to M-24.

### **Workmanship:**

“T” Rails shall be fixed to the floor and to the lintel at top by means of anchor bolts, embedded in cement concrete of floor and lintel. The anchor bolts, shall be placed approximately at 45 mm centers alternatively in the two flanges of the “T” iron. Iron bottom runner (T-iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible gate shall be fixed at the sites by fixing the end double channels in the T-Iron rail and also by hold – fasts bolted to the end double channel and fixed in the masonry at the side walls or the otherwise.

In case where the collapsible gate is not required at the lintel, beams a slope above a T-Iron suitably designed may be fixed at the top embedded in masonry and provided masonry with necessary clamps and roller arrangement at the top.

All the adjoining work damaged while fixing gate shall be made good to match the existing work without any extra payment.

All members of the collapsible gate including “T” iron shall be thoroughly cleaned to rust, scales, dust etc. and given a primary coat of red lead, before fixing them in position, and after fixing two coats of approved quality oil paint shall be applied.

## **23. I.P.S. FLOORING**

I.P.S. flooring shall be 50 mm thick in cement concrete 1:2:4 (1 Cement: 2 coarse sand: 4 Stone aggregate 20 mm. nominal size) with a floating coat of neat cement.

The cement concrete flooring of 50 mm. thick (average) is to be laid as per the site conditions. The concrete shall be mixed in a mechanical mixer at the work. Hand maxing may be allowed for smaller quantities of work and in case of failure of machineries or as permitted by the Engineer-in-charge. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However, in such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mechanical mixing shall be done for a period of 1.5 to 2 minutes. the quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose. Flooring of specified thickness shall be laid in accordance with the approved pattern or as directed. Finishing operation shall start shortly after the cessation or beating and shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be left for some time till moisture mixed with water to form a thick slurry and spread over the surface while the concrete is still green. Use of dry cement or cement and sand mixture sprinkled on this surface to stiffen the concrete or absorb excessive moisture shall not be permitted. The cement slurry shall then be properly pressed twice by means of iron floats, once when the slurry is applied and the second time when cement starts setting and finished floated smooth. The surface shall be marked with string or B.R.C. fabric jali to make the surface non-slippery as and when directed. The junction of floors with wall plaster, dado or skirting shall be rounded off where so required up to 25 mm. radius flooring in lavatories and bath rooms shall be laid after fixing of water closet and squatting pans and floor traps which shall be plugged while laying the floors and opened after the floors are completed.

Any damage done to the water supply or sanitary fittings during execution of work shall be made good.

After the final set, the concrete shall be kept continuously wet, if required by ponding for a period of not less than 7 days from the date of placement.

The form work shall be provided if necessary as directed by the Engineer-in-charge. Concreting shall be done as per alternate bay method with necessary centering either by mastic or cement mortar as directed.

## **24. GLAZED TILES**

### **MATERIALS**

Water shall conform to M-1. Cement mortar shall conform to M-3. White glazed tiles shall conform to M-33.

### **WORKMANSHIP**

**Bedding** - The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired levels and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.

The white glazed tiles shall be laid on cement mortar bedding of 12mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10mm. any place and on an average 20mm. thickness. The proportion of the cement mortar shall be as specified in the item.

**Fixing Tiles** - The tiles before laying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kgs./Cement/Sq.Mts. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

The tiles shall not have staggered joints. The joints shall be there to center line both ways. The nahn trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (swan) to the required size and the edge rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire, brush or trowel to a depth of 5mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to stay undisturbed for 7 days.

**Cleaning** - The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

**Preparation of Surface** - In case of brick masonry work, the joints shall be taken out to a depth of at least 15 mm. while the masonry is being laid. In case of concrete wall, the surface shall be chiseled and roughened with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

**Laying** - The wall surface shall be covered with 10mm. thick plaster of cement mortar 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both ways. The back of tiles shall be floated with grey cement slurry and edges with white cement slurry set in bedding mortar. The tiles shall be gently tapped in position one after the other keeping the joints as thin as possible. Dado shall be

truly horizontal and the joints vertical or as per the required pattern.

Risers of steps, skirting and dado shall rest on top of treads or flooring. Where full size tiles cannot be fixed, they shall be cut to the required size and the edges to be smoothed.

The joints shall be cleaned, and flush pointed with white cement. The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

## **25. WATER CLOSET**

The pan shall be sunk into the floor and embedded in a cushion of average 15 cms. cement concrete 1:5:10 (1 cement; 5 fine sand; 10 graded stone aggregate or brick aggregate 40 mm. nominal size) or as specified. This concrete shall be left 115 mm. below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably sloped so that the waste water is drained into the pan. The pan shall be provided with 100 mm. 'P' or 'S' trap with approximately 50 mm. seal. The joints between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement; 1 fine sand).

The 'P' or 'S' trap shall be fixed with pan and cast iron pipe with C.M. 1:1. The pan shall be provided with a 100 mm. 'P' or 'S' trap an approximately 50 mm. seal. The joint between the pan and the trap shall be made leakproof with cement mortar 1:1 (1 cement; 1 fine sand).

After laying the floor, the floor shall be suitably sloped so that the waste water is drained into the pan. A pair of footrests of size 250 mm x 130 mm x 30 mm of white vitreous china shall be set in cement mortar 1:3 (1 cement; 3 coarse sand). The foot rests shall be fixed at a distance of 175 mm. from the inner edge of the back side of the pan and shall be fixed at convenient angle.

## **26. WASH BASIN**

The wash basin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of R.S. or C.I. brackets fixed in C.M. 1:3 (1 cement; 3 sand). The bracket shall conform to I.S. 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the wash basin. After fixing the basin, plaster shall be made good and surface finished to match with the existing one.

The bracket shall be painted white with ready mixed paint. The C.P. brass trap and union shall be connected to 32mm.dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct into the gully trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged into vertically.

The height of the front edge of the wash basin from the floor level shall be 80 cms.

The capstan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or plastic as directed. The cock shall be fixed with pipe line with white Zink and spun yarn, to make joint water tight. The work shall be carried out in best workman like manner.

C.P. brass waste trap and union shall be connected to 32mm.dia. waste pipe which shall be connected suitably towards the wall and which shall discharge into the drain through a floor trap. The C.P. brass waste trap shall be provided for wash basin or sink as the case may be.

The stop cock shall be fixed in position by means of jam, nut & socket. The stop cock shall be fixed near the inlet of the water meter or as directed. The joints shall be done with white zinc and spun yarn. The joint shall be tested for leak proofing.

The necessary inlet, outlet connections and fittings such as pillar coasks, C.P. brass waste trap, waste pipe, stop cock etc. shall be fixed as specified above.

## **27. URINAL**

The white earthenware flat back or corner type urinal of size 430mm. x 260mm. x 350mm. shall conform to M-45.

The urinals shall be fixed in position by using wooden plugs and screws and shall be at a height of 65 cms. from the floor level to the top of the lip of urinal, unless otherwise directed. The wooden plug shall be 50 mm. x 50 mm. at base lapping to 38 m. x 38 mm. at top and 50mm. in length shall be fixed in wall in cement mortar 1:3 ( 1 cement; 3 coarse sand). The urinal shall be connected to a 32 mm. dia. galvanized mild steel waste pipe which shall discharge in the channel or after tap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp.

## **28. UPVC PIPE**

### **TYPE-A**

The pipe shall be measured including all fittings along its length in running meter. No allowance shall be made for the portion of pipe length entering the sockets of the adjacent pipe of fittings.

The rate includes the cost of all materials and labor involved in all the operations including jointing.

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

### **TYPE-B**

The pipe shall be measured including all fittings along its length in running meter. No allowance shall be made for the portion of pipe length entering the sockets of the adjacent pipe of fittings.

The rate includes the cost of all materials and labor involved in all the operations including jointing.

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

## **29. MARBLE STONE**

### **MATERIALS**

Water shall conform to M-1. Lime mortar shall conform to M-7. Cement mortar shall conform to M-8. Marble stone slab 25mm. thick shall conform to M-42.

### **WORKMANSHIP**

The marble stone slab of both faces polished shall be used. The thickness of stone shall be 25 mm. The allowable tolerance shall be 2mm. The tolerance shall be +/- 5mm. in length and breadth.

For fixing of the slab grooves of appropriate size shall be cut out into the masonry of R.C.C. wall and/or slab as required in appropriate position and making holes to receive any pipes etc. The partition slab shall be fixed securely in wall and/or the slab in required position by using C.M. 1:6 to get a firm grip, the slab shall be embedded in the wall and/or in the flooring for a depth of not less than 25mm. or as directed by the Engineer-in-charge whichever is maximum. Grouting of the joints shall be done in neat ordinary white or colour cement to match the adjoining surface as directed by the Engineer. The mortar shall be cured for 14 days. The partition slab shall be cleaned with water and all mortar droppings or stains shall be removed. The slab shall be given required shape as shown on the drawings or as directed by the Engineer.

## **30. C.I.NUHNI TRAP (75 MM DIA)**

The nahni trap with 100 mm.dia. inlet and 50 mm.dia. outlet shall be fixed as required or as directed.

The nahni trap shall be jointed with C.I. pipe, 75 mm. dia. with lead joints. The lead joints shall be done in conformation with I.S. 782-1976.

### **31. GULLY TRAP : (150 MM X 100 MM)**

Prov. & Fixing S.W. Gully Trap with C.I. grating brick masonry (C.M 1:5) chamber & water tight CI cover with frame of 300mmx300mm size (inside) include. Plastering smooth inside & outside 15mm th. In C.M.1:3 etc. comp.(i) Square mouth traps---150mm x 100mm Size- P type

#### **MATERIALS**

Gully trap shall conform to M-48.

#### **WORKMANSHIP**

The gully trap shall be set in c.c. 1:4:8 extending 30 cms. beyond the trap on the three sides over which shall be constructed one brick masonry chamber of suitable size with C.I. cover in top. The lid of cast iron along with C.I. frame of size 300mm. x 300mm. inside shall be of approved quality and fixed in c.c. 1:2:4 75mm. thick at top. The trap shall have C.I. gratings on top.

The C.I. cover shall be painted with two coats of anti-corrosive paint of approved make.

### **32. BRASS SCREW BIB TAPE**

#### **MATERIALS**

15mm. dia. brass screw down with bright polished finish shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

#### **WORKMANSHIP**

The screw down bib cock 15mm. dia. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or lead, lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

### **33. GUNMETAL CHECK OR NON RETURN VALVE**

#### **MATERIALS**

The gun metal check or non-return full way valve of specified dia. shall conform to I.S. 778-1964. The non-return valve shall be tested quality.

#### **WORKMANSHIP**

The gunmetal check or non-return wheel valve of 25 mm. dia. (1st quality) shall be fully cleared of all foreign matter before fixing. The fixing of valve shall be done by necessary means with 3mm. rubber insertions. The valve shall be fixed into supply pipe where required and as directed by the Engineer-in-charge.

### **34. FLUSH COCK**

#### **MATERIALS**

Chromium plated brass half turn flush cock shall conform to M-67.

#### **WORKMANSHIP**

The half turn flush cock of specified diameter shall be fixed as directed. The flush cock shall be fixed in G.I. pipe line with necessary fittings. The joints shall be made leak proof by using spun yarn and white zinc. The fixing work shall be carried out as per relevant specifications

### **35. GALVANIZED MILD STEEL TUBES**



Galvanized mild steel tubes of specified dia. nominal bore shall conform to I.S. 1239- 1961. The galvanized fittings, clamps, etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-charge.

**Cutting, Laying & Jointing** - When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554- 1955 with pipe dies and taps carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together.

The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in a water tight joint. The screw threads for the tube and fittings shall be protected from edge until they are fitted.

In jointing the tubes, the inside of the socket screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter.

Any threads exposed after 3 jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

**Laying in Trenches** - The width and depth of the trenches for different diameters of the tubes shall be as - For 15 to 80 mm. dia. tube width of trenches shall be 30 cms. and depth of trenches 60 cms. At joints, the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line and gradient in accordance with general specifications of earth work in trenches.

The pipes shall be painted with two coats of anti-corrosive bitumastic paint of approved quality. The pipe shall be laid on a layer of 75mm. sand filled up to 150mm. above the pipe if so specified. The remaining portion of trench shall be then filled with excavated earth. The surplus earth shall be disposed of as directed.

When the excavation is done in rock the bottom shall cut deep enough to permit the pipe to be laid and cushion of sand 75mm. In case of bigger diameter of tube where pressure is very high, thrust block of cement concrete 1:2:4 (1 cement; 2 coarse sand; 4 graded stone aggregate of 20 mm. nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground and spreading it over a sufficient area if so specified.

**Fixing of Tube Fittings to wall ceiling & floors** - In case of fixing of tubes and fittings to the walls or ceilings, these shall run on the surface of the wall or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15mm. clear of the wall. When it is found necessary to conceal the pipe sand when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried to walls or solid floors, where unavoidable, pipes may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeves shall be fixed at a place a pipe is passing through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime, under the floors, the pipe shall be laid in layer of sand filling.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps or required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 ( 1 cement; 3 coarse sand ) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 2 M c/c interval in horizontal run and 2.5 M. intervals in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia. the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick or concrete. However, for higher diameter pipes and holes shall be carefully made of the smallest required size. After fixing the pipe holes shall be made good with cement mortar 1:3 (1 cement; 3 coarse sand) and properly finished to match the adjacent surface.

Testing of Joints - After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone, and all leaking pipes removed and replaced without extra cost. The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./sq.cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all stock and water hammer. The draw off takes and stock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work of laying proceeds, veeping the joints exposed for inspection during the testing.

### **36. WHEATHER SHIELD, DISTEMPER, OIL PAINT**

#### **GENERAL**

##### **a] Preparation of Surface & Priming coat :**

The surface shall be thoroughly brushed free from mortar dropping and other foreign matter and sand papered smooth.

A priming coat of whiting shall be applied over the prepared surface in case of water-bound distempering and distemper primer or cement primer shall be applied in the case of oil bound distemper. No white washing coat shall be used as a priming coat for distemper.

##### **b] Application :**

After the primer coat has dried for at least 48 hours, the entire surface shall be coated uniformly with proper distemper brushes in horizontal strokes, immediately followed by vertical ones which together shall constitute one coat.

##### **c] Scaffolding -**

Where scaffolding is necessary it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be white or colour washed. A properly secured strong and well tied suspended platform (zoola ) may be used for white washing. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For white washing of ceilings, proper stage scaffolding shall be erected where necessary.

##### **Snowcap :**

Finishing wall with water proofing cement paint (snow-cem) on undecorated wall surface (three coats) to gives an approved brand and manufacture and required shape even shade after thoroughly brushing to surface to remove all dirt and remains of loose powdered materials.

The surface shall be thoroughly scrapped clean, finishing walls shall be completely cleaned before applying snow-cem or water proof cement paint. The shed and quality must be approved by Engineer-in-charge of the work before starting the work. The snowcap shall be applied with the fine brush and allowed to set before second coat is applied. The rate shall include necessary scaffolding, tools and plants and sufficient watering etc. complete.

The work shall be carried out to the entire satisfaction of the Engineer-in-charge of the work and in best in workmanship like manner as per specification of manufacturer and P.W.D.H.B.Vol.I & II and as directed.

**Oil Paint :**

All doors, windows, ventilators, shutters, railing, all fabricated items, motors, pumps, all interconnecting piping above ground level etc. shall be colored with three coats of approved make oil paint strictly as directed by Engineer-in-charge.

**Distempering :**

- 1] Distempering shall be of the oil or water bound type as specified.
- 2] Material :

Dry distemper or oil bound washable distemper of approved brand and manufacture for water bound and oil bound respectively conforming to IS : 428 shall be used. The proportions of the mix shall be as per the approved manufacturer's instructions.

- a) The dry distemper shall be stirred slowly in clean warm water using 0.6 liter of water per kg. of distemper or as specified by the approved makers. The mixture shall be well stirred before and during use to maintain an even consistency.
- b) Thinner as stipulated by approved manufacturer shall be used in case of distemper for oil bound type.
- c) Dry distemper shall not be mixed in larger quantity than is actually required for one day's work.

**37. G.I.RAILING**

The railing shall be fabricated from G.I. (Class-C, Medium) pipes, conforming to IS. The height of GI railing shall be 1.0 mtr. They shall consist of 3 horizontal pipes welded at a spacing of not more than 450 mm to vertical balustrade pipes of 40 mm dia. The distance of first horizontal pipe from the slab shall be 15 cm. The vertical pipes shall be spaced at 1.0 m c/c. The fabricated railing shall be installed using 6 mm thick M.S. base plate and 12 mm dia M.S. 'J' bolts. The exposed faces shall be painted with three coats of enamel paint over one coat of red oxide primer of approved quality.

**38. DRILLING BORE HOLE**

**GENERAL**

The minimum depth of bore hole shall be 20 meters and the diameter of bore hole shall be as per dewatering requirement or as per the pump requirement.

**WORKMANSHIP**

The ground shall be roughly leveled and after marking the position, the holes shall be bored with aspire angle to the depth as required and specified dia. using boring guide.

The bore shall be truly vertical and of uniform bore through of specified dia. after boring to the required depth, the bore shall be cleared off, the loose soil and disposal of surplus excavated stuff as directed within a lead of 50 m.

**39. R.C.C.NP2 / NP3/ NP4 CLASS PIPE :**

Excavation of Trenches- The width of trenches shall be required and depth shall correspond to inlet level of the pipe and to the required levels as directed. At joints, the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line, and gradient in accordance with general specifications of earth work in trenches.

Boning Staves and Sight Rails:

In various the pipes and fittings/specials the centre for each manhole/chamber or pipeline shall be marked by a peg. Contractor shall dig holes for and set up two posts (about 100 x 100 x 1800 mm) at each manhole/chamber or junction of pipelines at nearly equal distance from the peg and at sufficient distances there from to be well clear of all intended excavation. So arranged that a sight rail when fixed at a certain level against the post shall cross the centre line of the manhole/chamber or pipelines. The sight rail shall not in any case be more than 30 m apart; intermediate rails shall be put up if directed by Engineer-in-charge.

Boning staves of 75 mm x 50 mm size shall be prepared by contractor in various lengths. Each length being of a certain whole number of meters and with a fixed tee head and fixed intermediate cross pieces, each about 300 mm long. The top-edge of the gross piece must be fixed below the top-edge of the tee-head at a distance equal to the outside. Diameter of the pipe or the thickness of the concrete bed to be laid as the case may be. The top of cross pieces shall indicate different levels such as excavation for pipe line, top of concrete bed, top of the pipe etc. as the case may be.

The sight rail of size 250 mm x 40 mm shall be screwed with the top edge resting against the level marks. The centre line of the pipe shall be marked on the rail and this mark shall denote also the meeting point of the centre lines of any converging pipes. A line drawn from the top edge of one rail to the top edge of the next rail shall be vertically parallel with the bed of the pipe, and the depth of the bed of pipe at any intermediate point may be determined by letting down the selected boning staff until the tee head comes in the line of sight from rail to rail.

The post and rails shall be perfectly square and planed smooth on all sides and edges. The rails shall be painted white on both sides and the tee heads and cross piece of the boning staves shall be painted black.

For the pipes converging to a manhole / chamber at various levels. There shall be a rail fixed for every different level when a rail comes within 0.50 m of the surface of the ground. A higher sight rail shall be fixed for use with the rail over the next point. The posts and rails shall in no case be removed until the trench is excavated. The pipes are laid and Engineer gives permission to proceed with the backfilling.

laying of Pipes and fittings shall be carefully cleaned before installation. Whenever pipe laying is interrupted for any reason. The open end of the pipeline shall be sealed with a suitable expanding stopper or a properly fitted temporary wooden stopper and exposed pipes shall be suitably protected from stones and other objects falling into the trench from above.

The permissible tolerance for pipe lines in trenches shall be 6 mm in level and 25 mm in line between manholes. After the laying of a length of a pipeline but before testing the crown of the pipe shall be checked for level and alignment and any necessary adjustment made by un-jointing and removing the pipes concerned. Adjusting the bedding, relaying the pipes and rechecking for line and level. In addition, where a gravity pipeline is shown on the drawings as being straight between manholes it will not be accepted unless a light can be sighted directly through the length concerned.

For pipeline jointing systems incorporating flexible jointing rings, pipes shall be laid with the spigot and pointing in the direction of flow and with a gap between the end of the spigot and the base of the socket, or between spigots rubber rings shall comply to IS-5382.

### **Jointing:**

#### **General:**

Pipe section shall be joined utilizing spigot and socket flexible joint with rubber ring, as per IS-783. After jointing extraneous material, if any, shall be removed from the inside of the pipe and the newly made joints shall be thoroughly cured. The rubber sealing rings used for jointing shall conform to IS-5382.

#### **Spigot and Socket Joint (Flexible)**

The RCC pipe with the rubber ring accurately positioned on the spigot shall be pushed well home into the socket of the previously laid pipe by means of uniformly applied pressure with the aid of a jack or

similar appliance. The RCC pipes shall be of spigot and socket type and rubber rings shall be used, and the manufacturer's instructions shall be deemed to form a part of these engineer's requirements. The rubber rings shall be lubricated before making the joint and the lubricant shall be soft soap water or an approved lubricant supplied by the manufacturer.

**Testing of joints** - The pipe line shall be tested as directed. If any leakage is visible the defective part of the work shall be made good at no extra cost. A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe of joint shall be watched for and taken as indicating a defect to be made good.

#### **40. POLYPROPLENE STEPS**

##### **MATERIAL:**

The Polypropylene conforming to an ASTM D 4101, injection molded around a 12-mm dia. IS 1786 grade Fe-500 steel reinforcing bar and should meet the load requirement 225 kg as per IS 5455. The measurement should be as per attached drawing. The tolerance in the length and width is +/- 5 mm and +/- 1 mm in thickness. The weight of the steps should not be less than 0.900 kg.

#### **41. SEWER MANHOLE & SCRAPER MANHOLE**

##### **MATERIALS:**

Water shall conform to M-1, Cement Conform to M-3, Stone course aggregate of 20 mm nominal size shall conform to M-12, Grit shall conform to M-8, and Steel reinforcement shall conform to M-18-19. Fly ash brick shall conform to M-15A, Cement mortar of specified proportion shall conform to M-11, The cast iron steps shall conform to M-79

Manhole cover with frame of required size and weight shall be procured by the contractor.

##### **WORKMANSHIP:**

The manhole of different types and sizes as specified shall be constructed in sewer line at such place and to such levels and dimension as shown in drawing or as directed.

Excavation: - The excavation for construction of manhole including dismantling of all types of roads surface guarding, barricading, lightening the trenches, dewatering if required, removing and replacing, shifting of telephone/electric cables, pipe line etc. and all other safety provisions like shoring and strutting etc. till refilling of trenches and completion of manhole construction, stacking of excavated stuff within the specified lead, back filling of selected excavated earth, watering and consolidation etc. complete shall be carried out as per relevant specification of item No.1.

Concrete work: - The bed concrete in C.C. 1:3:6, Coping in C.C. 1:1.5:3 and benching concrete and in proportion c.c. 1:2:4 (1 Cement: 2 coarse sand: stone aggregate of 20 mm nominal size) by volume with necessary centering and shuttering work shall be mixed. Placed deemed and or vibrated and cured as directed by Engineer-in-charge.

##### **REINFORCEMENT:**

All the reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be security held in position during placing of concrete by annealed No. 1 binding work not less than 1 mm is size and by using stay block or metal chair spacers, metal hangers, supporting wires or other approved devices it sufficiently close intervals. Bars shall not be allowed to bag between supports nor displaced during concrete of any other operation of the work. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings.

Bars shall be bend cold to specified shape and dimensions or as directed, attain proper radius of bends, Bars shall not be bent or straightened in a manner that will injure the materials. Bars bend during

transport of handling shall be straightened before being used on the work. Unless otherwise specified for mild steel a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement.

In case which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The cold twisted steel bars shall be used or without hooks at the ends. Deformed bars without hooks shall however, comply with relevant anchorage requirements.

Bars crossing each other where required shall be secured by binding wires (annealed) of size not less than 1 mm in such a manner that they do not slip over each other at the time of fixing and concreting.

As far as possible bars of full length shall be used. In case this not possible over lapping of bars shall be done as directed. The overlaps shall be staggered for different bars and located at points along the span where either shear or bending moment is maximum.

When permitted or specified on the drawings joints of reinforcement bars shall be butt welded so as to transmit their full stresses. Welded joints shall preferably be located at points where steel will not be subject to more than 75 percent of the maximum permissible stresses and welds shall be staggered so that at any one section not more than 20 percent of the rods are welded. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work.

#### **BRICK MASONRY WORK**

As per Specification no.12

#### **PLASTER WORK:**

As per Specification no. 13 & 14.

#### **POINTING:**

The flush pointing work shall be carried out with mortar of required proportion by volume before pointing to be started the joints shall be raked to such depth that the average of new mortar measured from eight the sunk surface of the finished pointing or from the edge of the brick shall be average 10 mm.

The mortar shall be pressed in to the raked out joints with a pointing trowel according to the type of pointing specified in item. The mortar shall not spread over the corner finished with the fixing of C.I. Steps and M.H. cover pointed tools.

#### **FIXING OF POLY PROPYLENE STEPS AND MANHOLE COVER:**

During the construction of masonry wall of the manhole the cement mortar of required proportion shall be used for embedding the Poly propylene steps in the wall masonry. The spacing of steps in the masonry shall be 300 mm center to center in the staggered position in the vertical direction with two staggered rows at 385 mm center to center in the horizontal direction the top of the manhole shall not be more than 300 mm above the benching and the center line of two staggered rows shall be the center line of the shorter side of manhole frame in the roof of chamber.

The detailed specifications for the "Poly propylene steps as below:

The Polypropylene conforming to an ASTM D-4101, injection molded around a 12 mm dia. IS 1786 grade Fe-500 steel reinforcing bar and should meet the load required 225 Kg. as per IS-5455. The measurement should be as per attached drawing. The tolerance in the length and width is +/- 5 mm and +/- 1 mm in thickness. The weight of the steps should not be less than 0.900 Kg.

Unchequered portion of the step shall be inserted with the risk cement mortar during the course of masonry work so constructed around the steps as to keep the step on its right position. The non-slip grip chequered portion of the steps shall be well kept outside the masonry.

During fixing of the steps, they shall not be damaged and shall not vibrate or shall not shake during ascents and descents otherwise they shall have to be re fixed correctly as per the drawings or as mentioned above.

Manhole frame shall be firmly and securely laid on top of shafts of conical tops in 25 mm thick cement mortar and shall be embedded in 150 mm the cement concrete of proportion 1:2:4 (1 Cement: 2 coarse sand: 4 Kapchi as aggregate of 20 mm nominal size) in such a way that the top of M.H. frame shall be flush with concrete surface and top surface neatly finished 25 mm thick with cement mortar 1:3 in conformity with ground or road levels.

#### **OTHER REQUIREMENTS:**

As per line and level and size of the manhole pit shall be excavated as per drawing or as ordered by the Engineer.

The foundation concrete 1:3:6 with required thickness as per drawing or as directed shall be laid after compacting the bottom of the pit. The cement concrete shall conform to specified specification of Cement Concrete.

The clear inside chamber size of opening shall be as per the drawing or as directed by the Engineer-in-charge.

The masonry wall shall be plastered inside with 15 mm thick 1:3 cement mortar and outside with flush joint. The off set for the concrete foundation shall be 100 mm on all sides beyond walls of chamber.

Whenever pipes enter or leave the masonry chamber bricks on edge must be so laid around the upper half of the pipes so as to form the arch to prevent the weight of the masonry chamber over it.

On the top of masonry walls 1:1 cement mortar shall be laid and then R.C.C. slab of grade 1:2:4 necessary and as directed by the Engineer with coarse aggregate of trap metal of 20 mm nominal shall be laid necessary from work and centering shall have to be provided by the contractor at his own cost as per relevant specification of cement concrete.

In the bottom of manhole the channel and benching shall be done in C.C. 1:2:4 (1 Cement: 2 Coarse sand: 4 graded stone aggregate of 20 mm nominal size) rising at a step in line from edge of the channel, the channel of the bottom of the chamber shall be plastered 15 mm thick in c.m. 1:3 (1 Cement: 3 fine sand) and steel trowel smooth.

Channels shall be in semicircular in the bottom half and a diameter equal to the sewer. Above the horizontal diameter, the side shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junctions with the main channel an appropriate fall suitably rounded off in the direction of flow in the main channel shall be given.

For conical shaft of manhole necessary conical portion shall be treated from 750 mm below the bottom of concrete of slab for fixing of manhole cover and frame.

The item includes curing of all the cement work for 14 days.

## **42. RCC VENTILATING COLUMN**

### **MATERIALS:**

Water shall conform to M-1, Cement shall conform to M-3, Coarse Sand shall conform to M-5, Brick shall be conforming to M-12 and Reinforcement shall conform to M-18 and M-19, stone coarse aggregate of 20 mm nominal size shall conform to M-9, grit shall conform to M-6.

### **WORKMANSHIP:**

The item covers construction of ventilating shaft of size 100 mm dia inside opening and 200 x 200 mm outer dimension at top and 100 mm dia inside opening and 250 mm x 250 mm outer dimension at bottom in Cement concrete 1:1.5:3 (1 Cement: 1.5 Coarse sand: 3 graded stone aggregate of 20 mm nominal size). Bedding concrete in C.C. 1:2:4 (1Cement: 2 coarse: sand: 4 graded stone aggregate of 20 mm nominal size). The shaft should stand vertical in proper line level as per direction of Engineer-in-charge. The shaft shall be connected with sewer manhole by R.C.C. NP3 Class pipe of 100 mm dia. The item completed as per attached drawing of ventilating shaft. It should be colored as per the Instruction of Engineer-in-charge.

### **43. RCC PRECAST MANHOLE FRAME WITH COVER**

#### **(A) For Circular manhole of I.S.I.Mark**

Outer diameter	:-	860 mm	
Thickness	:-	175 mm	
Protection for edge edges	:-	25 x 25 x 3 mm M.S. angle shall be provided to project the edges	of frame with anti-corrosive paints.
Clear Opening	:-	560 mm	
Tolerance	:-	+/- 5 mm.	
Heavy duty Cover (Circular)	:-		
Outer diameter	:-	715 mm	
Thickness	:-	100 mm	
Lifting hooks	:-	16 mm Tot Bar welded to the bottom with steel. It shall be easily and quickly opened with crow bars and pickaxes.	
Protection for edge	:-	Same as for frame.	
Design Load and carrying capacity :		35 M.T.	
Tolerance	:	+/- 5 mm	

#### **NOTES:-**

- (i) Cover shall conform I.S. 12592 (Part-I 1988.)
- (ii) Frame shall conform I.S. 12592 (Part-II 1991)
- (iii) After production of each lot of manhole frame and cover the contractor shall send the offer letter for testing of same to Dream city Ltd.. The authorized representative of Dream city Ltd. shall select the specimens of cover as per I.S. for the load test, which should be carried out at S.V.R.College of Engineering, Surat. The specimens of frame should be checked for its reinforcement which must be provided as per detailed drawings attached with tender. The cost for testing of manhole cover and frame broken for inspection shall be borne by the contractor in any case.

#### **(b) For Scraper manhole.**

##### **DIMENSIONS FOR EACH SLEEPER :**

Length (L) 1100 mm

Breadth (B) 350 mm

Thickness (T) 100 mm

Protection for edge: - 25 x 25 x 3 mm. M.S. angle shall be provided to protect the edges of sleeper and the four sides of sleeper shall be covered with 100 mm width M.S. strip having thickness 2 mm.

Clear Opening of

Scraper manhole :- 900 mm x 1200 mm

Reinforcement :- As show in drawing.

Frame :- Frame shall be made from 2 mm thick M.S. plate as shown in drawing.



Lifting Hooks	: - 16 mm M.S. bar welded to the bottom steel. It shall be easily and quickly opened with crow bars and pickaxes.
Design load and Carrying capacity	: - 25 M.T.

**NOTES:-**

- (i) After production of each lot of sleepers the contractor shall send the offer letter for testing of same to Engineer-in-charge. The authorized representative of Engineer-in-charge shall select the specimens of sleepers as per I.S. for the load test which shall be carried out at S.V.R. College of Engineering, Surat. The cost of testing of sleeper for inspection shall be born by the Contractor in any case.
- (ii) 4% of the sleepers will be selected for load test and if the sample fails to carry the designed load, the whole lot shall be liable for rejection.
- (iii) 25% of the prepared loat shall be selected for physical (for dimension and workmanship) testing. The tolerance given below shall be strictly followed.  
Length - 1100 mm +/-5 mm  
Width - 350 mm +/-3 mm  
Thickness - 100 mm +/-2.5 mm
- (iv) Each sleeper shall be marked with your of manufacturing and notation of Dream city ltd.-DRG.

**44. FLUSHING WORK OF LAID LINE**

The contractor shall have to make arrangement for making flushing of the entire laid pipeline as per the instruction of Engineer-in-charge up to the achievement of desirable quality of water. Necessary labour, tools, machineries and other necessary equipment shall have to arrange by contractor only.

Water required for flushing will be arranged by Dream city Ltd. Water Distribution Station. As Dream city Ltd will arranged flushing program of laid line in different stages, contractor shall have to first excavate the trenches at the location of dead end or at `T' Open junction as per the instruction given by Engineer-in-charge. Proper size of trench shall have to excavate at the location so as to take necessary samples of water (i.e. up to 0.3 mt. below the bottom end pipe and at least 1.2 mt. x 1.2 mt. sizes in length and width). Trench shall have excavated end extended up to nearest creek/storm water chamber. Contractor shall have to clamp and plug the open and pipe. The item also includes necessary valve operation and opening and closing of scour valve and air valve.

Any leakages found shall be repaired by the Contractor at his own cost at the time of flushing. After flushing the dead end/tee open joint shall be capped / plugged by the Contractor at his own risk and cost. No extra lead joint shall be given for this item. Necessary barricading, lighting and necessary safety precaution shall have made by the Contractor. If accidents occur due to lack of above safety provision, the entire responsibility shall be on contractor head.

**45. GLAZED STONE WARE PIPE**

**MATERIALS**

Water shall conform to M-1. Cement mortar of proportions 1:1 shall conform to M-8. 100mm. dia. glazed stoneware pipe shall conform to M-49.

**WORKMANSHIP**

The diameter of glazed stone water pipe shall be specified in the item of the work.

The trenches for stone ware pipe drains shall be carried out as below width and depth of the trenches for different diameters of tee pipes shall be as under.

For 80 to 150 mm dia pipe width of trenches shall be 30 cms. and depth of trenches 60 cms. or the width of trenches shall be minimum width required for working and depth of trenches shall be as required for specified gradient/slopes as directed by Engineer-in-charge.

At joints, the trenches width shall be widened where necessary. The work of excavation and refilling shall be done true to lime and gradient in accordance with general.

**Laying:**

The pipes shall be laid accurately and perfectly true to line, levels and gradients. Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulation. All junctions and change in direction and diameter shall be made inside manhole by means of curved tapered channels formed in cement concrete finished smooth and benched on both sides. The body of the pipe shall rest for its entire length, on an even level bed grips being made on left on the bed to receive the sockets of the pipes.

**Jointing** - Tarred gaskin or yarn soaked in neat cement slurry shall first be placed around the spigot of each pipe, the spigot shall then be placed well home into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and gaskin caulked home so as to fill not more than 1/4th of the total depth or (13mm. in depth) of the socket.

The remainder of the socket shall be filled with stiff mixture of cement mortar in proportion of one part of cement and one part of sharp sand. When the socket is filled, a filled shall be formed round the joints trowel, forming an angle of 45 degrees with the barrel of the pipe.

The mortar shall be mixed as necessary for immediate use.

After the joint is made, any extraneous materials shall be removed from the inside of the joints with a suitable scraper or 'badger'. The newly made joints shall be protected until set from the sun, dry winds, rain or frost, sacking or other suitable materials, which shall be used for the purpose. The mortar shall be cured for 10 days.

**Testing of Joints** - The pipe shall be tested as directed.

If any leakage is visible the defective part of the work shall be made good at no extra cost.

A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joint shall be watched for and taken as indicating a defect to be made good.

## **46. . HDPE PIPES AND FITTINGS**

Providing and laying HDPE pipes with necessary fittings, specials, tee, bends, gaskets, etc. as required and as per the direction of Engineer-in-charge.

**Specification**

These pipes have been used for carrying the effluent form distribution boxes to Feeding boxes of the Reactors. These pipes shall be confirming to IS:4984. GI fasteners shall be used for erection purpose whereas SS 304 fasteners shall be used for under water body and shall be paid separately.

**Jointing**

HDPE pipe shall be jointed properly with HDPE socketted specials to get smooth inner side surface without any extrusion to avoid any obstruction to the flow of wastewater. If in any particular case butt welding has to be done, smooth inner surface of pipe without intrusion inside shall be ensured.

## **47. SLUICE VALVE**

**SCOPE:**

This specification covers the design requirements, features of construction, inspection, testing, painting, delivery, installation and commissioning of sluice valves with gaskets, hardware etc.

**CODES AND STANDARDS:**

The design and manufacture of the valves shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall relieve the vendor of this responsibility. Valves shall conform to IS 14846.

**DESIGN REQUIREMENTS FOR SLUICE VALVES:**

1. Valve shall be provided with back seat arrangement
2. Renewable body and screwed wedge rings (riveted over and above) shall be provided.
3. Collared drain plugs of gunmetal shall be provided for all valves.
4. Valves shall be with non-rising spindle type.
5. Valves shall be flanged and drilling shall conform to the standard as specified in data sheet.
6. Face to face dimension shall be as per IS 14846.
7. The gear, when provided, shall be packed enclosed (spur/worm) type. These gear boxes shall be sealed in such that there shall be no leakage of oil or grease even after long use.
8. The face and seat rings shall be riveted over and above press fitted.
9. Stuffing box gland shall be of bolted type.
10. The shoes & channel shall provide corrosion resistance bearing surface and minimize sliding friction and vibration, while maintaining accurate alignment.

The item also includes providing RCC work or steel support to valve for proper erection.

**CLEANING:**

Prior to factory inspection, all manufacturing waste such as metal chips, debris and all other foreign material shall be removed from the interior of the valve. All mill scale, rust, oil, grease, chalk and all other material shall be removed from the interior and exterior surfaces.

**PAINTING:**

Valves shall first be given two coats of zinc base primer after completely cleaning the surface and then it shall be coated with three coats of coal tar epoxy paint. The resulting coating shall be uniform and smooth and adhere perfectly to the surface.

**HAND WHEEL:**

A hand wheel shall be provided for normal operation.

**DIRECTION OF FLOW:**

Direction of flow shall coincide with the flow direction indicated by "arrow" casted on the valve body (If Required).

**DRAWINGS:**

The following drawing shall be submitted approved during detail engineering.

1. Preliminary outline dimensional drawings.
2. Typical cross sectional drawing.
3. Flow v/s head loss for valves.

**TESTS AND INSPECTION:**

1. Valves shall be offered for visual inspection and dimension check.
2. Valves shall be tested as per IS 14846 with latest amendments.
3. The hydrostatic testing shall be witnessed by the authorized representative of client.
4. Sluice valve shall be tested with and/or without actuator as desired by Dream city ltd..

**DATA SHEET FOR SLUICE VALVE :**

Standard	IS 14846
Size	<b>As per Bill of material</b>
Fluid	Sewage water
Rating	<b>PN: 1.0</b>
Stem	Non rising
Ends	Flanged, flat faced flanges as per IS 1538 Table IV and VI having off center bolt holes
Bonnet	Bolted
Disc	Solid wedge
Operation	Manual with the help of hand wheel
Seat	Body-renewable Disc-Renewable
Other requirements	Valves shall close in clockwise rotation of hand wheel
Valve position indicator	Required
Bypass arrangement	As per Indian Standard
Shoe channel arrangement	Required for more than 500 mm dia size.
<b>Material of Construction</b>	
Body and Bonnet	C.I IS 210 GR 260
Disc.	C.I IS 210 GR 260
Stem	S.S AISI-410
Body seat	S.S AISI 304
Disc seat	S.S AISI 304
Stem Nut	Bronze IS 318 GR LTB2
Stuffing box	C.I IS 210 GR 260
Gland	C.I IS 210 GR 260
Packing	PTFE
Bolts, studs & nuts	Carbon steel IS 1367 Class 4.6/4
<b>Testing:</b>	
Shell test	15 kg/ cm <sup>2</sup>

Seat test	10 kg / cm <sup>2</sup>
Back seat test	10 kg / cm <sup>2</sup>

## **48. AIR VALVE**

### **General**

The double air valves shall have two ball chambers, having one outlet of large capacity for admission and release of bulk volume of air during emptying and filling of the main and another having small outlet for escape of smaller quantities of entrapped air. This type of air valves shall be of flanged type with full conformation with IS:1538 of latest edition.

The ball sealed orifice always remains open while air is exhausting and is immediately closed when water rises in the chamber, lift the ball and seals the orifice. It shall also ensure that there are no recesses or pockets, sheltering, escaping air for the large orifice (low pressure) valve to drop into when the valve is open. Turbulent air at the time of filling of pipe shall not circulate in such cavities and cause the ball to be blown into when the valve is open. Turbulent air at the time of filling of pipe shall not circulate in such cavities and cause the ball blown into the discharging air streams, blowing the valve shut prematurely.

The cone angle of the lower pressure chamber shall be such that even at the critical velocity of air escape at 300 m/sec. The total impact force on the ebonite covered ball is less than the suction force on the angular area between the ball and the cone. The design of the valve should be such as to allow maximum free air discharge at various pressure differentials. The tenderer shall submit with the tender full set of curves showing discharge of free set of curves showing discharge of free air valves pressure differential for all sizes of valves offered by him.

Under no circumstances shall be large orifice ball blow shut prematurely.

The low-pressure cover shall be massive and designed to withstand full operating thrust in working conditions.

Air valve shall be designed to prevent premature closure prior to all air having been discharged from the line. The orifice shall be positively sealed in the close position but float (Ball) shall only be risen by the liquid and not by mixer of air and liquid. The sealing shall be designed to prevent the flots sricking after long period in the close position.

All branched outlets including outlets for Air valves will be with compensation pads (Dia. of Main / For branch Dia. ratio greater than 3). Diameter of compensation pad will not be less than 1.75 times O.D. of the branched outlet. Plate thickness for pads will be same that of the main.

For outlets with above ratio less than three, then the joints will be of plate reinforcement type.

All branched outlets including air valve tee's will be provided with one ½" BSP coupling duly plugged for measurement of pressure in due course. The closing plug will be in Stainless Steel (AISI 304 or equivalent) with Hex. Head and will be provided with copper washer for sealing.

The neoprene seat ring shall be held securely in place under the low-pressure cover by a joint support ring to prevent it from sagging when the ball is not sealing the office.

The valve body, the orifice cover, cowl of the air valves shall be made of cast iron of grade 2 of IS:210 of latest edition

Where tenderer considers necessary a suitable drain plug shall be provided.

### **Jointing Material**

Each valve shall be supplied with all necessary joint ring, nuts, bolts and washers for completing the joints such that it will ensure effective sealing of large orifice even at low pressures. The weights of floats of the same size and type shall not differ by more than 2%.

The timber, if used in the manufacture of floats shall be seasoned and those provided in large orifice shall be ebonite coated. The float provided in high pressure chamber, if manufactured from seasoned wood, shall be coated with “ethylene propylene Rubber” (EPDM).

### **High Pressure Orifice**

The high-pressure orifice and the high-pressure chamber shall be so designed that the orifice is effectively sealed in working conditions by “EPDM” coated float.

The material of the orifice shall be gunmetal. The orifice shall be of size not less than 3 mm and tapering to 100 mm suitable to release accumulated air within the pipe. The profile of the orifice shall be carefully chosen to avoid damage to the float surface. The orifice shall be protected by a suitable plug of stainless steel.

### **Valve Flanges**

All valves flanges shall be designed to withstand the stresses to which they would be subjected under hydraulic tests. Flanges shall be machined flat. The flanges shall be drilled in accordance with IS:1538 (part – I to XXII) – 1976 (specifications for C. I. Fittings for pressure pipes for water etc.) or its latest edition.

### **Coating**

The casting shall be such that it shall not impart any taste or smell to water. The coating shall be smooth, glossy and tenacious, sufficiently hard so as not to flow when posed to a temperature of 770 C and not so brittle at a temperature of 150 C as to chip off when scratched lightly with the point of penknife.

Alternatively, two coats of black Japan conforming to type 8 of IS 341-1971 (or latest edition) or paint conforming to type – 2 of IS 179-1969 (or latest edition) shall be applied.

The sluice shall be provided and fixed as per specifications given under IS-780-1980 or its latest edition.

### **Testing**

The air valves shall withstand 1.5 times the working pressure. The joints and air valve shall be water tight. During test, if the joints of air valve are found leaking or the air valve is found not functioning properly then the same shall be got rectified or replaced by the contractor to the satisfaction of Engineer-in-charge.

### **Joint Material**

The contractor shall have to provide all the jointing material like bolts, nuts, lacking, branch (up to 1 Mt long) with flange, white zinc etc. at his cost.

### **Installation of valve:**

The Kinetic type air valve & Air Cushion valve shall be conveyed carefully by the contractor at his cost to the site of work within Surat city limit. Any damage while transporting of Kinetic type air valve & Air Cushion valve or any other materials shall not be accepted and this have to be bare by the contractor. Valves shall be lowered and fixed in proper position and right to the plumb and flange joints with the sets of tail pieces shall be carried out perfectly water tight, rubber insertion etc. required for jointing shall be provided by the Contractor.

## **49. VALVE CHAMBER**

The size of the chamber shall be as required and as directed. Necessary excavation shall be carried out for constructing the chamber, foundation of c.c. 1:3:6 shall be 25 cm. thick and shall extend 8 cm. beyond the outer faces of the chamber. The thickness of the wall shall be as required or as directed by the Engineer depending upon the depth other chamber.

But in no case the thickness shall be less than 23 cm. The masonry shall be plastered by 15 mm. thick in C.M. 1:3 to a full depth inside the chamber and for a depth of up to 30 cm. below the ground level on the outside of the chamber. Providing and laying R.C.C. slab in 1:2:4 c.c. with required reinforcement and providing and fixing manhole cover and frame in position cutting the reinforcement and placing and fixing the same in position by using binding wires as directed by the Engineer. The weight of the manhole cover frame shall be not less than 200 Kgs. Necessary C.I. steps weighting not less than 5.30 Kgs. shall be provided at 0.37 meter c.c. on one side of the wall. The exposed surface of the R.C.C. slab shall be plastered with C.M. 1:3.

Brick Masonry - The bricks shall be table moulded good, sound, hard, square well burnt, with straight sharp edges. Their size shall be uniform. No bricks after 24 hours immersion in water should absorb more than 20 percent of their dry weight. Any brick which in the opinion of the Engineer are defective in quality, will be allowed to go into the work. Resistance of bricks to crushing shall not be less than 500 lbs. to the square inch. No bricks shall under any circumstances be used except such as to fulfill in all respects the conditions above specified and should the contractors fail to supply the bricks of the quality and description specified, and in such quantities as may from time to time be necessary for the expeditious progress of the work, the Engineer shall be at liberty to purchase on account of the contractor, and bring to the work such and so many bricks as the Engineer may from time to time deem necessary or desirable and the contractors shall in such case be charged with all cost which the Engineer may incur in supplying such bricks, and shall be bound to use in the work bricks so supplied.

The work shall be of best description and workmanship. No bricks shall be used in it except as closures, and in case of the contractors failing to supply good bricks, bricks approved by the Engineer only shall be used.

All bricks shall thoroughly immersed in water at least for 12 hours before being used, and the brick work shall be protected from the sun and kept well moistened for at least three days after completion. The bricks are to be evenly and truly laid, breaking joint, course by course and properly bent together in every part. The joints are to be closed and regular and in no case exceed three eighth of an inch thickness. The bond shall be English, except where otherwise specified.

All bricks masonry work shall be plastered both inside and outside. To receive cement plastering, the walls shall be prepared by racking out the joints to a depth of 1/2" and watered. The cement plastering shall consist of three parts of fine sand and one part of cement. A rendering of cement plastering of the required thickness properly gauged, shall then be applied in an even and uniform coat and shall be well and repeatedly wetted and troweled until hard and glossy surface is obtained. Contractor shall be confirming Chamber wall height before final submission of drawings and technical details by Clint/Consultant.

## **50. P.V.C. WASTE WATER PIPE**

### **WORKMANSHIP:**

The P.V.C. spigot and Socket soil or water pipe shall be joint as per following procedure.

Cut the P.V.C. pipe with a fine to the saw to the required length pipe should be cut square.

Chamfer the edge of the pipe to be inserted at an angle of about 15 to about 1/3 rd. the wall thickness, using a coarse file.

Make sure the spigot and socket are the roughly clean and dry.

Insert the pipe into the socket without the seal ring and mark along the pipe, when it is fully inserted.

Fix the rubber ring into the groove without twisting it.

Apply jointing lubricant to the chamfered end of the pipe, up to the make made on spigot or to the socket

end of the fitting.

Push the pipe firmly into the socket till the gap between the mark on the spigot and socket is about 10mm to allow for thermal expansion.

The pipe clips should be spaced at intervals of no more than ten times the outside diameter of pipes for horizontal runs & for vertical lines are spaced at intervals of one meter to a maximum of two meters according to pipe diameter.

All entry to main stacks should be protected with minimum 50mm water seal trap. Wherever there is mixing of soil & waste lines.

Smoke just should be avoided, and test plug/ socket plug should be used for testing the lines.

All soil pipes shall be carried up above the roof and shall have a wire balloon guard or a cowl.

The ventilation pipe or shaft shall be carried out to a height of at least one meter above the outer covering of the roof of the building or in the case of windows in a gable wall or a dormer two meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least one meter above the parapet or two meters measured vertically from the top of any windows or opening which may exist up to a horizontal distance of five meters from the vent pipe into such building and in no case shall be carried out to a height less than three meters.

Where ventilating pipes are carried in pipe shafts, the shafts, shall be of a minimum size of one meter. If the shafts are also used to give light and air to rooms, the ventilating pipes must be carried out to a horizontal distance at roof level not less than five meters from the site of the shaft.

The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning.

The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floors. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gully trap.

## **51. TERRACE WATER PROOFING**

Providing water proofing treatment on terrace of different levels, preparing roof surface for laying brick bat coba on cement mortar (1:5) with special water proofing compound with necessary gradient for easy flow of rain water, brick bat coba is finally covered by joint less cement plaster in cement mortar (1:4) added with special water proofing compound, and top smooth finished with trowel with false chequered marking of 300 mm size. The treatment is carried along the vertical surface of the parapet and other adjoining wall up to height of about 300 mm in a shape of quarter round vata. The average thickness of the water proofing treatment is 120 mm. Minimum thickness at rain after outlet point being 65 mm including curing etc. complete as per specification and instructions including water proofing test as directed

Material:

Water shall conform to M-1. Cement shall conform to M-3, Sand shall conform to M-5. Brick bat shall conform to M-11 water proofing compound shall be "CEMWET" or shall conform to I.S. 9103-1979.

Workmanship : Preparation of surface :

Before the operation of laying of the topping is started the surface of the base concrete brick masonry etc. shall be thoroughly cleaned of all dirt, loose particles, chocked mortar



dropping and laitance if any, by scrubbing with steel wire brush, where the concrete has hardened so hardened so much that roughening of surface by wire brush is not possible, the surface shall be roughened by chipping or hacking at close intervals. The surface shall be then cleaned with water and surplus water shall be removed by mopping before topping is laid.

**Laying :**

Before placing the cement mortar neat cement slurry shall be thoroughly brushed in to the prepared surface of the base concrete. Cement mortar of specified proportion and required thickness shall be laid with water proofing compound over the cement mortar bed, brick bats properly soaked in water shall be fixed to required level, thickness, slope & thoroughly tamped.

**Finishing the surface :**

After the brick bat surface has been fully compacted, it shall be covered by cement mortar of specified proportion with water proofing material of required thickness and top finished by trowelling with neat cement rendering. The surface shall be trowelled three to four times at intervals so as to produce uniform and hard surface. On the top of such surface impression of chequered 300 mm size square be formed as per the instruction of the Engineer-in-charge. The treatment shall be provided along the vertical surface of the parapet and other adjoining walls up to a height of about 300 mm in a shape of round vata.

## **52. CEMENT VATA(1:1)**

**Materials:**

Water shall confirm to M-1, cement mortar shall confirm to M-8.

**Workmanship:**

The work of cement vata of 10 cms x 10 cms size shall be carried out a junction of parapets and terraces as directed. the vata shall be finished in quarter round shape. The work shall be carried out in the best workmanlike manner. The inlet portion of rain water pipe shall be rounded off properly during constructing the vata. The work shall be cured for 7 days.

## **53. DEMOLITION / DISMANTLING OF RCC WORK**

Definitions:-

**Demolition :-** The term 'Demolition' implies breaking up. This shall consist of demolishing work or part of work including all relevant items as specified or shown on the drawings.

Dismantling :

The item 'Dismantling' implies carefully removing without damage (up or down). This shall consist of dismantling one or more part of the building as specified or shown on the drawings.

General :

Precautions:

All materials obtained from dismantling or demolition shall be the property of the Corporation unless otherwise specified and shall be kept in safe custody until handed over to any store of Dream city ltd.

The demolition shall always be planned before hand and shall be done in reverse order of the one in which the structure was constructed. The scheme shall be got approved from the Engineer-in-charge before stating the work.

Necessary propping, the shoring and or under pinning shall be provided for the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out the such away no damage is caused to the adjoining work or property. Wherever specified temporary enclosures or partitions shall also be provided.

Necessary precautions shall be taken to keep down the dust nuisance.

Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height. The or demolishing roofs, masonry etc. shall be carefully removed first. The dismantled articles shall be passed by hand where necessary, lowered the ground (as not thrown) and then properly stacked as directed by the Engineer- in-charge.

Where fixing is done by nails, screws, bolts, rivets etc. dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.

Any serviceable materials, obtained during dismantling demolition, shall be separated out and stacked properly on site or any store of Dream city ltd.. as directed by the Engineer-in-charge.

All unserviceable materials rubbish etc. shall be disposed off as directed by the Engineer-in-charge.

The contractor shall maintain/disconnect service temporary or permanent, if required.

Rates :

The rate shall include the cost of all labour involved and tools and in used in demolishing and dismantling including scaffolding. The rate shall also include the charge of or separating out serviceable and in serviceable materials and stacking the same on site or at any store of Dream city ltd. as directed by Engineer-in-charge.

The rate shall also include for temporary shoring for the safety of portions not required to be pulled down or of adjoining property and providing temporary and providing temporary, enclosures or partitions, there considered necessary. Item also includes dismantling any kind of masonry R.C.C. work, flooring work, plaster work, sanitary work etc. complete.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

24. MACHANICAL WORK

MECHANICAL WORK			
Sr.	Description		Qty.
1	Overhauling, Servicing, Repainting and Transportation of Existing Non Clog Sewage Submersible Pump sets from Pocket G SPS to New SPS <b>Capacity : 09 LPS, Head : 17 Mtr.</b>	Nos.	6
2	Overhauling, Servicing, Repainting and Transportation of Existing Knife gate valves for the discharge line of the Pump set from Pocket G SPS to New SPS; <b>Size : 50 mm Dia</b>	Set	6
3	Overhauling, Servicing, Repainting and Transportation of Non Return Valve for the discharge line of the Pump set; <b>Size : 50 mm Dia</b>	Set	6
4	<b>BAR SCREEN</b>		
	(a) SITC of Multi rake Coarse Type Bar Screen	Set	1
	(b) SS Manual Screen	Kgs.	1000
5	Cleaning, Repainting & Transportation of C.I. Fittings & Specials	Lot	1
6	Cleaning, Repainting & Transportation of SS Bellow		
a	Size: <b>350 mm</b>	Nos.	1
b	Size: <b>50 mm</b>	Nos.	6
7	Overhauling, Servicing, Repainting and Transportation Air valve for the Common Header Line at Pumping Station; <b>Size: 80 mm</b>	Nos.	1
8	Fully Electrically Operated Double Girder E.O.T. crane with electrically operated Hoist; <b>Capacity: 5 Ton</b> This scope of work also include Control Panel, Control Block, Brake, Safety Device, cables from Motor to starter Panel & Other required accessories & Tested 50 % Overload.	Set	1

9	Overhauling, Servicing, Repainting and Transportation Knife Gate Valve of Rising Main Line; <b>Size: 350 mm Dia</b> Mode of Operation: Electrical	Nos.	1
10	Overhauling, Servicing, Repainting and Transportation Non-Return Valve for Rising Main: <b>Size: 350 mm Dia</b>	Nos.	1
11	M.S. Fabrication work		
a	For Grills, Jalias, etc.	Kgs.	1500
b	I Beams, Channels for EOT Crain etc.	Kgs.	2500
12	S.S Fabrication Work for Ladder Etc.	Kgs.	150
13	SITC of Thimble mounted sluice gate Size: 1400 mm x 1400 mm (Electrically Operated)	Nos.	4
14	FRP Chequered Plate	Sq. Ft.	100
15	Overhauling, Servicing, Repainting and Transportation Dewatering Pump	Nos.	1
16	F.R.P Railing	Rmt.	20
17	Supply Installation Testing and commissioning of Ultrasonic Level Indicator Range: 0-12 Mtr.	Nos.	1
18	Electromagnetic Flow Meter on Common Header at Outlet of SPS, Size: 350 mm	Nos.	1

**ITEM NO : 1. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION OF EXISTING NON- CLOG SEWAGE SUBMERSIBLE PUMP SETS FROM POCKET G SPS TO NEW SPS (CAPACITY: 09 LPS, HEAD: 17 MTR.)**

Dismantling, overhauling, repairing, shifting & ETC of Existing Non- Clog Sewage Submersible Pump sets from Pocket G SPS to New SPS (**Capacity: 09 LPS, Head: 17 Mtr.**)

1. Dismantling, Overhauling, Re-Erection, and commissioning of Pump set with their accessories installed at Pocket G SPS.
2. The pump should be overhauled completely to check the clearance & to replace worn out parts. The effect of liquid handled on pump components should be checked if abnormal corrosion / erosion is observed. The components should be replaced with that of suitable material.
3. Replacement of consumable hardware like gaskets, rubber packing, graphite packing, etc. and repairing of bearing holder/ block etc. in the scope of the Contractor. All required Cutting & welding as per site requirements in scope of contractor.

4. Repairing of control panel boards including replacement of spare parts if any and also maintenance/ replacement and repair of cut outs, main switch, volt meter, ampere meter earthing wiring and single-phase wiring, inside and outside of pump house, repairing fuse wires internal wiring etc. with the help of qualified electrician motor, cable fault or decrease in discharge of the pump or any other cause. Every care shall be taken by the contractor while removing the motor so that no harm is made to asset of Dream city ltd., any loss if made shall be rectified by the contractor.
5. Any submersible motor falls in wet well while lifting, lowering, and running of idle condition. The submersible pump set if fallen shall be removed by the contractor at its own cost if contractor fails it will be carried out by department at risk and cost of contractor.

**ITEM NO : 2. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION OF EXISTING KNIFE GATE VALVES FOR THE DISCHARGE LINE OF THE PUMP SET FROM POCKET G SPS TO NEW SPS (SIZE: 50 MM DIA)**

Complete dismantling of all the Knife gate valves & related accessories from Pocket G SPS.

Overhauling, servicing, repairing or replacement with refitting, testing & commissioning of existing Knife Gate Edge Valve as directed by Dream city ltd. Engineer in Charge.

Tenderer shall have to complete scrap, clean of Knife Gate Edge Valve assembly. Tenderer also shall have to supply and fit the new subassembly for the existing Knife Gate Edge Valve, if required. While refitting of existing Knife Gate Edge Valve, proper alignment shall be done as per standard practice.

All required parts of Knife Gate Edge Valve, C.I fittings, special piece, sealing, steel / cement for civil works etc. shall be provided by the contractor at his own cost. Apply two coats of zinc base primer after completion of cleaning, brushing & scraping of Knife Gate Edge Valve and finally it shall be coated with epoxy paint.

All Valves shall be operated through electrical Actuator, installed at existing Gates. Repairing/Overhauling/Replacement and any other arrangements which need to be done for operation of Installed Actuators will be in the scope of contractor without additional cost towards it.

**ITEM NO : 3. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION OF NON- RETURN VALVE FOR THE DISCHARGE LINE OF THE PUMP SET (SIZE: 50 MM DIA)**

Complete dismantling of all the Non- return valves & related accessories from Pocket G SPS.

Complete dismantling, Overhauling, refitting, Testing & Commissioning of existing Single/Multi door type Non- Return valve as directed by Dream city ltd. in Charge.

Tenderer shall have to complete scrap, clean of Non- Return Valve assembly - subassembly of NRV. Tenderer also shall have to supply and fit the new subassembly for the existing Non-Return Valve, if required. While refitting of existing Non- Return Valve, proper alignment shall be done as per standard practice.

All required parts of NRV, C.I fittings, special piece, steel / cement for civil works etc. shall be provided by the contractor at his own cost. Apply two coats of zinc base primer after completion of cleaning, brushing & scraping of NRV and finally it shall be coated with base epoxy paint.

#### **ITEM NO : 4.(A): MULTIRAKE MECHANICAL COARSE BAR SCREENS FOR SEWAGE PUMPING STATIONS**

##### **1. PURPOSE & SCOPE:**

- a) Mechanized screens should be suitable for installation in Sewage pumping stations for removal of floating wastes coming along with sewage. These screens should be capable to screen out most of the medium and large floating material such as plastic bags, floating debris, weeds, paper wastes, clothes and rags etc. which are generally clogging the impellers of the pumps installed downstream of the screens.
- b) The mechanical screen should be sturdy against full blockage from waste and high force of water acting on the complete mechanical screen, the design of mechanical screen should withstand all condition.
- c) The operation of the screen shall be automatic through the timer. An ultrasonic type differential level sensor shall also be provided to sense the head loss through the bar and give the signal to the traveling raking mechanism to start/stop its operation.
- d) A complete electrical control system shall be supplied with each screen and shall be mounted independently near to the screen installation. The system shall provide for total automatic operation of the screen with the feedback from the level controller.

##### **2.GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS:**

- a) Fabrication and design features:
  - i. Use power grinder to dull and produce smooth edges.
  - ii. Use bolted field connections. Field welding will not be allowed.
  - iii. Design all components for continuous 24 hours per day service.
- b) The screen shall be so constructed so as to mechanically remove the waste from the bottom most portion of the bar using a traveling type multiple raking mechanism without shutting the water flow through the screen. The raking mechanism shall then travel up to the top of operating platform and automatically discharge the waste through a discharge chute.
- c) The screen shall have protection against overload conditions, which otherwise might damage the equipment.
- d) All screens shall be constructed and shipped as an integrated product comprising of frame structure and guides, rakes, dead plate, cog wheels / sprockets and chains, discharge chute & drive unit.
- e) The screen shall be supplied factory assembled and duly tested at manufacturer's works before dispatch. This integrated and factory assembled screen shall involve minimum dismantling and assembly at site for erection.
- f) Upon receipt at site the screen shall be installed resting on the channel floor and mechanically or chemically anchored to the parallel sidewalls of the channel (without making grooves in concrete or breaking open the concrete side walls and thereby weakening the civil structure) in a way that there are minimum chances of misalignment.
- g) All parts shall be designed to withstand the stresses that will be imposed upon them during handling, shipping, erection and operation.

- h) All stainless steel fabricated materials will be pickled and passivated before dispatch to remove ferrous contamination, if any.

### 3. ELIGIBILITY CRITERION FOR SCREEN MANUFACTURER:

- a) As screens are required in Stainless Steel material to withstand the corrosive and aggressive sewage environment hence the screen manufacturer is expected to follow the best manufacturing practice mentioned here under to further eliminate the possibility of corrosion of screen in such a corrosive atmosphere:
- i. The preferred manufacturers shall be as stated in data sheet. In addition to that manufacturer must have a quality system i.e. ISO: 9001-2008 in place to ensure the quality of end product.
  - ii. The screens should be manufactured in a stainless steel clean area i.e. in a plant where no ferrous material is cut or welded or handled. This is required for ensuring that no ferrous contamination / pick up takes place because the stainless steel surfaces subjected to ferrous pick up gets corroded.
  - iii. Further to this as an additional precaution the manufacturer of screen must have the facility for Pickling and Passivation to remove any ferrous contamination that might have taken place during manufacturing / handling / movement of raw and fabricated material.
  - iv. As screens are basically fabricated item hence to ensure best workmanship screen manufacturer must have welding PQR, WPS & Qualified welders as per ASME Section 9.

### 4.CONSTRUCTION & SPECIFICATION:

#### 1. MATERIAL OF CONSTRUCTION:

The material of construction for various components shall be as under.	
Fixed Bar	: Stainless Steel ASTM A 240 type 316*
Frame & support structure	: Stainless Steel ASTM A 240 type 316*
Bars & rakes	: Stainless Steel ASTM A 240 type 316*
Drive Chain & sprockets	: Stainless Steel ASTM A 240 type 316*
Drive Shaft	: Stainless Steel ASTM A 276 Grade 304/316 L
Assembly bolts, nuts and fasteners	: Stainless Steel ASTM A 276 type 316*

\* Positive Material Identification (PMI) tests to be carried out for these components at manufacturer works during the inspection.

#### 2. Screen Construction:

- i. The bars shall be of flat profile having minimum 10 x 50 mm size with an average bar spacing of 20 mm.
- ii. The bar rack shall be firmly anchored to the channel floor and supported by a dead plate at the top.
- iii. The rake shall be made of Ultra High Molecular Weight Polyethylene (UHMWPE) fixed on stainless steel plate.

- iv. The complete screen frame shall be constructed with 4mm plate stainless steels of suitable grade.
- v. The drive chain for the rakes shall be link type roller chain and made of stainless steel grade AISI 304/316 with special grade hardened stainless steel pins. This is very essential considering highly corrosive sewage atmosphere.
- vi. Drive chains, chain guides, sprockets and their bearings shall be replaceable without removing the screen from the channel.
- vii. To effectively remove the debris from the bottom most portion of the screen, the screen shall be provided with curved structure at the bottom of the screen.
- viii. The dead plate shall be of minimum 2 mm thick in stainless steel and shall be suitably braced to ensure rigidity and prevent caving / bending due to increased water flow in monsoon.
- ix. The upper sprocket bearing shall be re-greaseable and flange type.
- x. Lower bearings shall be made of non-re-greaseable special ceramic bushes.
- xi. The screen should have integrated scraper for discharging the screenings to discharge chute. The scraper / wiper shall be cushioned during travel to the rest position.
- xii. The rake mechanism should be operated by a Geared motor and be suitable for automatic operation controlled by a level sensor and electric control cabinet.
- xiii. Torque switch should be provided to protect the screen from damages resulting from excessive torque.
- xiv. After fabrication and assembly, the stainless steel parts, all welded joints are to be further cleaned by acid pickling and after that they should be passivated to remove any ferrous contamination that might have taken place during manufacturing / handling / movement of raw and fabricated material.

### **3. Level Sensor**

The level sensor shall be of ultrasonic differential type.

### **4. Electrical motor**

The drive shall be Geared motor and the motor shall be of TEFC type with IP 55 protection & Class F insulation and be suitable for operation on 3 phase, 1000 RPM, 415V+/- 10%, frequency of 50 Hz+/- 5% and IE2 class efficiency as a minimum.

### **5. Control Panel**

The control panel shall have IP 65 protection, painted with epoxy paint and shall be comprising of

- a) Mushroom head emergency stop.
- b) Overload relays for motor protection.
- c) If required PLC Circuitry to operate the screen with differential type ultrasonic level sensor.
- d) Selector switch to operate the screen in Auto, off and JOG mode.
- e) Provision to run the screen on timer in case of failure of level sensor.

### **6. SHOP TESTING**

The screen must be completely manufactured and subsequently offered for inspection at the plant of the manufacture only. A screen assembled by a vendor and offered for inspection at the plant of a vendor / sub-contractor shall not be accepted. The screen shall be subjected to following tests at manufacturer's premises before dispatch:



- **Dimensional Check:** Important dimensions of the screen to be verified with respect to approved G.A. drawing.
- **Operational Test:** The complete screen including its carriage, rake, drive system and motor shall be mechanically operated and tested in dry condition to verify interference free movement and satisfactory operation.
- **Positive Material Identification (PMI) test:** To ensure that Screens are actually made of Stainless Steel Grade SS 304/316 positive material identification (PMI) test to be conducted for all important screen components like Bars, Frame, Dead Plate during inspection and PMI reports to be submitted to client / corporation along with joint inspection report.
- **Dye Penetration test:** Dye penetration test to be conducted at random for checking the soundness of welding joints during the inspection. Both Procedure as well as person conducting the dye penetration test should be certified by the outside agency as per relevant standard.
- **Review of test certificate:** Material test report / certificate, Motor certificate, Control Panel certificate at el to be offered for review during the inspection.
- **Review of WPS, PQR & Weldor's qualification certificate:** To be offered for review during the inspection and copy of same to be submitted to client / corporation along with joint inspection report.

#### 7. MISCELLANEOUS:

The installation and commissioning of screens has to be done in the presence of manufacturer's representative(s) so as to avoid any possibility of misalignment and faulty installation.

Packing of screens and allied accessories shall be transit worthy to avoid any possibility of damage during the transportation to the site(s).

The specification given hereunder shall supersede other specification in case given elsewhere in tender document.

Sr. No.	Parameters	Offered
1	<b>Make</b>	
	<b>ISO: 9001-2008 certification</b> (Yes / No)	
2	<b>Design features</b> Channel Width in mm Channel Depth in mm Upstream sewage water depth in mm Average flow / screen in MLD Peak flow / screen in MLD	

	Average Bar spacing (20 mm)	
	Angle of Inclination (75 degree)	
	Screen bar dimensions	
	No of rakes	
	Discharge height above platform (Minimum 750 mm)	
	Velocity through clean screen at peak flow (< 1.2 m/sec)	
	Head loss through clogged screen in mm (<300 mm at 50%)	
3	<b>Constructional features</b>	
	Outside Screen width in mm	
	Inside Screen width in mm	
	Max. inclined length of screen in mm	
4	<b>Material Of Construction</b>	
	Screen Bars	
	Guide Rails / Channels / Frame / Discharge chute/ Scraper	
	Rake Traveling Carriage	
	Dead Plate	
	Rake Tine	
	Drive Chain & Sprockets (SS 304)	
	Control Panel (Epoxy Painted)	
5	<b>Shop Testing</b>	
	Dimensional check	
	Operational test	
	PMI test	
	Dye Penetration Test (Random)	
	Review of test certificates	
	Review of welding WPS, PQR & Weldor qualification	
6	<b>Miscellaneous</b>	
	Control Panel protection IP 65 approved by CPRI (Yes / No)	

## **ITEM NO : 4. (B): STAINLESS STEEL FOR MANUAL SCREEN AND FABRICATION**

### **SCOPE:**

Supply, erection, fixing, testing and commissioning of movable / manually raking type inclined stainless steel coarse bar screen including hand rake, supporting structural framework, angles, brackets, fasteners etc. complete.

### **DESIGN REQUIREMENTS:**

- 1) Movable / Manually raking type inclined stainless steel coarse bar screen shall be suitable for fixing in RCC chamber/channel with clear spacing between screen bars.
- 2) It shall be provided with hand rake, supporting structural framework, angles, brackets, fasteners etc. complete.
- 3) The angle of inclination of screen shall be as per data sheet.
- 4) Fixed type manual screen having chamber size as mentioned above to be made of SS flats. Side Mounting Brackets to be provided at suitable distances on both sides of screen to fix screen with channel walls.
- 5) All fasteners including nuts, anchor bolts, washers, foundation bolts, etc. both in wet and dry areas shall be of stainless steel.
- 6) The design and fabrication details of manual screen shall be got approved from Engineer-in-Charge before placing the order for the same.
- 7) Material shall be weigh shall be derived as per latest IS standard. Therefore, it is in the interest of bidder to use standard size steel.
- 8) Supply, erection, fixing, testing and commissioning of manually raking type inclined stainless steel coarse bar screen suitable for fixing in suitable size as per site requirement and as per instruction by Dream city ltd. Officials high RCC channel with 20 mm clear spacing between screen bars including hand rake, supporting structural framework, angles, brackets, fasteners etc. complete. The angle of inclination of screen shall be 60<sup>0</sup> to the horizontal or as approved by engineer in-charge.
- 9) Movable/Fixed type manual screen having chamber size as mentioned above to be made of 10 x 50 mm SS 304 flats with bar spacing of 20 mm to be installed at suitably inclined or Vertical shall be supplied. Side Mounting Brackets shall be provided at suitable distances on both sides of screen to fix screen with channel walls.
- 10) All fasteners including nuts, anchor bolts, washers, foundation bolts, etc. both in wet and dry areas shall be of stainless steel (SS 304/316).
- 11) The design and fabrication details of manual screen shall be got approved from Engineer-in-Charge before placing the order for the same.
- 12) It is to be noted that the fabricated manual screen should be weighted in presence of Dream city ltd. representative on the Dream city ltd.. way bridge before unloading at site & original receipt of the Way Bridge must be submitted to Dream city ltd. without which no payment will be released. Payment will be made on as per Dream city ltd. way bridge receipt. No dispute regarding this matter will be entertained later on.
- 13) Out of two chambers Dream city ltd. may prefer to install one fix type and one movable type screen. Further, the work includes channel/guide grouting with required civil work and restating of civil structure is included. If any Mild steel fabrication is carried out , same will be paid in respective MS fabrication item.
- 14) Contractor need to submit Drawing of manual Screen during Detailed engineering and get approval for Dream city ltd. before installation of manual SS screen.

**MEASUREMENT: - The screen will be paid on actual weight basis as per standard weight table calculation for the fabricated screen.**

#### **DATA SHEET**

<b>Description</b>	<b>Details</b>
Application	For screening in sewage pumping station
Location	Outdoor
Chamber/Channel Size	As per site Condition
Angle of inclination of screen	60 <sup>0</sup> to the horizontal for manual screen
Flat/Bar material	SS 304
fasteners including nuts, anchor bolts, washers, foundation	SS 304
Flat/bar size	As per Requirement
Spacing between bars	As per Requirement
Spacing between side mounting brackets	Suitable

#### **ITEM NO : 5. CLEANING, REFITTING, REPAINTING & TRANSPORTATION OF C.I. FITTINGS & SPECIALS**

Cleaning, Refitting, Repainting & Transportation of C.I. Fittings & Specials installed at Existing Pocket G SPS. The scope of work also includes the replacement / Addition of C.I. Fitting which are damaged and found leak. Contactor shall have to change or replace Existing C.I. Specials and fittings without any extra cost.

#### **ITEM NO : 6. CLEANING, REPAINTING & TRANSPORTATION OF SS BELLOW**

Tenderer shall have to complete scrap, clean of SS Bellow assembly - subassembly of SS Bellow. Tenderer also shall have to supply and fit the new subassembly for the existing SS Bellow Valve, if required. While refitting of existing SS Bellow SS Bellow Valve, proper alignment shall be done as per standard practice.

#### **ITEM NO : 7. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION AIR VALVE FOR THE COMMON HEADER LINE AT PUMPING STATION, SIZE: 80 MM**

Complete dismantling of Kinetic air valve & related accessories Installed at Pocket G Sewage Pumping Station.

Complete dismantling, Overhauling, refitting, Testing & Commissioning of existing Kinetic Air Valve as directed by Dream city ltd. in Charge. In case of new part to be installed, that will be in scope of contractor without any extra charge.

Tenderer shall have to complete scrap, clean of Air Valve assembly. Tenderer also shall have to supply and fit the new subassembly for the existing Air Valve, if required. While refitting of existing Air Valve, proper alignment shall be done as per standard practice.

All required parts of Air Valve, C.I fittings, special piece, sealing, steel / cement for civil works etc. shall be provided by the contractor at his own cost. Apply two coats of zinc base primer after completion of cleaning, brushing & scraping of Air Valve and finally it shall be coated with epoxy paint.

## **ITEM NO : 8. E.O.T. CRANE WITH ELECTRICALLY OPERATED CHAIN HOIST (CAPACITY: 5.0 TON)**

### **EOT CRANE**

Supply, erection, fixing, testing and commissioning of 5.0Ton capacity Single girder EOT crane with single speed electrical hoist suitable as per site Requirement including all the accessories, electrically operated hoist with trolley, lifting chain, hook, fasteners, fixtures, etc. complete. Required electrification to power-up chain hoist shall be in the scope of this work.

### **GENERAL:**

It shall be provided with 5.0 Ton capacity EOT crane for the required span, height and long travel length including all the accessories, electrically operated single speed hoist, traveling trolley, lifting chain, hook etc. complete for electrically hoisting and lowering of all kind of equipment, etc.

The scope of work includes designing, providing, erecting, testing and commissioning the crane of suitable capacity as specified.

### **CODES AND STANDARDS**

The design, manufacture and performance of the crane and its allied equipment and material shall comply with all currently applicable statutes regulations and safety codes in the locality where the crane will be installed.

The equipment shall also conform to IS: 3177 and IS: 807 and relevant international standards.

### **FEATURES OF CONSTRUCTION**

The feature of construction shall generally conform to the specifications.

The crane shall be of best quality equipped with given capacity standard traveling trolley, electrically operated chain hoist, etc.

The electrically operated chain hoist shall be of machine cut gears, tested for 50 % over load capacity and shall have sturdy forged hooks, special alloy load chains, chain for hand operation all for smooth working without any shocks, all complete.

Chain block shall be fitted or hinged on cross traversing trolley.

A traversing cross trolley shall be designed and assembled using standard size RS girders adequate to withstand to travel in any direction on load with all mechanism complete. It shall be provided with wheels and trade over two traction rail bars, which shall be fitted on RCC beams/girders. These shall be adequate for room dimensions as proposed.

The gantry girders shall be designed and manufactured with two RCC beam/girders frame, traveling wheel on both ends of the span and shall have an arrangement to operate with sprocket wheel and chain, suitable for operations from ground level of the SPS. The steel used for the same shall conform to IS 2062.

Two girders shall be adequately braced at equal spacing using MS channels or MS standard section and shall have bolting arrangement to have perfect rigidity and performance.

Welding quality for the entire unit shall be maintained using standard make welding rods for duty purpose. All lengthwise girders and frame used for traversing shall be designed for 150% of the design load, considering the spans, in both direction, lengthwise and width wise where the crane is to be operated.

On the entire length of RCC beam/girder, both sides, adequate size MS square or standard rail section shall be designed and used. It shall be welded on both sides of the section to have homogeneous section. Welding shall be carried out using standard welding rods for the purpose and it shall be carried out by experienced trained welder having sufficient experience of this type of work. All excessive welding shall be removed and then to be ground to requirements.

The entire structure shall have good stability with or without load. Suitable arrangements at both the ends shall be provided to restrict the travel of the crane beyond decided limits.

### **PERFORMANCE**

The unit shall be capable of satisfactory operation and shall be available for duty as required in the Pumping for handling of machinery and allied equipment.

### **PAINTING**

All the parts of the unit shall have good and smooth finish. It shall be painted to produce a neat and durable surface which will prevent rusting and corrosion. The equipment shall be degreased cleared of all rust, sharp edges, scales to be removed before painting. The Crane structure shall be painted with two coats of red-oxide metal primer and two coats of enamel paint of approved colour. The electric hoist and LT -drive units shall be painted with enamel paint approved by Engineer-in-Charge.

### **TESTS**

All routine tests shall be conducted in manufacture's works and test certificates shall be produced.

The unit shall be tested as per latest IS codes.

Load chain certificate, forged load hook certificate shall be provided along with the test certificate of chain block provided on the unit.

### **DOCUMENTS**

As a part of proposal, the Tenderer's shall furnish relevant descriptive and illustrative literature on the components proposed to be provided for the gantry arrangement.

General arrangement drawing showing details of all parts and accessories of EOT crane.

Detailed methodology and note for erection and test.

Test certificates of electrically operated chain hoist and other components.

### **BEARING**

Plain or roller type bearings shall be used. Roller bearing shall conform to IS: 5669. Plain bearing shall be of cast iron or bronze.

### **FRAME**

The frame shall be designed for proper strength and it shall maintain alignment under all service conditions. The material shall be high tensile, weldable structural steel.

#### **LUBRICATION**

The block shall be provided with adequate facility for lubrication unless materials with inherent lubricating properties are used.

#### **ANCHORAGES**

The load chain anchorages associated fittings and framework at the slack end shall be at least equal in strength to 2.5 times the maximum tension in the load chain when working load is being lifted.

#### **GEARS**

Gears shall be provided for proper strength and for surface durability such as to afford efficient operation during the guarantee period and thereafter. Material of construction shall be carbon steel of conforming to IS 1875 and 4367, or equivalent international Standard.

#### **LOAD BRAKES**

The electrically operated chain hoist shall be provided with an automatic mechanical load brake which will prevent self-lowering of the load. It will arrest and sustain the load in any position within the working limit. Brake should allow smooth lowering of the load.

#### **INSPECTION**

The representative of Dream city ltd. shall have access to the works of the manufacturer for inspecting the material, tests etc.

#### **DESIGN TESTS**

Test certificate shall be produced for design test, which should be carried on tensile testing machine to at least 4 times the working load limit without any distortion.

#### **OPERATIONAL PROOF TESTS**

Each chain block shall be subjected by the manufacturer to a proof load of 1.25 times the working load limit through a length of lift which will ensure that every part of the block mechanism and each tools of gear comes under load.

#### **MAINTENANCE**

For maintenance of Crane at regular interval, contractor shall Provide operating platform of suitable height of Crain.

#### **ITEM NO : 9. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION KNIFE GATE VALVE OF RISING MAIN LINE; SIZE: 350 MM DIA**

**As per Description/ Specification mentioned in Item No. 2**

#### **ITEM NO : 10. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION NON- RETURN VALVE FOR RISING MAIN (SIZE: 350 MM DIA)**

**As per Description/ Specification mentioned in Item No. 3**

**ITEM NO : 11. M.S. FABRICATION WORK**

**MATERIALS:**

The structural steel work shall conform to M-22 and its latest amendment.

**WORKMANSHIP:**

1. The steel section as specified or required shall be cut, square and correct lengths, as per design. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member, except as indicated in the drawing or permitted prior to starting of work as directed. All straightening and shaping to form shall be done by application of pressure and not by hammering. Any bending or cutting shall be carried out in such a manner so as not to impair the strength of the metal. All operation shall be done in cold state unless otherwise directed /permitted.
2. **Welding** shall generally be done by electric process. Gas welding shall be restored to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work. The welding work shall conform to I.S.816-1969, and its latest amendment.
3. **Preparation of surfaces:** Surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed Oil shall be permitted.
4. **Assembly for welding:** Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.
5. **Precaution:** All operation connected with welding and cutting equipment shall conform to safety requirements given in I.S. 1118-1968 and its latest amendment.
6. The following points shall be borne in mind during the process of welding-
  - a. Welds shall be made in flat position wherever practicable.
  - b. Arc length, voltage and amperage shall be suited to the thickness of material type of groove and other circumstances of the work.
  - c. The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.
  - d. The defective welds, which shall be considered harmful to the structural strength, shall be cut out and re-welded.
7. All the members shall be thoroughly cleaned, of rust, scales, dust etc. before fixing them in position.
8. The complete fabricated structure shall be scraped, cleaned and painted with two coats of oil paint after applying one coat of red oxide primer.
9. All material used shall be of recently manufactured, free from defects, mill scales, laminations, pitting, rust, etc. All welds shall be free from defects like blow holes, lack of penetration, slag intrusion etc. It shall be free from chip, crack, fracture, Pit, Scratch etc.

**SCOPE OF WORK:**

**For Crane etc.**

1. Providing, fabrication and fixing in position works such as Bridge Girder ISMB, gantry girder's ISMB ,Square Bar ,Chequered /plane plate for the electric operated chain pulley block, End Carriage Assembly and necessary size of the flat Etc. shall be included in this item.



2. Contractor should submit the selection calculation (as per elect. operated chain pulley block's IS 3177) of the Bridge Girder ISMB, gantry girder's ISMB and Square Bar of the chain pulley block from Crain manufacture & final selection of the same will be done by Engineer-In-charge.
3. All material used shall be of recently manufactured, free from defects, mill scales, laminations, pitting, rust, etc. All welds shall be free from defects like blow holes, lack of penetration, slag intrusion etc.
4. The girders shall be leveled and aligned before grouting. If require necessary packing shall be inserted / welded.
5. The availed head room and clearances are as per the drawing attached.
6. Joint for Gantry girder shall be allowed on R.C.C. support only.
7. No Joint shall be allowed in Bridge Girder.
8. The complete fabricated structure shall be scraped, cleaned and painted with two coats of oil paint after applying one coat of red oxide primer.
9. The payment should be made on the basis of weight as per I.S. of various sections actually used. The measurement shall be taken after complete fabrication is done. No cutting of burning allowance shall be permitted.
10. This item also includes the braking R.C.C. slab beam etc. as per site requirement and make it finish. Sand cement etc. will be brought by the tenderer for the same work. Rate should be given per Kg. basis.

**For Grills, Ladders etc.**

1. Providing, fabrication and fixing in position works such as grills, ladders, angles, ISMC, etc. as per directed by Engineer in Charges.
2. The walkway detailed drawing of the department shall give sketch as and when required depending on the site condition. The final drawing as per fabrication done will be supplied by the contractor. The final drawing shall indicate size and dimension of the job/parts/ sections having M.S. steel sections like round, square, flats, angles, channels or M.S. joints as per site requirement.

**Accessories-**

All accessories like coupler plate, bend, tees, cleats, hardware etc. shall be considered.

**ITEM NO : 12. S.S FABRICATION WORK FOR LADDER ETC.**

**AS Per Description/ Specification Mentioned in Item No.: 4(B)**

**ITEM NO : 13. ELECTRICALLY OPERATED CAST IRON WALL THIMBLED MOUNTED SLUICE GATE (SIZE:1400 X 1400 MM)**

**GENERAL:**

The construction of cast iron sluice gates shall be in accordance with the specifications mentioned hereunder and as per IS:13349-1992. The sluice gates shall be capable of performing the duties set out in this specification without undue wear or deterioration. They shall be so constructed, that maintenance is kept to a minimum.

**DESIGN & CONRUCTIONAL DETAILS:**

The constructional features and details of components of the required types of gates are to be as under:

**GATE FRAME:**

- a) The gate frame will be made from cast iron and shall be sufficiently rigid to withstand the designated water head. The gate frame shall either be flat back type or flange back type to suit the designed head and site condition.
- b) Back flange of the gate aperture frame to be precisely machined flat and drilled to engage with the Cast iron wall thimble mounted on the wall. A rubber gasket will be provided between the wall thimble and the gate for ease in future dismounting of the gate for repairs / replacement.
- c) The gate frame of these sluice gates shall either be self-contained type or non-self-contained type depending upon site requirement.

In case of non-self-contained gates, the frames shall have short length extension guides and shall be without yoke at their top. The length of extension guides in such cases shall be sufficient to engage at least half the overall vertical height of door when the gate is full open and shall be in accordance with the relevant provisions of IS-13349.

In case of self-contained gates, the frames shall have full length extension guides and shall be provided with a yoke at their top. The length of extension guides in such cases shall be sufficient to engage the overall vertical height of door when the gate is full open position.

**GATE SLIDE / SHUTTER / DOOR:**

- a) The gate slide / shutter / door will be made from cast iron and shall be sufficiently ribbed to withstand the designated water head.
- b) The gate slide / shutter will be provided with integral pocket to house the thrust nut used to connect the stem with the slide.

**1. SEATING/SEALING FACES:**

- a) Materials: These should be of Stainless Steel or as specified.
- b) Fitment: The facings shall be attached to flat machined faces of gate frame and door and secured in place using taper screws. The taper screws adopted for facings shall be of same material as that of the seat facings.
- c) The front faces of integral extension guides which can come in contact with the sealing faces of door while opening, shall also be fitted with sealing faces of the same material as that of the sealing faces on door. This is required to offer non- corroding smooth sliding surfaces to the sealing faces of door/shutter during its vertical travel for opening and enhance the effective life of gate.
- d) Finish: The mating seating/sealing faces on the gate frame and door shall be precisely finished for proper contact. They should be so finished that the clearance or gap, if any, between the mating sealing faces, in gate closed position, does not exceed 0.1mm.

**2. WEDGING DEVICES:**

- a) The Sluice gates shall be provided with adjustable wedging devices to ensure forced contact between frame and shutter seat facings, when the gate is in closed position.
- b) The gates meant for seating head shall be provided only with side wedging devices. Gates meant for unseating head of sizes larger than 600 mm, shall be provided with side, top and bottom wedging devices or with side and top wedging devices and flush bottom closing arrangement as required.
- c) The wedging devices comprise of wedge brackets shall be fitted on gate aperture frame and door. The wedge bracket on frame shall remain in fixed position and those on door shall be adjustable or vice versa. A sort of slot and tennon arrangement shall be

provided on base of wedge brackets to prevent any tendency to shift. Provision shall be made to clamp the adjustable brackets firmly in adjusted position.

- d) The wedging devices shall be made of cast iron. If the wedges/wedge blocks of wedging devices are of Cast Iron, then these are to be lined with contacting faces of the same material as that of sealing faces attached to the gate frame and door.

### 3. CONVENTIONAL OR FLUSH BOTTOM CLOSING:

The sluice gates shall be provided with conventional or flush bottom closure arrangement as required.

The sluice gates provided with conventional bottom closing arrangement involve corrosion resistant metallic contacting sealing faces at the bottom sill of gate. In such cases, the invert of the gate is required to be kept above the floor of the channel / chamber by at least 100mm to 150mm depending upon the size and type of gate. The gate manufacturer should verify whether this clearance is available at the site of installation for fitting a conventional bottom closure gate.

In case of conventional closing gate, if the invert of the gate is kept at the same level as that of the channel/chamber floor, then there remains a slot or a groove at the invert of the gate. Debris, dirt etc. which may settle in this slot and may not allow the gate to close properly and this may give rise to heavy leakages while in operation.

With a view to avoid this, in situations where the invert of the gate is to remain at the same level as that of the channel/floor, a Flush Bottom closing gate instead of Conventional Bottom Closing gate should be provided.

Flush Bottom Closing shall involve a flexible rubber seal at the bottom of the gate, mounted either on the shutter or on the frame, ensuring that the sealing face remains flush with the floor. The cast iron bar fitted at the bottom of the frame is required to be embedded in the channel / chamber floor and for this a cut out / recess of ample dimensions is required to be provided beneath the waterway opening along the gate invert, while constructing the floor. The dimensions of this cut out shall be provided depending upon the feasibility to do so as per actual site conditions.

This cut out/recess is to be later on filled up with removable asphalt or loose concrete mixed with sand dust or vermiculate after putting the gate in position so that it is possible to break open this second stage grout for removal of the gate in future.

The rubber seal employed shall be made of EPDM or Neoprene rubber and the rubber seal retainer bars as well as the fasteners for fitting the rubber seal and the retainer bar are of stainless steel.

### 4. GATE OPERATING HEADSTOCK/LIFT MECHANISM:

- a) The operating headstocks shall be designed in such a manner as to permit the gate operation by a single person under the specified maximum operating head with an effort of less than 18kgs on the crank / hand wheel.
- b) The headstock shall be geared type and the geared headstock may be either of single speed or of double speed, as might be necessary to make it convenient for one person to

open or close the gate as fast as practicable. Two speed headstocks shall be supplied with gates requiring higher hoisting capacities. In this type of headstock the low speed is meant for crack opening the gate when the effort required to open the gate is maximum and the high speed is meant for further faster opening after the gate is crack opened.

- c) Geared headstock shall be supplied with easily removable crank handle or hand wheel with a radius not exceeding 375mm.
- d) All the gears of geared headstock shall be kept completely encased in cast iron housing to protect them from damage, dirt, dust, water etc. and other atmospheric effects and thus ensure their smooth operation, especially in the intended application where most of the time the gearboxes will be subjected water sprays coming from top of the cooling tower. Grease nipples shall be provided at proper places for lubricating with grease.
- e) Headstock meant for mounting on operating platform shall be supplied with a pedestal/floor stand to provide a convenient operating height of approximately 900 mm. The pedestal of the headstock shall be provided with a covered window opening to enable cleaning and greasing of stem threads.

#### 5. LIFTING SPINDLE/STEM :

The sluice gates shall be supplied with rising type lifting spindles/stems. The stem shall be provided with acme / square threading, length of threaded portion being about 400mm more than the height of waterway opening. This much extra length is required to allow for a minor variation of approximately 100mm on either side of the specified height of operating platform.

STEM Length: Depth of the well is consider as per actual site condition.

The design of stem will be done as per the provision in IS-13349.

#### 6. STEM BLOCK / CONNECTING BLOCK / THRUST NUT :

The rising type stem shall be connected to the door through a stem block/thrust nut housed in a ribbed pocket cast integral with the door. The bottom end of stem shall thread into the stem block and is locked in place by a set screw to prevent the stem from unscrewing. The Stem block shall be cast bronze or Gunmetal.

#### 7. SAFETY STOP NUT :

The stem shall be provided with a safety stop nut to prevent the chances of over closing of gate which may otherwise damage either the stem or the lifting platform. The stop nut shall be furnished with a set screw for setting it in a fixed position after the gate is installed. Upon installation the safety stop nut should be set in such a way that its bottom remains about 1 to 2 mm away from the top of headstock, in gate closed position.

In case of stainless steel stem the stop nut shall also be of stainless steel material of the same grade.

#### 8. STEM/SPINDLE COUPLINGS :

For ease in transportation and handling, maximum length of one piece stem shall be restricted within 4.5 to 5 meter length. Where the stem are required to be furnished in more than one piece, threaded stem couplings shall be furnished to interconnect different sections of the stem. The couplings shall have provision for pinning after inserting in the threaded end of the stem.

In case of stainless steel stem the couplings shall also be of stainless steel material of the same grade.

9. STEM GUIDE BRACKETS :

Longer stems shall be provided with sufficient number of stem guides to prevent buckling of stem. The stem guide bracket to be provided shall be Adjustable Centre Type - wherein a separate stem guide is bolted on to the wall bracket. The stem guide shall be adjustable in the slots on wall bracket in a direction perpendicular to the face of wall. Wall bracket should also offers minor adjustment in the direction parallel to the wall.

The stem guides shall have machine bored split journals to facilitate erection. The journal shall be lined with brass/gunmetal bush.

10. PIPE HOOD FOR STEM:

A Pipe hood shall be provided on the top of headstock in case of rising spindle/stem gates to cover the spindle threads for protection against damage, dirt, dust, water etc. It shall be made of transparent fracture resistant polycarbonate material. The pipe hood shall have vent holes to prevent condensation.

11. GATE OPENING INDICATING ARRANGEMENT:

Gate opening indicating arrangement shall be provided to indicate the position of the shutter. This shall comprise of scale mounted on the pipe hood and an indicator nut mounted on the rising spindle to show the extent of the opening and closing. The minimum scale graduation shall be 25 mm.

12. MATERIAL OF CONSTRUCTION:

The material of construction for various components shall be as under.	
Gate frame, Shutter, Thimble,	: Cast iron IS 210 FG 260
Headstock, Wedges, Stem Guides	: Cast iron IS 210 FG 260
Seating faces	: Stainless Steel ASTM A 240 type 304
Rubber Seals	: EPDM Rubber
Rubber seal retainer bar	: Stainless Steel ASTM A 240 type 304
Assembly bolts, nuts and fastener	: Stainless Steel ASTM A 276 type 304
Stem & connecting pin	: Stainless Steel ASTM A 276 type 304
	: Mild Steel to IS: 2062 grade A
Thrust nut and Lift nut	: Gunmetal / Phosphor Bronze

13. PAINTING:

Following painting procedure shall be adopted for the gates:

Priming	:	1 coat of red oxide primer before and after shop testing.
Finish Painting – gate	:	Black bituminous paint for gate assembly.
Minimum DFT 200 microns.		
Painting yoke & headstock	:	Epoxy red oxide primer and epoxy grey paint. Minimum DFT 150 microns.

## **ELECTRICAL ACTUATOR WITH INTEGRAL STARTER:**

### **SCOPE:**

This specification covers the design requirements, features of construction, inspection, testing, painting, delivery, installation and commissioning of actuator with integral starter with required hardware etc.

### **CODES AND STANDARDS:**

The design and manufacture of the actuator shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall relieve the vendor of this responsibility. It shall be manufactured with relevant national/international standard.

### **DESIGN REQUIREMENTS:**

1. Electrical Actuator shall be selected based on the working of actuator at rated pressure of valves/ gates. Each actuator shall be adequately sized to suit the application and be continuously rated to suit the modulating control required. The operating gear of all pen stocks / Sluice Gates shall be capable of opening or closing the gate against and unbalanced head equal to the maximum working pressure. The valve actuator shall be capable of producing not less than 1.3 times the required valve torque and shall be suitable for at least 15 minutes continuous operation.
2. The actuators shall develop the required torque to operate the valves smoothly and there shall not be any jerks in the operation at any position.
3. The actuator shall be capable of functioning in an ambient temperature ranging from 0 C to +50 C.
4. Motor shall be of suitable rating to work with design safety margin on maximum torque required for open & close valve at design working pressure of valve/gate.
5. In case of underground valves in chambers, necessary appropriate head stock, shaft extension, coupling, support, etc. shall be considered, actuator shall be mounted minimum 1.0 mtr height above the ground/chamber.
6. Contractor shall have considered all parameter such a temperature, site environment, site condition, fixing provision etc. before designing and supply.
7. Following data shall be provided:
  - i. Stem diameter
  - ii. No. of turns from full open to full close position.
  - iii. Selection of gearbox, if necessary and as per selection of model of actuator.
  - iv. Consider required coupling, stuffing box etc.
  - v. Required Torque for opening as well for closing.

### **CONSTRUCTIONAL FEATURES:**

- 1) Valves shall be operated by an electro mechanical actuator, comprising of motorized gear train and screw assembly which drives the valve stem. The actuator shall be supplied with the following accessories.

- A.C. electric motor.
- Reduction gear unit and stool
- Coupling to couple with existing valves / gates
- Torque switch mechanism complete with set of torque switches
- Limit and Auxiliary switch for protection (such as over travel limit, intermediate position indication, etc.),
- Hand wheel for manual operation.
- Auto manual clutch, Hand-auto change over lever with suitable locking arrangement.
- Local/remote control switch/push buttons
- 415/110 V AC control transformer
- Local LED Display with Digital Valve position indicator.
- Integral forward reverse starter

#### **A.C. ELECTRICAL MOTOR:**

- 1) A.C. electrical motor provided shall be fully tropicalised and suitable for operation in the prevailing climate conditions. They shall be suitable for operating satisfactorily under variations of electric supply.
- 2) Motors shall be 3 phase. Squirrel cage induction motor as per IS 325 minimum efficiency class IE2, with insulation class “B”, winding to be impregnated to render them non-hygroscopic / oil resistant suitable to operate in any harsh & corrosive environment. Motor shall be rated for 15 / 30 min. It shall be protected by bi metallic relay or electronic relay. Reset should be manual.

#### **ACTUATOR:**

- 1) The actuators shall be heavy duty and shall capable of opening and closing of the valve/gate. Actuators shall be suitable for operation on 3 phase. 415+10% volts, 50 Hz+3% A.C. supply.
- 2) Enclosure shall be IP 67.
- 3) The actuator shall be local controls comprising switches for Open, Close and Stop and a Local/Remote selection lockable in any one of the following three positions:
  - Local control only,
  - Off (no electrical operation),
  - Remote control with local stop only

The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity for stopping the actuator.

#### **STARTERS**

- 1) Reverse forward starter shall comprise electrically and mechanically interlocked reversing contactors, suitably rated, HRC type fuses.
- 2) Local control shall comprise push button for operations of CLOSE, OPEN AND STOP. Local-remote selector switch shall be provided having three different positions viz, local remote only, remote control plus local stop only and stop locked off-no electrical operation.
- 3) Internal wiring shall be as follows: control wiring of 1.5 mm<sup>2</sup> copper control cable and power circuit of 4 mm<sup>2</sup> cable. Suitable cable entry shall be provided.

- 4) The terminals shall be provided to terminate a wire cross section up to 6 Sq.mm. copper cables for power & 2.5 Sq.mm for controls cables.
- 5) Actuator Starters with integral starters:

When specifically asked, the actuators starters shall be integrally housed with the actuator in a robustly constructed totally enclosed weather proof housing. The motor started shall be capable of starting the motor under the most server conditions.

The starter housing shall be fitted with contract and terminal for power supply, remote control and remote positional indicating, and shall also be fitted with internal heaters so as to provide protection against damage to conditions. Heaters shall be suitable for single phase 110 volt operation. The heaters shall be switched "ON" when the starters are "OFF" and shall be switched "OFF" when the starters are "ON"

Each starter shall be equipped as follows.

- a. 2 No. T.P. Magnetically operated line Contactor with no-volt release and electrical and mechanical interlock.
- b. 1 No. T.P. Thermal cut-out device.
- c. 1 No. 415 – 110V, Control, Circuit Transformer fully protected by fuses on primary and secondary circuits.
- d. 1 Set of "Open", "close" and "Stop" buttons.
- e. 1 No. Local – Off –Remote switch with padlocking facilities.
- f. 1 No. Set of Torque and limit switches for "Open" and "Close" positions with 2 NO + 2 NC contacts.
- g. 2 Sets of Auxiliary limit switches with 1 NO + 1 NC contacts for intermediate position.
- h. 4-20 ma signal unit provided for SCADA operations.

### **REDUCTION GEAR UNIT**

1. Reduction gear unit shall be of totally enclosed oil bath/grease lubricated type. Gear box shall be provide with the first charge of oil lubricants and appropriate filling and drain connection. This is not applicable if it is grease lubricated.
2. Gearing shall be adequate to open and close the vale under full maximum operating pressure differential at a speed sufficient to cover the extent of travel.
3. The gear box shall have suitable stops to have stops at definite location. i.e. to prevent movement of shaft beyond fully open/close position. The gear box shall also be designed for 15 5 torque than maximum valve torque,.
4. The valve operating equipment shall have hammer blow device to loosen stuck valve or retrieve jammed valve position as an inbuilt feature achieved through "Lost motion principle"

### **HAND WHEEL WITH MOTOR RIDING FEATURE**

1. The actuator shall be provided with a hand wheel for emergency manual operation. The selector fork lever when put on the hand position shall disconnect the motor drive. When the motor is switched on the hand wheel connection shall be disengaged automatically. Hand wheel shall be marked with open and close direction.
2. Hand wheel shall not rotate during electrical operation & Manual drive operation shall automatically disengage when the motor starts.

### **Local Indicator/Display**



1. An actuator should have a local LCD display to show the local digital position indication to show the actual position of the valve. Along with the digital position indicator, actuators should also show the status as well as fault indications/information of actuator on LCD display

### **Space Heater**

- 1) An anti-condensation heater shall be provided in switching compartment of the actuator.

### **Lubrication:**

1. Actuators shall be grease-filled prior to dispatch from the factory. Apart from periodic inspection, no lubrication maintenance shall require. Actuator should be suitable for any positional mounting.

### **Rising spindle gate/valve:**

1. All actuators with the exception of rising spindle penstock shall be equipped with indicators showing whether the penstock is fully open or closed. A transparent P.V.C. cover shall be fitted to protect the thread of the rising spindle.
2. All operating spindles, gears and head stock shall be provided with adequate points for lubrication.

### **PROTECTIONS:**

#### **Auto Phase Correction:**

The controls should monitor the rotation of the incoming 3 phase supply and automatically directs the actuator controls to ensure that the motor always runs in the correct direction throughout the life of the unit.

#### **Single Phase Protection:**

If one or more phases are lost the control circuit will be prevented from energizing the contactors.

#### **Instantaneous reversal:**

The direction of travel of the actuator may be reversed without first stopping the unit; this facility being available in either the "Local" or "Remote" mode.

#### **Jammed Valve Protection:**

In the event of jammed valve the control circuit will automatically switch off power to the motor.

#### **ESD (Emergency Shutdown):**

Whenever ESD signal will be applied to actuator the controller will override existing signals and if the actuator is in remote mode the valve will move to pre-selected shutdown position.

#### **Anti-Hammer Protection:**

Once a torque switch has operated the control circuit prevents energization of the contactors in the same direction until a signal in the reverse direction has been applied.

### **DRAWINGS:**

1. Tenderer must mention the model and make of each item in the technical bid with necessary technical details. Failing to this price bid will not be opened.
2. Contractor shall have to provide detailed drawings, detailed designing, detailed of Actuator (make, model no, rated torque etc.), details of gear box, MOC of equipment, Drawings of control panel etc. and same shall be got approved from Dream city ltd. before execution.

### **TESTS AND INSPECTION:**

The following drawing shall be submitted approved during detail engineering.

1. Each actuator must be performance tested and individual test certificates shall be provided. The test equipment should simulate a typical valve load, and the following parameters should be recorded.
  - Current at max. torque setting
  - Torque at max. torque setting
  - Test voltage and Frequency.
  - Flash test voltage
  - Actuator output speed or operating time.
2. In addition, the test certificate should record details of specification such as gear ratios for both manual and automatic drive, closing direction, wiring diagram code number and , when applicable, remote position transmitter signal range.
3. The certificates should clearly indicate the model for which testing has been done.

### **FOLLOWING TO BE SUPPLIED/SUBMITTED AFTER THE AWARD OF CONTRACT**

1. Each actuator shall be supplied with a start-up kit comprising any necessary special setting tools, installation instructions, electrical wiring diagram and sufficient spare cover screws and seals to make good site losses during the commissioning period.
2. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating: -
  - a) Serial number
  - b) External voltage values
  - c) Wiring diagram
  - d) Terminal layout.

### 3. MANUAL: -

The system must be provided with 3 sets of operational manuals along with all required drawings for further maintenance work.

### **ITEM NO : 14. FRP FABRICATED ITEMS**

The material for FRP fabricated items shall consist of FRP sheets having required thickness as mentioned on drawings.

The FRP with UV stabilizer to be used for fabrication shall essentially consist of following:

- Resin Unsaturated Polyester (UP) based on Isophthalic
- Glass Alkali free (Aluminum boro silicate) glass (E-glass) with a Reinforcement chromium bending agent. Alkali percentage to be less than 1%
- Filler Substances to improve viscosity of laminate. Resin is permitted to have maximum of 5% by weight of the Thixotropic agent. The substance must not have any harmful effects on other components
- Gel coat Resin – rich layer at the mould side

Resin must be unsaturated polyester based on Isophthalic

Reinforcement : 2 layers of E-glass  
Type : fiber mat or roving  
Total Thickness : 0.6 mm

- Top coat Same as gel-coat
  - Filter of top Resins for top and gel coat have to be coated with substances which will improve the resistance against aggressive fluid, mechanical damages or aging by UV-radiation.

### **GUIDELINES FOR FABRICATION OF FRP ITEMS**

1. Thickness shown on drawings are minimum values. The contractor may increase the same if required with the approval of Engineer-in-Charge considering the function of each item.
2. All items shall be finished smooth with glass like surfaces.
3. All fixtures, specials like sockets, feeds and nipples etc. shall be molded monolithic with the main unit.
4. Exact and uniform dimensioning is essential, in order to erect the FRP items in their places correctly.

IS codes for FRP specification are given in Table

#### **Table: IS codes for FRP specifications**

IS: 6746-1972	Unsaturated polyester resin systems for low pressure fiber reinforced plastic
IS: 9845-1986	Method of analysis for the determination of specific and/or overall migration of constituents of plastic materials and articles intended to come into contact with foodstuffs
IS: 11273-1985	Woven roving fabrics of 'E' glass fiber
IS: 11320-1985	Glass fiber roving for reinforcement of polyester and of epoxide resin systems
IS: 11551-1986	Glass fiber chopped strand mat for the reinforcement of polyester resin systems
IS: 12709-1989	Specifications for glass fiber reinforced plastics (GRP) pipes for use for water supply and sewerage.

Approved Makes of Fiber Glass: Owen Glass ecg ltd., Owen Corning jushi group, Goa glass

**Approved Makes of Resin: Network Polymers, Viscous Oils, Critics Resin, GPK International Pvt. Ltd.,**

**Approved Makes for Outside Epoxy Pigment for UV Stabilizer: Colourtex Products, Kerox or equivalent**

### **FABRICATION & ERECTION**

All items shall be finished with smooth like surface.

All the dimensions shall be exact and uniform in order to erect the FRP items in their places correctly with respect to location, verticality etc.

All FRP edges or cuts have to be covered immediately after cutting with Resin.

In case this precaution is not taken the fabricated FRP item will start to disintegrate and loose strength.

A fabrication workshop may be set up for FRP items at site during erection and commissioning of the prefabricated FRP products. However, the contractor shall have to make all arrangements including electricity, water etc., on his own. All testing facilities shall be properly laid out in the field workshop.

**ITEM NO : 15. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION DEWATERING PUMP**

**As per Description / Specification Mentioned in Item No.: 1**

**ITEM NO : 16. F.R.P RAILING**

**As per Description / Specification Mentioned in Item No.: 14**

**ITEM NO : 17. SUPPLY INSTALLATION TESTING AND COMMISSIONING OF ULTRASONIC LEVEL INDICATOR (RANGE: 0-12 MTR.)**

**SCOPE:**

The scope includes supply, installation, testing and commissioning of instruments as indicated below with hardware, accessories viz. companion flanges, canopy, isolation valve, etc. with power cable, signal and control cables up to main panel.

**LEVEL TRANSMITTER & INDICATOR:**

- 1) The level measurement shall comprise of an ultrasonic level sensor, transmitter, remote digital indicator & switches for high & low alarm.
- 2) The level transmitter shall be mounted at a convenient location above the maximum water level.
- 3) The level transmitter shall be designed for outdoor installation.
- 4) The level sensor shall be suitable for flange mounting.
- 5) Feature shall be provided in the level transmitter for rejection of sonic disturbances and reflection from surrounding surfaces.
- 6) Automatic temperature compensation shall be provided for ambient temperature variations.

**DATA SHEET FOR LEVEL MEASUREMENT SYSTEM: -**

DESCRIPTION	SPECIFICATIONS/RATINGS
<b>LEVEL INDICATING TRANSMITTER</b>	
<b>LEVEL SENSORS</b>	
Make	As per vendor List Only
Location /Qty.	One Nos.
Type	Ultrasonic type
Liquid	Sewage Water
Accuracy	± 0.25 %
Sonic beam angle	5 degrees or less
Range	0 – 12 mtr.
Weather Protection	IP 68
Mounting	Flange/Socket mounting

Power Supply	230 VAC +/- 15% (min) or suitable
<b>Level Transmitters</b>	
Type	Electronic
Input	Level
Output	4 – 20 Ma
Mounting	Front of Panel
Display	½ digit, 14 mm or better LED/Backlit LCD display
Enclosure	IP 68
<b>Level Indicators</b>	
Location	Control panel
Input	4 – 20 mA from level transmitter
Output	Digital display
Power supply	230 V AC +/- 15% (min)
Display	7 Segment LED with 3 ½ digits
Accessories	A limit value monitoring unit with 4 adjustable set points. Connectivity with GSM & CDMA for Data Collection shall be provided.
Cable	Power and control cables up to control panel
Enclosure	IP52
Alarms	High & low with potential free contact
Interlocking with all pumps	Required
Voltage stabilizer	Range 190 V to 270 V

**ITEM NO : 18. ELECTROMAGNETIC FLOW METER ON COMMON HEADER AT OUTLET OF SPS (SIZE: 300 MM)**

**LOCATION: COMMON HEADER LINE OUTLET (350 mm - 1 No.)**

<b>A.</b>	<b>GENERAL</b>		
1	Type		Full Bore Electromagnetic, Microprocessor based
2	Type of Excitation		Pulsed or Dual Frequency Excitation
3	End Connection - Type	Flange/Wafer	Flanged
		MOC	CS or better
4	Process Connection		As per ANSI 16.5/DIN standards, Face to Face Distance as per ISA Standards
<b>B.</b>	<b>PROCESS / SERVICE</b>		
1	Location of Measurement		Refer Table for Size and Location mentioned below separately
2	Service		Sewage / Sewage Sludge Application
3	Function		To measure & indicate Instantaneous Flow and Totalised Flow / Transmit (Flow)
4	Pipe Size		Refer Table mentioned below separately
5	Pipe MOC		CI / CS / SS
6	Operating Temperature		Ambient, 50 °C Max.

7	Operating Pressure		Atm., Max. 6 Bar
8	Fluid Conductivity		> 5 $\mu$ S/cm
9	Specific Gravity		Normal: 1.0 gms/cc, Max.: 1.1 gms/cc
10	Vacuum Possibility		Nil
11	Installation		Indoor or Outdoor, Below or Above Ground as per piping / site conditions
<b>C.</b>	<b>FLOW SENSOR / TUBE / ELEMENT</b>		
1	Type of Sensor		Full Bore type
2	Connection Size		Refer Table mentioned below separately
3	Flange Materials		CS or SS 304 or better as per mfr. Std.
4	Tube Material		SS304 or SS 316
5	Liner Material		PTFE For Size up to 500 mm , Hard rubber for size above 500 MM
6	Body Material / Coil Housing		SS304
7	Electrode Material		SS316L or Ha-C
8	Power Supply		From Transmitter
9	Grounding	Type / Material	Earth Ring Only / SS316
10	Protection Class	Above GL or Indoor within Pump House / Bldg.	IP-67 for flow meters installed above Ground Level or if installed indoor within pump house / building below ground level.
		Below GL outdoor	P-68 for flow meters installed outdoor below Ground Level (shall be mounted within RCC / Brick Masonry Chamber)
11	Cable Entry (for separated / remote version) & Glands		Shall be as per mfr. Std. and suitable to maintain the specified protection class at site
12	Cable Length	Sensor to Transmitter	Min. 10m, dual shielded cable
13	Calibration Certificate		Required
14	Painting, where applicable	CS / other	Chemical Resistant, Epoxy Painted
15	Upstream / Downstream Clearance		Bidder to Furnish
<b>D.</b>	<b>TRANSMITTER</b>		
1	Function		Transmit and Indicate
2	Type		Remote (Non-Integral) type, Microprocessor based, User Programmable, 2-Wire or 4-Wire type as per mfr. Std.

3	Location		Field Mounting
4	Flow / Velocity Measurement Range	Max. Flow Velocity	Flow meter shall be capable to measure flow with velocity up to max. 10 m/sec
		Minimum Flow Velocity	up to 0.2 m/sec. (shall measure flow without loss of accuracy up to 0.5 m/sec and below that, accuracy shall be as per mfr. Std.)
5	Accuracy	Flow Vel. $\geq$ 0.5 m/s	+ 0.5% of Flow Rate / Measured Value or better
		Flow Vel. < 0.5 m/s	as per mfr. Std. for flow velocity up to 0.3 m/s
6	Analogue Output Signal	For Flow	Isolated, 4 -20 mA DC, Isolated (preferably with transmission over Modbus or Profibus or Ethernet to communicate with PLC for flow, totalized flow and fault data)
	- Load Resistance		500 Ohms max.
7	Pulse Output		Required, for Totalized Output
8	Instrument Power Supply		100 to 240 VAC + 10%, 50 Hz + 5% or 24V DC as per mfr. Std.
9	Cable / Conduit Entry		1/2" NPT.
10	Local Indicator / Display	Inst. & Total Flow	Backlit LCD Display (Inst. Flow and 8/9 digit internal totalized flow)
11	Scale Graduation / Measuring Units		Engg. Units
12	Security Access Code		Preferably Required, password protected
13	<b>Protection:</b>		
a	Elec. Area Classification		Safe
b	Intrinsically Safe		N.A.
c	Enclosure	Type & Protection Class	Weather Proof to IP-65 as a minimum or better
		MOC	Cast Alu. or equi. as per mfr. Std. suitable for withstanding harsh environment
		Paint	Chemical Resistant / Epoxy Coating
		Requirement for Hazardous Area	N.A.
14	Mounting	Remote / Integral	Remote Type
		Type	Wall mounting / Pipe mounting
15	Operating Temperature		0 to 55 °C
16	Humidity		10 to 90% RH @40 °C
17	Vibration Conditions		Conformity with IEC 60068-2-6 or equi., shall be able to endure vibration, when in service, without any degradation in performance

18	Pipe not Full Detection / Empty Pipe Detection		Required
<b>E. Options / Accessories:</b>			
1	Mounting Accessories		Required, Universal 2" Pipe and / or Wall Mounting Kit
2	Tag Plate		Required, SS 304
3	Cable Glands		Required, IP-65/66 as a min., Ni-Plated Brass / Polyamide
4	Plugs for addl. cable entries		Close up Plugs shall be provided for all unused cable entries, Ni-Plated Brass / Polyamide
5	Canopy for Analyzer / Transmitter	To prevent from direct sun and rain	Required. MOC: FRP - min. 4mm thick / G.I. - min. 2mm thick
6	Expansion Bellows	SS 304	Required at suitable location to enable ease of removal / insertion of flow meter for maintenance
<b>F. SPECIFIC REQUIREMENTS FOR FLOW METER MOUNTING</b>			
1	RCC Chamber		In case of flow meter mounted outdoor below ground level shall be provided with suitable water proof chamber constructed in RCC elevated sufficiently above GL/HFL of sufficient size for ease of operation and maintenance. Chamber shall be sized suitably to accommodate flow meter and bellows in the same chamber with necessary upstream / downstream clearance requirement. (Construction of Chamber is in the scope of Contractor)
2	Modification Work in piping / Supply of flanges on piping side		Shall be included in the scope of contractor, as required, for mounting and proper operation of flow meter (includes providing the necessary straight run of upstream/downstream pipe, total 6 mtrs length maximum, with necessary flanges on flow meter / pipe side). MOC of straight run and flanges shall be either C.I. or MSEP for sewage / sewage sludge / water application. For rest applications, it shall match with pipe MOC.
<b>G.</b>	<b>Recommended Spares</b>	For 1 Year Normal Operation	Bidder to submit recommended spares list along with part nos., part description and qty. required for 1 year normal operation along with their technical bid for procurement, if required, by client in future. However, O&M spares shall be separately included by the bidder as part of O&M cost as per tender.



<b>H.</b>	Make		As per approved Vendor List
	Model	Transmitter	Bidder to Furnish
		Flow Sensor / Tube	Bidder to Furnish
<b>I.</b>	<b>Quantity of Instruments:</b>		
	Flow meter Size:	Qty.	<b>1 No. (350 mm Size)</b>

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

<b>25. ELECTRICAL WORK</b>			
<b>Sr. No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty.</b>
1	Overhauling, Servicing, Repainting and Transportation of All Distribution Panels	Lot	1
2	Overhauling, Servicing, Repainting and Transportation of Existing D.G. Set	Nos.	1
3	Supply Installation and Commissioning of Necessary LT Power Cables	Lot	1
4	CI plate type earthing station for L.T. panel body, pump motor, Fencing etc. 450 x 450 x 350 mm.	Nos.	10
5	GI strip 50 X 6 mm	kg	80
6	GI strip (motors) 25 X 3 mm	kg	80
7	G.I. wire 12 SWG	kg	80
8	CU Wire 12 SWG	Kg	605
9	<b>LIASONING CHARGES</b> Liaison fees for preparing necessary documents and drawings for getting N.O.C from supply co and Electrical Inspector for charging the installation.( All statutory fees will be paid by Dream city ltd. ).	Lot	1
10	<b>AUTOMATION</b> Automation and instrumentation work with CCTV camera system 1. Pressure Gauge 2. Pressure Switch 3. CCTV Camera as per detailed Specification 4. Computer System (2 Nos.) 5. Level Detection System 6. HMI Display 7. Communication from SPS to SMAC Center Via GPRS * The scope of work also include the construction of RCC Chamber of Suitable Size for the Electromagnetic Flow Meter.	Lot	1

**ITEM NO : 1. OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION OF ALL DISTRIBUTION PANELS**

Operation and Comprehensive Maintenance including preventive maintenance and all major & minor repairing work of PMCC / Starter Panel, which is mentioned in Electrical BOM of

Pocket G Sewage Pumping Station including supply of required spares, lubricants, consumables, tools etc.

Alignment and support of PMCC / Starter Panel and also support to base channel minor works & Drilling of holes on walls, slabs etc.

Air Circuit breakers, MCCB's, Voltmeter, Ammeter, Protective Relays, MFM etc. are functioning properly and if it is not then servicing /repairing/replacement is to be done by contractor.

Control Wiring & Ferruling shall checked properly & fix it proper manner.

Any minor work required such as Gas welding, Gas cutting & electric welding etc will be in the scope of contractor.

As per rules & regulation of electrical inspection and licensee's office, labour commissioner office, factory inspector or from semi government organization if certification or passing are required then it will be in the scope of contractor.

**The Item also include cost of Dismantling, Shifting, transportation, loading & unloading & ETC of existing all Panels Form Pocket G Sewage Pumping Station to New Sewage Pumping Station at Dream City.**

## **ITEM NO : 2.OVERHAULING, SERVICING, REPAINTING AND TRANSPORTATION OF EXISTING D.G. SET**

One number of existing DG set at Sewage pumping station. The contractor shall visit the site and shall inspect the DG set before quoting the tender. The contractor shall make sure that the repaired machine shall last long for at least another Five years without major breakdowns.

1. Scope of work also includes the supply of required spares for Repairing/Maintenance of DG Set. Only genuine, recommended spares shall be used by the contractor.
2. Replacement of all filters like Air, Diesel and Oil etc.
3. Reconditioning/Painting of DG set with its outer Enclosure.
4. All the Repairing/Maintenance work shall be done under supervision of trained person so as to keep engine in workable & healthy condition.
5. No component(s)/spare(s) shall be removed without informing competent authority/ prior concern of Engineer In charge.
6. The repairing work shall carry unconditional guarantee of one year.

## **ITEM NO : 3. SUPPLY INSTALLTION AND COMMISIONING OF NECESSARY LT POWER CABLES**

### **SCOPE:**

This section shall cover supply, laying, testing and commissioning of medium voltage XLPE Cables. This specification gives the general requirement of cables. However, it is the responsibility of the vendor to take the joint measurement, prepare the cable schedule and obtain client's (Dream city ltd.) approval before the placement of orders to the main supplier/manufacturer. The quantity mentioned in the Schedule-B is tentative. Cut lengths will not be accepted.

### **STANDARDS:**

The following standards and rules shall be applicable:

- IS: 7098 Part I XLPE insulated electric cables (heavy duty).
- IS: 3961 Recommended current ratings for cables.
- IS: 8130 Aluminum conductors for insulated cables.
- Indian Electricity Act Rules.

**MEASUREMENTS:**

The cables will be measured in meters. The unit rate shall include cutting the cable into required lengths, packing, loading, unloading, insurance, transportation, delivery to stores/site as per work order, stocking in stores, testing of cables at stores, etc. of medium voltage cable. Total quantity in meters shall be measured lug to lug basis. Necessary excavation and refilling is included in item. Whereas cost of cable tray will be paid in respective item and excluded here.

Important Note: A joint measurement by Contractor and Dream city ltd.’s representative shall be taken after order before starting manufacturing of cable to ensure total length required. Length of each run etc. cable shall be supplied accordingly. Payment shall be made at actual. If contractor shall supply excess quantity, it will be taken back by the contractor and same quantity shall be deducted from the bill. Also consider that, If Dream city ltd. shall supply the cable from the departmental store, only erection, testing & commissioning charges shall be paid in particular size of the cable. Cable Selection calculation, Cable Schedule along with Cable Layout shall be submit by contractor for Approval Prior to Execution work at site.

**CONSTRUCTION:**

**GENERAL:**

The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specification, relevant Indian Standards specifications, manufacturer’s instructions. The cables shall be delivered at site in original drums with manufacturer’s name, size, and type, clearly written on the drums.

**MATERIAL:**

Medium voltage cable shall be XLPE insulated. PVC sheathed, aluminum or copper conductor, armoured conforming to IS: 7098 Part I.

**TYPE:**

The cables shall be circular, multi core, annealed copper or aluminum conductor, XLPE insulated and PVC sheathed, armoured or un armoured.

**CONDUCTOR:**

Uncoated, annealed copper / aluminum, of high conductivity up to 4 mm. Size, the conductor shall be solid and above 4 mm. Conductors shall be concentrically stranded as per IEC: 228.

**INSULATION:**

XLPE rated 70 c. extruded insulation.

**CORE IDENTIFICATION:**

- Two Core : Red & Black
- Three Core : Red, Yellow & Blue
- Four Core : Red, Yellow, Blue & Black
- Single Core: Green, Yellow for earthing

- Black shall always be used for neutral.

**ASSEMBLY:**

Two, three or four insulated conductor shall be laid up, filled with non-hygroscopic material and covered with an additional layer of thermoplastic material.

**ARMOUR:**

Galvanized Steel flat strip/round wires applied helically in single layers complete with covering the assembly of cores.

For cable size up to 25 sq. mm : Armour of 1.4 mm dia G. I. round wire

For cable size above 25 sq. mm : Armour of 4 mm wide .8 mm thick G. I. strip

**SHEATH:**

XLPE 70 deg. C. rated extruded.

Inner sheath should be extruded type and shall be compatible with the insulation provided for the cables.

Outer sheath should be of an extruded type layer of suitable PVC material compatible with the specified ambient temp. 50 deg. C operating temperature of cables. The sheath shall be resistant to water, ultraviolet radiation, fungus, termite and rodent attacks. The color of outer sheath shall be black.

Sequential length marking required at every 1.0 meter interval on outer sheath.

Vendor has to furnish resistance/reactance/capacitance of the cable.

**RATING:**

Including 1100 volts.

**CABLE LAYING AND ERECTION**

Cable shall be laid/erected as per standard code of practice related to IS-1255-1983 and site requirements. Cable may be required to either lay in ground, on rack/cable tray or/and on the ground/duct/ structure. No hanging cables without cable tray/rack will be allowed.

**Laying directly in ground**

The cable shall be laid at least 1.05 mtr. And .9 mtr. Below ground for 22 KV and below rated cable respectively. The cable shall be covered by half round RCC block after suitable filling of sand above and below cable. The excavation shall be properly restated as per original.

**LAYING ON STRICTURE /RACK/ CABLE TRAY**

It shall be properly erected and clamped with galvanized heavy clamps at every meter of span. It shall be in straight line. Where the laying is on wall/RCC the clamping shall be done with screw after application with wooden/fiber gutty.

**TESTING:**

Test shall be carried out at manufacturer's site if desired by Dream city Ltd.. Internal test & Routine Tests certificate shall be submitted along with each drum length or part thereof.

**CABLE TEST BEFORE AND AFTER LAYING OF CABLES AT SITE: -**

- Insulation resistance test between Phases, Phase to Neutral and Phase to Earth.
- Continuity test for all the phases, neutral and earth continuity conductor.
- Sheathing continuity test.
- Earth resistance test of all the phases and neutral.

All tests should be carried out in accordance with relevant Indian Standard Code of practice and Indian Electricity Rules. The vendor shall provide necessary instruments, equipment, labor for conducting the above test, and bear all expenses in connection with such tests.

#### **TRANSPORTATION AND DELIVERY**

The cable shall be supplied in the actual length as per joint measured at site. The cable shall be dispatched at client's stores or at site as per detailed instructions given by client at later stage. The cable shall be loaded from the main vendor's store and properly stacked as per instruction of client's local repetitive.

#### **SPECIFICATION OF L.T. CABLES TERMINATION**

Providing end terminations / cable jointing for the cables mentioned in the BOQ including supply of all jointing materials like glands, cable end sockets, lugs etc. The cable glands shall be of double compression sleeve type and lugs shall be crimping type.

#### **TERMINATIONS:**

Provide Copper/Aluminum type connectors or cable lugs crimping / solder type at both ends of the cable. However, contractor has to provide Bi-metal washer whenever Aluminum and Copper connection will be made. Dowell's make conductivity grease to be used while using crimping type cable lugs/ sockets. The compression tool shall be equipped with attachment which shall assure proper crimping pressure on the connectors.

Connections shall be made tight and insulated with PVC electrical tape of colour as per I.S. Terminations of cables shall be done by using kits as recommended by the Engineer-in-Charge taking due care as specified by the manufacturer.

Provide a double compression type cable gland at each end of the cable. Glands should be of nickel-plated brass, with PVC shrouds over it. Before applying a PVC shrouds, all bare metal shall be wrapped with pressure sensitive adhesive tape.

#### **SADDLES AND CLIPS:**

Saddles and Clips shall be PVC covered or of G.I. Fixing screws shall be round head brass, where screws are used. Nuts shall be or brass, square pressed type.

#### **JOINTING SLEEVES:**

Jointing sleeves shall be of brass with standard termination. Solder type cable connectors / cable sleeves shall be used to join the cable / conductors. The Solder used shall comply with B.S. 219 type No corrosive flux only shall be used.

#### **SUPPLYING & ERECTION OF CABLE TRAYS**

All branch cables / tubes, cables on various civil units/structures shall run on cable trays only. Cable trays shall be made out of perforated galvanized mild steel sheets of 2.5 mm thickness. The width shall be so selected that 40-50% space is available for future use. Suitable cable clamps shall be supplied for binding cables / tubes at every 500mm.

#### **ITEM NO : 4. CI PLATE TYPE EARTHING STATION FOR L.T. PANEL BODY, PUMP MOTOR, FENCING ETC. (SIZE : 450 X 450 X 350 MM.)**

#### **GENERAL:**

All the non-current carrying metal parts of the electrical installation and mechanical equipment shall be earthed properly. The cables armour and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specific earthing system. An earth continuity conductor shall be installed with all the feeders and circuit shall be connected from the earth bar of the panel boards to the conduit system, earth stud of the switch box, lighting fixtures, earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of the motors shall be also connected to the earthing system.

#### **SCOPE OF WORK:**

The scope of work shall cover supply, laying, installation, connecting, testing and commissioning of:

- Earthing station.
- Earthing G.I/Copper strips from earthing station to equipotential bar.
- Earthing G.I/Copper strips/ wires from equipotential bar to lay feeder mains and circuit to connect power panels, DBs, switchboards etc.
- Bonding of Non-current carrying parts, and metallic parts of the electrical installation.

#### **STANDARDS:**

The following standards and the rules shall be applicable.

- IS; 3043 – 1966 Code of practice for earthing.
- Indian Electricity Act and Rules
- All codes and standards mean the latest.
- Where not specified otherwise the installation shall generally follow the Indian Standard Code of Practice or the British Standard Code of Practice in absence of Indian standards.

#### **TYPE OF EARTHING STATION:**

##### **PLATE EARTHING STATION:**

1. The equipment neutral earthing shall be with copper plate earthing station and equipment body earthing shall be with hot dip galvanized iron earthing station.
2. The plate electrode shall be 600 x 600 x 3.15 mm copper plate for neutral earthing and shall be of hot dip galvanized iron plate having dimension 450 x 450 x 3.5 mm thick for body earthing.
3. The earthing station shall be as shown in the drawing.
4. The earth resistance shall be maintained with suitable soil treatment as shown in the drawing.
5. The resistance of each earth station should not exceed 1 ohm.
6. The earth lead shall be connected to the earth plate through Hot Dip G.I bolts.
7. The earthing conductors shall be of copper strip in case of copper earthing and hot dip galvanized iron strip in case of G.I earthing. G.I pipe with funnel of approved quality shall be used for watering the earthing electrodes/station.
8. The block masonry chamber with chequered plate shall be provided for hosing the funnel and the pipe for watering the earthing electrodes/ station.

9. The hardware and other consumable for earthing installation shall be of copper/brass in case of G.I earthing.
10. The link/test pit covers through chequered plate.

#### **INSTALLATION AND CONNECTION:**

- The plate / pipe electrode, as far as practicable, shall be buried below permanent moisture level but in no case less than 3Mtr below finished ground level.
- The plate / pipe electrode shall be kept clear of the building foundation and in no case; it shall be neared by less than 2Mtr from outer face of the respective building wall /column.
- The plate electrode shall be installed vertically and shall be surrounded with 150 mm thick layers of charcoal dust and salt mixture.
- 20 mm dia. G.I. pipe for watering shall run from top edge of the plate / pipe electrode to the mid-level of block masonry chamber.
- Top of the pipe shall be provided with G.I. funnel and screen for watering the earth /ground through the pipe.
- The funnel with screen over the G.I. pipe for watering to the earth shall be housed in a block masonry chamber as shown in the drawing.
- The masonry chamber shall be providing with a cast iron hinged cover resting over the cast iron frame which shall be embedded in the block masonry
- Contraction of the earthing station shall bin general be as shown in the drawing and shall conform to the requirement on the earth electrodes mentioned in the latest edition of Indian standard IS: 3043, Code of Practice for Earthing installation.
- The earth conductor (Strips / wires, G.I. / copper) inside the building shall properly be clamped / supported on the wall with Galvanized iron clamps and hot dip GI screws / bolts. The conductor outside the building shall be laid at least 600 mm. below the finished ground level.
- The earth conductor shall either terminate on earthing socket provide on the equipment or shall be fastened to the foundation bolt and /or on frames of the equipment. The earthing connection to equipment body shall be done after removing paint and other oily substance from the body and then properly be finished.
- Over lapping of earth conductor during straight through in joints, where required, shall be of minimum 75 mm. long.
- The earth conductor shall be in one length between the earthing grid and equipment to be earthed.

#### **EARTH LEADS AND CONNECTION:**

Earth lead shall be bare copper or galvanized steel as specified with sizes shown on drawings. Copper lead shall have a phosphor content of over 0.15%. Galvanized steel buried in the ground shall be protected with bitumen and Hessian wrap or polythene faced Hessian and bitumen coating. At road crossing necessary Hume pipes shall be laid. Earth lead run on surface of wall or ceiling shall be fixed on saddles so that strip is at least 8 mm away from the wall surface.

The complete earthing system shall be mechanically and electrically bonded to provide an independent return path to the earth source.

Wherever crossing is required, earth jumper shall be of insulated wires.

#### **EQUIPMENT EARTHING**

All apparatus and equipment transmitting or utilizing power shall be earthed in the following



manner. Copper / G.I. earth strips /wires shall be used unless other-wise indicated in the Schedule B.

**POWER TRANSMISSION APPARATUS:**

Metallic conduit shall not be accepted as earth continuity conductor. A separate insulated continuity conductor of size 100% of the phase conductor subject to the minimum shall be provided.

NOMINAL CROSS-SECTIONAL AREA OF LARGEST ASSOCIATED COPPER CIRCUIT CONDUCTOR SQ. MM	NOMINAL CROSS-SECTIONAL AREA OF EARTH-CONTINUTY CONDUCTOR SQ. MM
2.5	2.5
4	4
6	6

The earth continuity conductor be drawn inside the conduit shall be insulated.

Nor metallic conduit shall have an insulated earth continuity conductor of the same size for metallic conduit. All metal junction and switch boxes shall have an inside earth stud to which the earth conductor shall be connected. The earth conductor shall be distinctly colored (green or green / yellow) for easy identification.

Armored cable shall be earthed by two distinct earth connections to the armoring at both the ends and the size of connection being as for the metallic conduit.

In the case of unarmored cable, an earth continuity conductor shall either be run outside along with the cable or should from a separator insulated core of the cable.

Three phase power panel and distribution boards shall have two distinct earth connections of the size correlated to the incoming cable size. In case of single phase of DB's a single earth connection is adequate.

**TEST:**

The entire earthing installation shall be tested as per requirement of Indian Standard Specification IS: 3043.

The following earth resistance values shall be measured with an approved earth meggar and record.

1. Each earthing Station
2. earthing system as a whole
3. Earth continuity conductors

Earth conductor resistance for each earthed equipment shall be measured which shall not exceed 1 ohm in each case.

Measurements of earth resistance shall be carried out before earth connections are made between the earth and the object to be earthed.

All tests shall be carried out in presence of the consultant/client.

**METHOD OF MEASUREMENT:**

Provision of earthing station complete with excavation, electrode, watering pipe, soil treatment, masonry chamber with cast iron cover etc. shall be treated as one unit of measurement.

The following items of work shall be measured separately paid and paid per unit length covering the cost of earth wires / strips, clamps, labour etc.

- a) Main equipment earthing grid and connection to the earthing station.
- b) Connection to the switch board, power panels, DB etc.

The cost of earthing the following items shall become part of the cost of the item itself and no

separate payment for earthing shall be made.

- a) Motors- earthing forming part of the cabling/wiring for the motors.
- b) Isolating switches and starters should form part of mounting frame, switch starter etc.
- c) Light fitting- form part of installation of the light fittings.
- a) Conduit wiring, cabling- should form part of the wiring or cabling.
- b) Street lighting- should form part of the street light poles.

#### **EARTHING STRIPS & WIRES:**

- Supply, erection, testing and commissioning of earthing strips for connection between LT switch gear, motor, starter as well as transformer neutral and earthing stations
- The earthing strips shall be laid underground or in trenches or on the floor of pump house and hence excavation/ refilling, clamps etc. shall be included.
- The strips shall be finally painted with green colour. The joints shall either be brazed or bolted after tin plating the ends and using GI/brass bolt nut and washers as per direction of engineer –In- charge.
- All equipment earthing joints must be done using nut-bolts and other must be welded. For measurement purpose over lapping of joints shall not be considered and payment shall be made as per actual basis.

All necessary excavation, refilling shall be in the scope of the work.

#### **INDOOR EQUIPMENT EARTHING:**

1. Each floor of building shall have its own earth bus embedded in concrete.
2. Earthing grid embedded in the floor slab shall have a minimum concrete cover of 50 mm.
3. Earth buses on different floor and main grid shall be connected by a latest two conductors of main grid conductor size.
4. Every alternate column (steel or RRC) of the building, housing electrical equipment shall be connected to main earthing grid.
5. Earthing conductors shall be welded at intervals of 1000 mm along their run of styece structure and shall be at interval of 750 mm along the wall.

#### **OUTDOOR EQUIPMENT EARTHING:**

Wherever earthing conductor crosses the trenches, funnels railway, track, etc., it shall be run below the trench etc.

Equipment structures shall be earthed at two diagrammatically opposite points.

Earthing & Lightening Protection System:

1. Sizes and number of earth leads for earthing various items and other technical particulars shall be as specified by the contractor.
2. Earthing conductors shall be shown diagrammatically. Exact location of earthing conductors, earth electrodes test pits, and earthing connections may be changed to suit the site conditions.
3. Earthing conductors in the building, running parallel to walls and columns shall not be less than 150 mm away from the wall/ columns.
4. Suitable earth risers shall be provided if the equipment is not available while carrying out earthing connections.
5. However, earthing conductor passes through walls, galvanized iron sleeves shall be provided for the passage of earthing conductor. Water stope sleeves shall be provided.

water stops shall be provided wherever earthing conductor enters the building from outside.

6. Whenever the Conductors are to be buried, the contractor shall co-ordinate with other civil contractors to ensure that the conductors are installed before concreting.
7. All connections shall be low resistance, so that contact resistance shall be minimum.

**GENERAL:**

1. Area to be lit up may be pump house, outside open area, bridge, substation building, stair cases etc. The equipment which are to be lit up are pumping machineries comprising of pumps, motors and associated accessories, circuit breakers, panels, electrical equipment etc.
2. Voltage available at each site is  $415 \pm 10\%$ , 50 Hz, 3-Phase and hence all fittings/accessories must be selected accordingly.

It is also imperative to mention here that all factor for indoor/ outdoor lighting i.e. moisture, reflecting property of surroundings, colour of walls etc. must be taken-up by due care during the erection. Proper hanging/ mounting arrangement for fittings (like angled bracket etc) from ceiling/ wall should also be worked out and included/considered in the cost. It is important to note that bidder is requested to visit the site prior to quoting for the job and familiarize himself with the site and prepare proposed GA drawing which must be attached with tender.

**ITEM NO : 5. GI STRIP 50 X 6 MM**

**As per Description / Specification Mentioned In Item No. 4**

**ITEM NO : 6. GI STRIP (MOTORS) 25 X 3 MM**

**As per Description / Specification Mentioned In Item No. 4**

**ITEM NO : 7. G.I. WIRE 12 SWG**

**As per Description / Specification Mentioned In Item No. 4**

**ITEM NO : 8. CU Wire 12 SWG**

**As per Description / Specification Mentioned In Item No. 4**

**ITEM NO : 9. LIASONING CHARGES**

**Approval from electrical inspector**

It shall be contractor's responsibility to:

1. Prepare drawings for sanctioning for electrical inspector.
2. Coordinate for all activities as per electrical inspector office requirements.
3. Submitting fees of electrical inspector offices.
4. Arranging visit of electrical inspector and complying comments, if any, by electrical inspector.
5. Getting approval certificate.
6. Charging system as per satisfaction of Electrical Inspector.

7. Procedure to Procurement of power supply from Electricity Supply Co.

### **Procurement of Factory License from Office of Factory Inspector (If Applicable)**

It shall be contractor's responsibility to:

1. Prepare drawings for sanctioning from Factory Inspector.
2. Coordinate for all activities as per Factory Inspector office requirements.
3. Submitting fees of Factory Inspector offices.
4. Arranging visit of Factory Inspector and complying comments, if any, by Factory Inspector.
5. Getting Factory License.

Charging system as per satisfaction of Factory Act.

### **ITEM NO : 10. AUTOMATION**

Bidder to design PLC system with SCADA

#### **PROGRAMMABLE LOGIC CONTROLLERS:**

#### **CODES AND STANDARDS:**

The design material, construction features, manufacture, inspection and testing of Programmable Logic Controllers (PLC) shall comply with all currently applicable statutes, regulations and safety codes. The PLC shall comply with the latest applicable standards and codes. If any such standards are not applicable then the same shall comply with the available recommendations of professional institutes like NEMA, IEC, ANSI, ISA, IEEE, DIN and VDE

#### **DESIGN AND CONSTRUCTION REQUIREMENTS**

- a. This shall comprise of programmable systems based on operational logic for safe and semi-automatic operation of the Sewage Pumping Station to produce required quality of Effluent as per the specified parameters. PLC shall be provided as a standalone controller to perform combinational and sequential logic functions, status monitoring and reporting functions with counter and timer facilities, for each station.
- b. PLC shall comprise of necessary processors, Input /Output (I/O) modules, communication interface modules and man-machine interface required to perform the desired functions.
- c. PLC shall have the following attributes as a standalone controller:
  - It shall carry out sequential start/stop logic implementation for operation of the filters.
  - It shall carry out computation and interfacing for data acquisition, data storage and retrieval.
  - It shall accept downloaded program from a programmer.
  - It shall have different functional modules to perform the desired functions.
  - It shall scan the inputs in time cycles and update the status of inputs/outputs.
  - To avoid spurious output because of output module failure, all commands shall be associated with release signals. Release signals shall include information on healthiness of the hardware, software and power supply modules.
  - It shall have relays, counter/timer functions, internal registers/ flags, watch dog timer,
  - Set/reset facilities, up-down counter etc.
  - It shall have provision for spare input and output modules.
- d. The PLC system shall be expandable and shall be modular in construction so as to carry out the future expansion without any hardware modifications.

- e. The PLCs shall have analog and digital signal monitoring capability for checking the healthiness of the signals. In case of detection of any unhealthy signal "PLC trouble" alarm shall be generated. In case of failure of a PLC, the status of all the outputs of the PLC shall be stay put.
- f. PLC shall be 32 bit microprocessor based with state of the art technology. System components shall be carefully chosen so that the reliability of the PLC shall be high. PLC shall use open standard bus protocols and structures for all communication within and outside the system.
- g. The PLC used shall have a proven record in the type of application concerned and in the prevailing environmental conditions.
- h. It shall be possible to perform the simulation functions and testing the program by changing the status of contacts and monitoring the output.
- i. The PLC system shall support 'hot swapping' of I/O modules i.e., removal and insertion of I/O modules under power on condition.
- j. The design of system configuration and development of PLC software shall be undertaken by the PLC manufacturer or System Integrator authorized by the PLC manufacturer.

#### **CENTRAL PROCESSING UNITS:**

- a) The Central Processing Unit (CPU) shall be high performance processor with modular configuration suitable for real time process. High inherent reliability, self checking, error-recovery and trouble-shooting features shall be source of the features of CPU.
- b) Communication between CPU and peripherals shall be by an I/O bus. The individual device, interfaces shall be capable of being plugged into the I/O bus.
- c) CPU shall have a real time clock capability to accept a time synchronization pulse from external communication system and adjust its internal clock with the pulse.
- d) CPU shall have extensive self diagnostic facilities and watch dog timers to identify faults at card levels.
- e) Automatic restart of the system on resumption of power shall be provided.

#### **MEMORY UNIT:**

- a) Memory unit shall comprise of highly reliable memory chips which are industry standard, proven design with fast random access and suitable for operation in process environments. Main memory shall be modular and facility shall be provided for up gradation and expansion of memory to meet future demands.
- b) Sufficient program memory and data memory space shall be provided. With At least 100% extra memory space shall be provided over the actual requirements. System initialization and application software shall be stored in EEPROM or EPROM with necessary hardware. Running data shall be stored in a RAM with internal battery back-up. The battery back-up provided shall last for at least one month with life of battery a minimum of 3 years. Appropriate programs for application software modification shall be provided.

#### **INPUT/OUTPUT MODULES:**

- a) Standard rack mounted I/O modules with plug-in cards shall be provided. Field wiring shall be terminated in screwed terminal blocks and interconnected to the processor I/O system with pre-fabricated cables and plug in card type connectors.
- b) 20% extra I/Os of installed capacity for each type shall be provided as spares and shall be wired to the terminal block of the control panel. Provision shall be made for future expansion of extra I/O modules of the installed capacity.
- c) Some of the common features of the I/O modules shall be as follows:

- i. All inputs shall be terminated with input protective network and necessary isolating barriers.
- ii. Filters for noise rejection.
- iii. Provision for isolation of faulty channels.
- iv. Input /output status shall be indicated by LEDs.
- v. Test points and fault indication LEDs shall be provided to carry out
- vi. All the modules shall be of addressable type.
- vii. Protection for continuous overload upto 20% of all input ranges.
- viii. All outputs shall be provided with fuse protection and fuse failure detection. The fuses may be mounted externally from the output module.
- ix. All the modules shall be of addressable type.
- x. The I/O modules shall have diagnostic features i.e., in case of failure of any I/O channel an alarm "PLC trouble" shall be generated automatically.
- xi. Internal battery backup.

d) Analog input modules

They shall consist of an input isolation unit, signal conditioning unit and an analog to digital converter (ADC). In addition, the following features shall be provided:

Cross talk attenuation.

- i. Provision for monitoring of the ADC for overflow detection.
- ii. Gain amplifier with high common mode rejection ratio.
- iii. Accuracy for analog signals shall be minimum + 0.5%.
- iv. Screwed terminals with fuse and LED for indication of 'fuse blown' shall be provided for each analog input.

e) Digital input modules

The following design features shall be provided.

- i. Contact bounce protection.
- ii. Choice of type of contacts.
- iii. Screwed terminals with fuse and LED for indication of 'fuse blown' shall be provided for each digital input.

f) Digital output modules

The digital output module shall provide contact closure output by driving relays. The features to be provided are as follows:

- i. Contact bounce protection.
- ii. Relay output to operate pump motors and motorized valve actuators.
- iii. Fail safe position in case of output module failure and fault indication.

**DEFAULT VALUES:**

Every operator selectable parameter shall be provided with a default value held in EPROM or EEPROM in the relevant PLC.

The default value shall be used if no other value has been entered through the local PLC or if the value entered through the local PLC has been lost. The default values shall be made available for interrogation by the local PLC at all times. Sensible and logical default values shall be inserted prior to the start of system tests. The default values at the time of handing over the SPS shall be those found operationally suitable during commissioning. The PLCs shall make available for interrogation by the local PLC for bits corresponding to the following PLC faults:

- a. Failure of PLC as indicated by the PLC watchdog relay;
- b. Failure of each I/O card;
- c. Failure of communication link
- d. Status of 24 V DC power supply for I&C system.

SCADA System requirement for SPS:

<b>Sr</b>	<b>Description</b>	<b>Unit</b>	<b>Particulars</b>	<b>To be filled by Bidder</b>
<b>A</b>	<b>GENERAL</b>			
1	Description		Supervisory control and Data Acquisition System (SCADA)	
2	Make		As per Approved	
3	Quantity		1 Set	
4	Model/Version		PI. Furnish	
5	Type		Run time , Control & Development	
6.	Computer		As per Below Specification	
7.	Platform		Microsoft Windows, Windows NT or better.	
<b>B</b>	<b>SOFTWARE FEATURES</b>			
1	Tags		Suitable for running system successfully with necessary reports	
2	Graphics		Easy to configure with support of library, Suitable to any resolution.	
3	Animation links		Animation link facility for analog, discrete, string value, etc. with editing facility.	
4	Library		Frequently used wizards/icons with facility for conversion AUTOCAD drawings.	
5	Drivers		Connectivity for network protocols, and third party developer (commonly used).	
6	Trends		Built module for Real time & historical trend with stamping of Tag name, min, max, avg. value, zooming/scrolling of scale & time, Export data facility to excel, text. Multiple trend pages facility, comparison facility between actual & predicated/Ideal values.	

7	Alarm and Events		Analog/discrete type alarms, Alarm & Event display, logging & printing. Alarm stamping Time, Value, status of alarm, ack.	
			Time, security level, interlinks, etc. Group facility	
8	Messaging		Pop up messages, Flash messages with conditions & action to be taken details	
9	Password		Password protection for all facilities. Separate levels for Engg, Operators, Incharge	
10	Reports		Built in report formats for daily, shift, weekly, efficiency, etc. format in sheet format.	
11	Condition Editor		Support of Condition script editor for operator use	
12	Control Strategy		Facility to Control strategy as per attachment.	
13	Storage Capacity of Date		Minimum of 60 days for any kind of form such as trending, reports, etc.	
<b>C</b>	<b>SUPPORTS</b>			
1	Hardware		Pl. Furnish	
2	Platform Software		Pl. Furnish	
3	Laser Printer		Pl. Furnish (HP/SAMSUNG/CANON ONLY)	
4	Communication		TCP/IP	

\*Note : Data Given for Guideline Purpose & Design Purpose only

### **HUMAN MACHINE INTERFACE (HMI) SOFTWARE**

HMI SCADA Software shall be of Server-Client architecture and One full development Runtime License is required.

The operator interface software, herein described as the HMI (Human Machine Interface) shall be common for engineering and as operator works station. - an integrated package for developing and running automation applications and also to be just running the automation application.

The HMI shall be designed for use in Microsoft Windows NT /WINDOWS 2000/WINDOW XP and shall use OLE, ODBC, DDE, OPC and ActiveX technologies for optimal performance and integration with other software systems.

The HMI shall have several Methods for collecting data from programmable controllers. One method shall rely on DDE servers. Another method shall rely on OPC servers. And still another shall use a C-API interface through direct device tags.



The tag database shall be organized in a hierarchy, each level represented by a folder that can be expanded or collapsed.

The HMI shall have the ability for the current value of a tag to be updated from the device it is connect to and stored in RAM so it is immediately accessible to all parts of the HMI.

The tag database shall provide the ability to generate tag names of up to 40 characters long. The tag names shall be able to contain the following characteristics: A through Z, 0 through 9 underscore ( ) and dash (-).

The HMI shall have the ability to create a tag whose value is the result of an expression. The expression can be made up of mathematical operations, tag values, if-then-else logic and other special functions. The current value of the derived tag shall be stored in an analog, digital or string tag in a value table.

The HMI shall provide a Macro capability that will execute system commands, user defined commands and other macros.

The alarm system shall have the ability to monitor any analog or digital tag for alarms, up to a maximum of 10,000 tags.

The alarm system shall have the ability to define up to eight different severity classes to visually and audibly distinguish alarms.

The alarm system shall have the ability to use system default messages or create unique messages to describe an alarm log messages to a file, to a printer or to both suppress alarms for maintenance and tuning purposes and set up global alarm monitoring.

The alarm system shall provide a means of displaying up to 1000 tags that are in alarm. This alarm summary display shall be fully configurable.

The alarm system shall have the ability to create alarm log files periodically, at specified times and on event. This alarm log system shall have the ability to automatically purge old files after a specified time.

The HMI shall have the ability to trigger actions based on an event that has an expression applied to it. An expression is an equation containing tag values, mathematical operations, if-then-else logic, or other functions. An action shall have the ability to produce a variety of functions including, but not limited to, initiating a snapshot of tag values, displaying an error screen and changing a tag value.

The HMI shall have the ability to allow certain users or groups of users to access only certain parts of the system. The security shall be based on a series of codes. Each code shall allow the users, or groups of users, with security privileges for that code to access the HMI commands allowed by that code. Users shall be allowed to be assigned combinations of security codes, allowing for each user to access a different set of features.

The security system shall assign each person a user account with a login name, password, and any desired macros. The HMI shall have a minimum of 17 different security codes.

The HMI shall provide a graphics display editor for creating displays using graphic objects.

The graphics display editor shall have the ability to drag and drop objects from a pre-configured graphics library, paste objects that are copied to the clipboard from another Windows application, and insert objects created by another Windows application using OLE. The graphic display editor shall allow the user to create libraries of graphic objects.

The graphic display editor shall have the ability to attach, as a minimum, the following control to objects: blinking colors, visibility, rotation, horizontal and vertical movement, resizing (width and height), fill and touch.

#### **Additional requirements**

The HMI package shall be able to specifically provide the following features:

- Display status of Plant in a graphical and tabular format (i.e. running, stopped, fault etc.)
- Display Analog values on the appropriate graphic screen.
- Annunciator alarms associated with the area of the Pumping Station concerned including details of the time the alarm occurred

The HMI package shall provide following facilities for the operator Station

- Acknowledge alarms
- View a journal of unacknowledged alarms
- View a journal of the last 200 alarms acknowledged and unacknowledged.
- Display process set points
- Provide real time and historic trending of local analogue values
- Provide data archiving of all local analogue values
- Prepare daily and weekly reports (providing details of daily and weekly throughputs against numbers of pump running hours and power usage)
- Display a total running hour's log of local transmission pump drives.
- Any additional features required to assist in the effective and efficient operation of the SPS.
- Power monitoring/management using various analogue / digital inputs provided from the HT switchgear breakers, breakers & feeders, Motor Starter, etc. for SPS.

Graphic screens shall be provided as follows but not limited to this:

- Main and subsystem menus
- Process overview (i.e. Status of Screen and Gates , providing details of Nos. of pumps / equipment running, Flow, totalized flow, levels, / power supply status / Power Consumption of each Pump / APFC Capacitor Status / Power factor , etc.)
- Overview of power monitoring system
- Overview of control system
- Screens to permit viewing of process set points
- Tabular screen of Pumping Plant status and values
- Running hours log for Pumping Station.

The screens shall display data commensurate with their size and the area of and number of Pumping Station items covered. In addition to the specific screen requirements stated above, any additional screens to ensure comprehensive coverage of the Works needs to be provided.

A comprehensive screen navigation system shall be provided giving access to all screens via a system of menus and short cuts (i.e. it shall be possible to follow the process from one screen to another by clicking the mouse cursor on screen 'hotspots' to effect the move from one screen to another).

The sample rates required for the displaying of trends shall typically be one sample every 15 seconds for flow values and one sample every 30 seconds for levels. The system shall be capable of storing real time data for one day and historic data for 60 days.

The sample rates for archiving shall be the same as for trending. The archives shall be stored in daily files. The system shall provide capacity to store archives for 60 days. A warning alarm shall be provided to the operator to advise that archiving to disk should take place or archived data will be overwritten.

The data derived from archiving to the MMI and the archived data viewed using the trend facility. The HMI shall have the ability to record specific tag values under certain conditions. Several models shall define these conditions. This data that is collected shall be stored in .dbf (dBase IV) format for displaying in trends, archiving for future processing or analysis, and/or using with third-party software, such as FoxPro, Crystal Reports, and Microsoft Excel, for display or analysis. It shall be possible to log historical data directly to an ODBC compliant database

The Contractor shall provide a disc drive with the MMI in order to download archive data or to upload previously stored archive data onto electronic storage media.

Contractor shall provide minimum of 3 sets of as-built control panel wiring drawings, PLC logic write-up, I/O Schedule/assignment, ladder diagram and other relevant documents in hard copy format and 3 sets in soft copy form on CDs. Soft copy format shall be in editable form to enable incorporating any changes in future. 3 sets of application program as back-up shall also be provided in soft form on CDs

## **COMMUNICATIONS**

Minimum one port for High performance Ethernet communication at 10/100 Mbps network for data acquisition, SCADA / communication network between various remote locations. Necessary Industrial type Ethernet switch shall also be provided.

Modbus / Ethernet port, as applicable as per mfr. Standard for local program upload / download, on-line editing, and SPS panel mounted human machine interface (HMI), as applicable.

Additional ports or modules (Modbus / Profibus / Ethernet) as required to achieve the communication capability as explained above in the operation philosophy of the envisaged PLC/SCADA system under this project including necessary modems for GSM and dial-up connection facility shall also be supplied.

Contractor shall provide connectivity over network for data acquisition of various instruments, energy analyzers, Motor starters, temp. scanners, etc. as specified in the tender specifications with necessary signal cable / data cable / communication cable

Water level of the well/Sump will be sensed by the Ultrasonic Level sensor having programming facility and sensor will give signal to the PLC according to the Start set point of

the pump, PLC will give start command and pump start , when level of the well/sump goes to stop set point then sensor will give signal to PLC and PLC give stop command to stop the pump with manual Start /Stop Option.

**Programming of the PLC will be done as per site requirement and as directed by Dream city ltd. Engineer-In-Charge.**

**All Above Arrangement will be design in such a way that Pumping Machineries shall be Operate locally as well as from Remote area. In case of Lower Sewage Water level or any Faulty condition , Text message alert will be sent on Dream city ltd. official Mobile phone number. SCADA System shall be link up with Central SCADA Room at Dream city ltd.**

Tenderer shall make arrangement by PLC and specification should be approved before work execution. **PLC shall have all features like communication port, extensible, surge protection etc.**

Equipment/Switchgear which have not been specifically mentioned in this specifications, but are necessary to complete the work for trouble free and efficient operation and guaranteed performance of the entire Atomization system and equipment offered shall be deemed as included within the scope of this specifications and shall be provided by tenderer without any extra price to purchaser.

**COMMUNICATION CABLES**

Communication cables suitable for supporting communication over Profibus, Serial (Modbus Protocol), Ethernet, etc. as per the communication option selected by bidder for various proposed analysers, instruments, VFDs or Motor Starters, power analysers, relays and instrument, as applicable (existing instrument / equipment where applicable shall normally be without communication port or if available shall be with Modbus, Profibus or Ethernet communication). Communication cables shall be shielded and shall be laid in PVC ducts of minimum 1” size (for buried cables) / on ducts / trays (for in air / overhead cables).

However, bidder shall note that selection of communication are subject to review of client / consultant and client reserves to reject the proposal without assigning any reason there of in which case bidder shall offer instrument / equipment with communication options mentioned in the bid (Profibus, Modbus, Ethernet,). Necessary repeaters, couplers, termination kits, converters, connectors / plugs, etc. as applicable for connecting with necessary instrument / equipment shall be included appropriately by bidder based on the quantity (BOM) furnished for all instrument / equipment for proposed as well as existing instrument / equipment for necessary connection to communication network and communicate with PLC/SCADA system

In general, cables for Ethernet shall be twisted pair with RJ45 connector, for Modbus it shall be twisted pair, shielded cable with terminators, for Profibus-DP it shall be shielded twisted-pair line or a fiber optic cable (with transmission standard EIA RS485).

**PRESSURE TRANSMITTER FOR EACH PUMP AND AT OUTLET OF SPS**

<b>A.</b>	<b>GENERAL</b>	
1	FUNCTION	MEASURE & INDICATE GUAGE PRESSURE

2	TYPE	SMART TYPE PRESSURE TRANSMITTER
3	CASE	HOUSING : ALUMINUM ALLOY
4	MOUNTING	2" PIPE MOUNTING
5	ENCLOSURE	IP67
6	ELECTRICAL AREA CLASS.	SAFE
7	CABLE ENTRY	1/2" NPT (F)
8	ACCURACY	BASE ACCURACY 0.075%
9	ZERO ELEVATION & SUPPRESSION	INBUILT
	<b>B. TRANSMITTER</b>	
10	OUTPUT	2 -WIRE, 4-20MA WITH HART PROTOCOL
11	TX. POWER SUPPLY	24 VDC
	<b>C. MEASURING UNIT</b>	
12	SERVICE	GAUGE PRESSURE
13	ELEMENT TYPE	DIAPHRAGM
14	BODY MATERIAL	DIAPHRAGM : SS316, HOUSING : ALUMINUM ALLOY
15	ELEMENT MATERIAL	HAST-C
16	OVERRANGE PROTECTION	OVER PRESSURE LIMIT OF 210 BAR
17	PROCESS CONNECTION	1/2" NPT (F)
18	CONNECTION LOCATION	BOTTOM
	<b>D. OPTIONS</b>	
19	OUTPUT METER	LCD DIGITAL DISPLAY
20	MOUNTING ACCESSORIES	2" PIPE MOUNTING BRACKET
21	CABLE ENTRY	1/2" NPTF
<b>22</b>	<b>MAKE</b>	AS PER TENDER APPROVED MAKE

**PRESSURE SWITCH FOR EACH PUMP**

<b>SPECIFICATIONS FOR PRESSURE SWITCH</b>			
<b>A.</b>	<b>GENERAL</b>		
1	Location of Measurement		Gauge Pressure at discharge of various pumps as per specifications
2	Service		Sewage / Sewage Sludge / Water or other Liquid Application
3	Function		Detect and On/Off Switching (Flow or No Flow detection at set point)
4	Type		Diaphragm
5	Mounting		Bottom
6	Operating Temperature	Ambient	Ambient, 50 °C Max.
7	Operating Pressure		Atm., Max. 5 Bar
8	Installation		Field / Outdoor / Indoor, as applicable
9	Overall Accuracy		+ 1% of Span
<b>B.</b>	<b>Measuring Unit / Enclosure</b>		
1	Service		Sewage / Sewage Sludge / Water or other Liquid Application
2	Element Type		Diaphragm Sealed Piston Actuator or suitable better technique
3	Element Material	Seal	SS316
		Socket	SS316
		Wetted Parts	SS316
4	Body Material	MOC	Die Cast Alu. or equi. as per mfr. Std. suitable for withstanding harsh environment
5	Over range Protection		130% of maximum static pressure
6	Process Connection		1/2" NPTF
7	Connection Location		Bottom
8	Calibration Certificate		Required
9	Measurement (Calibration) Range		Shall be from 0 to 5 Kg/Cm2, to be finalised during detailed engg.
10	Accuracy		+ 1% of Span
11	Output - Contacts	Nos. & Type	Potential free relay contacts, min. 1NO + 1NC, Rating 5 amps
12	Cable Entry		1/2" NPT F
13	<b>Protection:</b>		
a	Elec. Area Classification		Safe
b	Enclosure	Type & Protection Class	Weatherproof to IP-65 as a minimum
		MOC	Cast Alu. or equi. as per mfr. Std. suitable for withstanding harsh environment
		Paint	Chemical Resistant / Epoxy Coating

<b>C.</b>	<b>Options / Accessories:</b>		
1	Mounting Accessories		Required
2	Tag Plate		Required, SS 304
3	Cable Glands		Required, IP-65/66 as a min., Ni-Plated Brass / Polyamide
4	Plugs for addl. cable entries		Close up Plugs shall be provided for all unused cable entries, Ni-Plated Brass / Polyamide
<b>D.</b>	<b>Recommended Spares</b>	For 1 Year Normal Operation	Bidder to submit recommended spares list along with part nos., part description and qty. required for 1 year normal operation along with their technical bid for procurement, if required, by client in future. However, O&M spares shall be separately include
<b>E.</b>	<b>Make</b>		As per approved Vendor List
	<b>Model</b>	Pressure Switch	Bidder to Furnish
<b>F.</b>	<b>Quantity of Instruments:</b>		<b>Refer Quantity / Location table below for each Zone (STP/SPS)</b>
<b>G.</b>	<b>Approved Vendors</b>		<b>Dag Process Instruments, Danfos, E+H, Indfos, N.K. Instruments, Switzer</b>

### **CCTV CAMERA SPECIFICATION**

Provide the outside and inside, Day and Night DOME colour indoor camera - 6 nos : 1/3" super HAD CCD image sensor, greater or equal to 600 TVL, 0.3 Lux, DWDR, DNR Technology, Varifocal 3-8 mm lens in built, CE/UL certified with all other accessories and power supply, 16 channel digital video recorder within built 2 TB hard disc, display and recording at 400 FPS, SATA hard drive support, DVD-RW in built, RG-6 armored video cable, RG-6 video cable (cable as per site requirement), 6 U, 600 x 600 mm depth rch to put DVR with all basic accessories plus 10 socket 5/15 amp power strip + 6 hardware tray, 1 KVA online UPS with battery backup of 45 minutes, with external charger if applicable and laying of cable with necessary accessories & fittings/ laying of HDPE pipe with all required accessories and mounting/laying of cable through hard soil digging and refilling/laying of cable through soft soil digging and refilling/installation, commissioning and testing of all the CCTV system components.

### **COMPUTER SYSTEM SPECIFICATION:**

The contractor shall provide 2 Nos. of Desktop computer with following minimum specification

- Processor - dual core 2.4 GHz+ (i5 or i7 series Intel processor)
- RAM - 6 GB
- Hard Drive - 500 GB or larger solid state hard drive

- Graphics Card - any with DisplayPort/HDMI or DVI support - desktop only
- Monitor - 23" widescreen LCD with DisplayPort/HDMI or DVI support - desktop only
- Operating System - Windows 10, Home or Professional editions with latest Microsoft Office license Version.
- Warranty - 2-year warranty
- Backup Device - External hard drive, USB Flash Drive, and/or DVD+/-RW drive

**USB ports: Front 2x USB3, Rear USB ports: 4x USB 3**

**Make: Dell, HP, Lenovo, Acer, TOSHIBA, IBM Only**



## **SPECIAL NOTES RELATED TO WORK:**

1. The materials supplied and installed shall be genuine only and as per the specifications. If the same are not found satisfactory, the same shall have to be replaced "free of cost ". Manufacturer's certificate towards genuineness of materials shall have to be supplied (if required by the Department) otherwise the material shall be rejected. In case of doubt / dispute the corporation shall ask the contractor to send the material / equipment to the Manufacturer's work for testing genuineness. The decision / report received from the manufacturer shall be conclusive and binding on both the parties i.e. the Dream city ltd. and the contractor. If the material / equipment sent for testing is not found to be genuine than the whole expenses for testing shall be borne by the contractor and the contractor shall replaces the whole lot of materials / equipment supplied by him, free of cost.
2. The responsible authorized person of the contractor should be available on site daily when work is in progress. The Dream city ltd. shall not be responsible for any accident or damage done to the workmen / staff of the contractor. No compensation of any kind shall be paid by the corporation. The contractor shall observe govt. rules regarding labors etc.
3. The watch and ward of the materials / equipment or in case of stolen/robbery of material from the site of execution / Natural Tragedy such as flood, Earthquake, Cyclone etc. till handed over to corporation after commissioning shall be the responsibility of the contractor even if part payment is paid to the contractor against delivery of materials / equipment. Dream city ltd. will not give any extra payment for mentioned Cause(S).
4. All the equipment shall be tested for tests as per relevant IS in presence of corporation's representative & TPI prior to dispatch and certificate thereof supplied. Slow-speed testing shall not be allowed.
5. The Contractor has to carry out necessary civil works also for this job like foundation etc. The contractor shall complete the civil works at his cost i.e. cost of labor cement, sand, bricks, M.S. bars, etc. shall be included.
6. The responsible, qualified and experienced Engineers of the Contractor should be available at site daily when work is in progress.
7. The Dream city ltd. shall not be responsible for any accident or damage done to the workman/staff of the Contractor.
8. No facilities will be given to the contractor at work-site by Dream city ltd. in any type or in any manner.
9. The contractor has to carry out the work with his own tools/ tackles/ equipment/ instruments/ ladders etc.
10. Material/equipment storage facility at work-site will not be provided by Dream city ltd. to the contractor.
11. The labors/staff deployed by the contractor at work-site will not be given accommodation by Dream city ltd. in any manner.
12. It is presumed that, the tenderer has seen the work-site and the nature of work before quoting the rates into the tender.
13. Any loss, damage to Dream city ltd. property due to the carelessness of the contractor in work, all will be deducted from contractor's bill.
14. In case of any dispute arising out of this tender work, the decision of Dream City ltd. will be final and will be accepted to the contractor.
15. All the safety precaution, necessary arrangement, color code, notice board, etc., as per Govt. Safety rules.
16. The work should be as per site requirement and instruction by engineer in charge.

17. If Energy Audit is not possible for the pump sets, due to unavoidable circumstances Dream city ltd. Has right to provide exemption Certificate for Energy Audit on Written Request from Contractor.
18. Providing 6 Inch bore well at the site of Execution with all necessary piping, motor and 3000-liter Tank is also in scope of contractor.
19. In case of Power Failure, Contractor has to managed D.G Sets, Extra charges for the same is paid by Dream city ltd. as per quoted rate for DG set in Price Bid.
20. During the five-year O & M of SPS, if desired by the corporation, the contractor has to arrange the agency from market and bought the DG set within one hour of intimation and use during the power failure / arranged shutdown of power supply agency. For the same, Dream city ltd. will pay as per the rate quoted in price bid by the agency. For delay, penalty Rs.2000.00 per hour/part of it will be imposed.
21. Contractor shall Embossed / Print, indication code / Marking on each electrical and mechanical Equipment as per the instruction given by Dream city ltd. Engineer-in-Charge.
22. The contractor shall have to carry out energy audit on commissioning of project and at every three year, from Government approved agency. The contractor shall have to borne the charges for the same. Dream city ltd. shall not pay anything towards it.
23. The calibration of each equipment shall be carried out at least once in every year.
24. The Contractor has to bare extra items cost for nessesity of health condition after site survey and existing replacement & overhaul of entire mechanical & electrical items. The Dream city ltd. does not pay any extra cost for it.

Signature Of The Contractor.

I/C. Town Planner  
Surat Municipal Corporation  
And Dream City Limited.

## **26. OPERATION & MAINTANANCE:**

### **1. SITE DETAILS AND BROADER SCOPE OF WORK:**

#### **1. JOB BACKGROUND:**

1. Dream city ltd. has adopted PPP approach. (Public Private Partnership) for operation and maintenance of the sewage treatment plants and sewage pumping stations, besides turnkey job of constructions.
2. Present tender/section is towards the O & M of sewage pumping station. Following are expectations from the contractor:
  - Efficient, prompt and effective O & M through skilled/highly skilled staff.
  - Professional management to overcome 'on hand' hindrances and foresight backed by 'vast' experience in the field to overcome forth-coming problems.
3. Contractor's performance shall be evaluated based on following Key Performance Indicators:
  - a. Low break down hours. (Hr./Year)
  - b. Low operation and maintenance cost. (Rs. /MLD)
  - c. Low specific energy consumption. (KWH/MLD)

#### **2. SITE INFORMATION :**

Employer / Purchaser	:	Dream city ltd., Surat.
Climatic Conditions	:	Max. Temperature 45°C Min. Temperature 10°C
Rainfall	:	310 mm to 825 mm (Avg. 550 mm)
Seismic Zone	:	Zone - 3

#### **3. BROADER SCOPE OF WORK:**

1. Operation of SPS
2. Routine and breakdown maintenance of SPS
3. Providing spare, parts and consumables
4. Painting at regular interval
5. Housekeeping & General maintenance of building and site/campus.
6. Providing manpower, skilled and unskilled labor
7. Providing security and safety in campus/boundary
8. Compliance of legal requirements
9. Maintaining Govt. Licenses and liasioning
10. Documentation and record keeping
11. Misc Scope of work as mentioned
12. Incidental additional work on payment basis

### **2. DETAILED SCOPE OF WORK**

**The job involves operation of electro mechanical equipment and all INCLUSIVE comprehensive maintenance including materials/ spares for routine, preventive and breakdown maintenance, including men power. The Pumping Stations shall run 24 hrs, 365 days basis. The contractor would be responsible for smooth, efficient & satisfactory operation & maintenance and repairing, replacement of spares, any work related to sewage pumping station on round the clock basis.**

**All the operation activities and scheduling, such as running of pumps, numbers of pumps, pumping hours etc. shall be decided under the guidance of Engineer-in-charge.**

**For Operation & Maintenance of Pump Sets:**

1. The contractor shall give unconditional performance guarantee of all the pump sets for entire 5 years of O&M contract from the date of actual commissioning of the whole works / project. It means contractor has to maintain the flow, head & energy parameters (Duty points) of the pump sets within  $\pm 5\%$  tolerance limit for entire O&M contract period. Moreover, he has to carry out all replacement / major repair / major modifications / maintenance of necessary part /parts / pump as required to achieve the performance duty parameters & same shall be done at pump manufacturer's works. Only minor maintenance works are allowed to be carryout locally after taking consent from respective pump manufacturer.
2. If pump is to be sent at manufacturer's works for any repairing works, it will be returned and recommissioned satisfactorily within 30 days. Otherwise penalty as per tender conditions shall be made applicable.
3. The Service Engineer of pump manufacturer shall visit once in a year and certify and confirm the satisfactory working of the pump sets and if required, he will carry out all the remedial measures/rectification to optimize pump sets performance.
4. After completion of 30 months of O&M period, Energy audit shall be carried out by the contractor from Govt. Approved Energy auditor, for the pump set, transformer & capacitor. This work shall be completed within one month.

**The contractor shall have to submit the MOU / Confirmation from manufacturer of pump set for 5 years Guarantee for performance duty parameters of the pump sets, as well as major maintenance / repairing work and any kind of technical supports, etc. from pump manufacturer. The MOU / Confirmation shall be comprising of of all above points ( 1 to 3) and submitted along-with tender document. Without this MOU, technical bid shall be rejected and price bid shall not be opened.**

**1) OPERATION OF SPS:**

- 1.1 The contractor shall operate the complete sewage pumping station and associated services, on a continuous 24 hours basis.
- 1.2 The contractor shall operate and utilize all the electrical power, control and monitoring systems, provided and if found to be necessary and if approved by the engineer, shall make adjustments within the operating range of the control system and equipment so that the sewage pumping station matches the requirement.

**2) ROUTINE AND BREAKDOWN MAINTENANCE OF SPS:**

**2.1 Maintenance of installed equipments at Sewage Pumping Stations.**

All machinery, plants and equipments will be handed over to successful contractor in healthy and running condition at the time of commencement of the contract. Same way the contractor will have to handover all the machinery, plants and equipments to the Dream city Ltd. in healthy and running condition at the end of contract period.

**Followings are few out of many works to be carried out under this contract:**

The maintenance service provided by the contractor for the period specified in the contract shall **ensure the continuity** of All Sewage Pumping Stations that the breakdown or deterioration in performance, under normal operating conditions, of any items, of plant and equipments and component parts thereof is kept to a minimum.

Also **minor and major repairs**, during routine or breakdown maintenance, of electro-mechanical equipments installed in the plant is to be carried out by the contractor during the O & M period.

All **routine maintenance** (like lubricating/ greasing of pumps and motors, cleaning of fix moving contacts of starters/contactors/ panels etc.) shall be done on regular basis. All the **consumable** material like lubricating oil, grease, gland packing, nuts/ bolts/ washers etc. shall be supplied by contractor. The routine and preventive maintenance shall be done will utmost punctuality and in best engineering manner so as to minimize or eliminate any major breakdown of the machinery.

The routine and preventive **maintenance schedule** shall be prepared and got approved by Engineer In-charge of the department.

In the case of any **major breakdown** the maintenance shall be done by the contractor on **highest priority basis** and in no case sewage network of such area to be interrupted. **Root cause analysis** for every minor as well as major fault must be done in details and to be well documented.

All the electrical & mechanical installation including HT and its equipments in the sewage pumping station premise are in scope of work. Also, **Liasioning** with Torrent Power Ltd. and electrical inspector or any government authority shall remain in the scope of contractor.

All the **tools, tackles, Jigs and fixtures** required for maintenance shall be brought by the contractors and shall be permanently kept at each sewage pumping stations. All the maintenance activities shall be done by **qualified, experienced and skilled staff** as asked in the schedule.

The contractor shall **adhere to the manufacturer's recommendation** with respect to equipment maintenance, the type and grade of lubricants to be used, frequency of lubricant, adjustments to be made regularly and recommended spares to be kept in store. All the **records and documentation** shall be prepared and updated for all maintenance activities as per directed by Engineer-in-charge.

**Motor, transformer, starter panel rewinding/rewiring etc is also in the scope of contractor.** If any motor(s) burns during the contract period, the contractor is required to rewind and restate it using same quality of conductor/ insulating materials.

The scope of the contractor includes **operation, maintenance & replacement of gear mechanism** for valve. Also operation, **maintenance of EOT/ HOT crane**, mech. screen.

The scope of work includes **attending of all type of cable faults** including end terminations of cable, changing of lugs or changing LT cable, etc.

**All ACBs, MCCBs, Switchgears and circuit breakers** should be maintained to enhance the protection of all pumps/ motors/ cables/ panels etc. The protections, releases provided for the purpose should be kept in healthy condition and regular calibration should be done at least once in a year and recorded.

The contractor will be responsible for the **operation and maintenance of all valves, gates, screen etc** of sewage pumping station.

## 2.2 Maintenance of workshop equipments

The scope of work also includes **providing necessary tools & tackles** for day-to-day O&M routine maintenance, preventive maintenance and break down maintenance.

The contractor should **provide, keep & maintain at least one set of tools/tackles** for the maintenance of the machinery and equipments supplied by them under this contract.

**General Tools & tackles** required by the contractors are: Spanners set suitable to open vertical turbine pump/ Submersible pumps, HS Pumps and other equipments like hammer, sling, D-shekel, screw driver set, master level, vibration meter, noise meter, dial gauge, welding machine, grinding machine, megger, multi meter, grease, grease gun, earth rod, safety glows for discharging HT panel etc.

In addition to above all other necessary general/special tools as and when required must be with the contractor for satisfactory operation & maintenance.

## 2.3 Cleaning of automatic screen and it's maintenance :

Job also involves **cleaning of the automatic/manual screen** provided at the inlet of the sps.

It is also expected that contractor full aware of the risk involved in the cleaning job and safety precautions required for the job. Contractor is expected to keep also **safety precautions at site during this work**. Contractor is required to **provide all safety equipments** to the workers. Contractor is also expected to **provide necessary safety training** to the safety before entrusting job of the cleaning. Also, it is expected that, safety training, specifically, **working in confined space and working in hazardous atmosphere** is imparted to each skilled & unskilled workers before they start to work at depth of well.

Contractor is free to **provide required man power at his will** (it is not defined in manpower requirement table). Contractor may entrust job of cleaning to the qualified cleaning contractor, however, prior approval of such sub contractor justifying qualification of such sub contractor shall be sought.

The **frequency of cleaning shall be decided mutually as per site requirements**. Please note that, the cleaning frequency, i.e. amount of the removable material received in SPS is decided by the habits of the community, as such frequency has to be decided according to site condition.

Maintenance of the screen should be also considered as part of the job.

**3) SPARE PARTS AND STORAGE:**

- 3.1 The contractor is also responsible for **providing spare parts and material** required for the operation & maintenance during the operation period, including the cost of storing and safeguarding.
- 3.2 The **storage inventory, the issuing and recording of spare parts** will be responsibility of the contractor.
- 3.3 The contractor will make all necessary arrangements to **ensure the continuous supply of spare parts and material** for the work, and the rate of supply of these material shall be in such quantities amounts as would ensure uninterrupted operation.
- 3.4 The contractor shall supply spare parts and the same will be used during operation & maintenance contract period. Any parts not used during the O & M period shall be handover to the corporation.

**4) PAINING:**

- ✓ This work is also inclusive of **painting of pumping station** as per following schedule.

Sr. No.	Item to be painted	To be painted in starting of year...				
		1	2	3	4	5
1	Civil structures, Panel room, pump house building, toilet etc.	--	--	--	√	--
2	Doors & Windows	--	√	--	√	--
3	Shutters, grills, Collapsible gate	--	√	--	√	--
4	All Process Equipment with its accessories, and G.I. railings etc. except pump sets.	--	√	--	√	--
5	Pump sets, valves, C.I. fittings, Sluice gate, motors, starters, common header, rising main etc. pump related items in pump house.	--	√	--	√	--
6	PCC/MCC Panels, HT panel transformers etc.	--	√	--	√	--

**Specifications for painting material:**

- a) Civil work outer side: ACE Exterior Emulsion.
- b) Civil work inner side: White wash for water retaining structure & Distemper for pump house & buildings.
- c) Doors, Windows, Street light, Flood Light: Synthetic Enamel.
- d) All type of Electrical & Mechanical machineries and structures like Pump sets, valves, C.I. fittings, Sluice gate, M.S grill, Jaliya, transformers etc.: Synthetic Enamel.

**Note: -**

1. Painting shall be done as per best engineering practices and commonly followed industrial standard.
2. If any unit/mechanism will found to have some defect in paint work at any time, the Contractor has to repaint the same under the instruction of Dream city ltd..
3. Inner part of L.T and H.T PANELS to be painted, if feasible.
4. Schedule for painting should be submitted to Engineer in-charge before starting the work.

**Important Note**

Please note that during the work, all required and necessary Electrical Safety Rules must be followed by the contractor. Dream city ltd. will not take any responsibility towards any damage/accident caused to workmen deployed by the contractor. Therefore, it is in the interest of contractor to ensure all safety precautions before commencement of the work.

**5) MAINTENANCE OF BUILDINGS & SITE:**

The contractor shall be responsible for:

- a) The scope of works includes **housekeeping** of all the buildings as well as entire campus/boundary. The building services maintenance, housekeeping and cleanliness shall be undertaken on all building including HT Substation, Switchyard, roads, open spaces and services installation etc. within the premises.
- b) **Site maintenance** including approaches and gate.
- c) The **maintenance of electrical, ventilation, service water piping, plumbing & installation.**
- d) **General building civil maintenance**
- e) **Cleaning of screen (Auto & Manual).**
- f) **Full maintenance of the site services** such as wiring, cabling, earthing system, plant & road/street light system, and such civil/mechanical/electrical services.
- g) **Regular disposal unwanted or redundant items** is included in scope of work. The contractor shall ensure that all unwanted or redundant items are removed from the building and site. Depending on their condition such items shall either be placed into **storage or disposed off site.**
- h) The Contractor has **to maintain the garden already developed** in and around the plant premises. **Scope of contractor does not include garden development work**, however, removing debris, cutting of grass and plantation, vegetation, as and when required, as per direction of Engineer In Charge, shall be considered in contractor's scope of work.

**6) MANPOWER:**

- 6.1 The contractor shall provide experienced managerial, technical, supervisory, administrative and non-technical personnel and labour necessary to operate and maintain all the sewage pumping Stations safely and efficiently on a continuous 24 hours basis for the term of O & M contract period as per schedule.
- 6.2 The qualification and capability of the contractor's personnel shall be appropriate for the task they are assigned to perform. The staff provided shall be fully trained in the operation of water / sewage Pumping station before giving responsibility for



operating any part of the plant. If in the opinion of the engineer, any member of the contractor's staff is considered to be insufficiently skilled or otherwise inappropriate for the task he is required to perform, the contractor shall replace him with a person with the appropriate skills and experiences for the task, to the approval of the engineer. The contractor will be required to submit to the corporation the schedule of "Manpower and Organization Chart".

6.3 The CV/Resumes of the contractors personal shall be submitted to the engineer for acceptance at least 7 days before the anticipated commencement of the O & M period. Any change of personnel shall be promptly informed to the engineer within a day's time. Normal time duty hours for the contractors' operation & maintenance personnel may be modified as necessary and the contractor and agreed by the engineer who will ensure that an adequate number of the contractor's staff, fluent in Gujarati as well as Hindi is on duty at plants 24 hours per day, 7 days per week, including all holidays.

## 7) **SECURITY & SAFETY:**

### 7.1 SECURITY:

- The contractor shall be responsible for providing **security of entire installations, man power & material stored within campus** compound/boundary of plant on round the clock basis.
- Contractor shall **deploy necessary security staff** as enlisted in relevant man power table.
- The contractor is also responsible for the **safe custody of all the materials** and equipments under this contract. Contractor shall also oversee the material of Dream city ltd. lying in the campus.

### 7.2 SAFETY:

The contractor shall be responsible for safety on site during the O & M of the works by the contractor. The contractor's duties with respect to safety shall include the following:

- a) Utilize safety awareness procedures in every element of operation & maintenance.
- b) Gives emphasis to site including:
  - (1) Safe working practices and safety procedures as per rule and regulation of government regarding use of protective clothing, gloves, Safety Shoes/ shock proof boots, and helmet etc.
  - (2) Cleanliness of the plant as a whole.
  - (3) Awareness of hazardous condition and accident reporting and necessary compliance.
  - (4) Safe practice in pumping station.
  - (5) The safety and security of all equipments/materials etc within the campus shall also be contractor's responsibility.
- c) Safety Training (Electrical/mechanical Maintenance work, Working at Confined space etc..) shall be imparted to concern O & M staff.
- d) Brief reports of all accidents and hazardous incidents including description of cause, extent of damage, action taken and precautions taken to prevent the repetition shall be submitted at regular interval.

## 8) COMPLAINACE OF LEGAL REQUIREMENTS:

- Contractor is required to strictly follow the provisions of wages Payment Act 1936, Bonus Act 1965, Employees Provident Fund & Miscellaneous Provisions Act 1952 & Labour Laws with latest amendments, state and central laws, Indian Pinal Code related to this Operation & Maintenance Work.
- As and when required contractor is bound to furnish required information to the Dream city ltd.. Contractor will not be given any relaxation regarding these provisions.
- Attention of Contractors are invited to the Child Labour (Prohibition and Regulations) Act1986, which prohibits employment of children below 18 years of age in certain occupation and process and provides for regulation of employment of children in all other occupations and progress. Hence, contractors are requested to adhere to the provisions in the act and see that engagement of child labourers in the operational activities of the Dream city ltd. are completely eliminated. Any violation of the provisions will lead to penal action apart from strict actions as per Dream city ltd. rules which may include black listing/removing the name of the contractor from the list of registered contractors.
- Any legal action required under any law, specifically under IPC, shall be initiated by contractor. It is duty of the contractor to adhere to and follow the provisions under various laws of states and central government of republic of India.
- FIR to police department, if required, shall lodged by contractor (for example, in case of theft of some material) and legal actions shall be initiated in relevant cases by contractor.
- It shall also be informed in detail about incidence to the employer i.e. Dream city ltd. parallel.

## 9) GOVERNMENT LICENACES AND LIASIONING:

- Contractor is specifically required to follow strictly the provisions rules and regulations of under Factory Act 1947 & other Industrial & Labour Laws with latest amendments, state and central laws, related to this Operation & Maintenance Work.
- Contractor's attention is drawn towards following state/central department, where it is required to complete and abide by formalities yearly or at per defined regular interval.
  - Factory inspector
  - Electrical inspector
  - Labor department
  - Certification of loading/unloading equipment from third party
  - Power supply co.
- **All legal charges/fees required shall be borne by contractor. However, all the formalities of licenses and receipt of payment shall be in the name of Dream city ltd. Any other direct or indirect cost for Liasioning, cost for preparation of drawing, cost for arranging visit of authority (such as electrical inspector, factory inspector etc) shall also be considered and included.**
- All administrative support for such formalities shall be extended by Dream city ltd..
- As and when required contractor is bound to furnish required information to the concern department observing such laws after due permission Dream city ltd.. Required information about fulfilling and completing formalities at regular intervals as per law shall be furnished.
- **Completing the formalities of first time registration and applying for license (after commissioning) to such authorities is also in scope of contractor.**

### **DEALING WITH POWER SUPPLY AGENCIES (Torrent Power Ltd./DGVCL):**

- In case of any interruption of operation of sewage water pumping due to failure of power supply, it should be duly and immediately communicated to concern authority of the power supply co. as well as Engineer-in-charge of Dream city ltd.. It shall be contractor's job to ensure fast recovery of power supply and maintain smooth regular operation.

### **10) DOCUMENT RECORDS / LOG BOOK:**

- The contractor will be responsible for **keeping up to date records of documents** including History Card for equipment and maintaining every day log book relating to various operational parameters like sewage pumping Station hours, Amperes, H.T. voltage, Power factor, energy meter reading, pressure and other reading required are recorded in every shift at regular interval e.g. hourly or as agreed mutually by Dream city ltd..
- **Log books/ routine maintenance books / registers and all printed necessary stationery** required for maintaining records of O & M will be prepared under the guidance and will be provided by Contractor free of cost and also maintain these books in order will be the responsibility of Contractor.
- The Contractor **shall prepare and submit monthly reports to Dream city ltd.** in required copies within 10 days of the next month. The report shall describe the operation and maintenance of the pumping station with copies of the records submitted to Dream city ltd. including summaries of the record in tabular and graphical form. The report shall include a section describing the performance in terms of compliance with the requirement of the contract. The Contractor shall make available all supporting documents, records etc. to Dream city ltd. if required to do so.

### **11) MISC SCOPE OF WORKS:**

#### **11.1 POWER FACTOR IMPROVEMENT & MAINTAINING CONTRACT DEMAND:**

**APFC panel / capacitor banks must be kept in working condition to keep average power factor 0.99 (min.). Any penalty levied by Torrent Power Ltd. or loss of power factor rebate on account of poor factor / maintaining power factor less than mentioned above will be recovered from the contractor from their monthly O & M bills or otherwise.**

**Contractor shall have to maintain contract demand within the agreed limit. In case of the agreed Contract demand of power supply is crossed and demand penalty is made applicable by the supply co., the same shall be recovered along with the other probable expenditures like damage to electrical equipment, cable, meters, switch gears, etc. from the contractor's O&M bills. If the demand is crossed as per the specific intimation from the authority of the Dream city ltd., Excess Contract demand penalty up to that extent shall not be recovered from contractor's bills.**

**All account will be settled on the monthly basis.**

### 11.2 PLANT VISIT:

Dream city ltd. reserve the right to arrange the visit of VIP's dignitaries, public representative and other person of social or political repute, students, any organization as and when necessary, to the all Sewage Pumping Stations. The contractor shall offer co-operation to the Dream city ltd. on the occasions of such visit.

All disciplinary measures as observed by corporation and rituals being followed by corporation shall also be adopted by the concern employee of contractor' staff.

### 11.3 CALIBRATION OF INSTRUMENTS:

The scope of works also includes the calibration or testing of important meters, if necessitated, by third party/Government recognized laboratory; e.g. pressure gauge, A-meter, voltmeter, energy meter (installed on LT penal), etc for measurement of accurate reading. (As per manufacturer Std.).

### 11.4 INCIDENTAL ADDITIONAL SCOPE OF WORK:

For incidental additional work, the contractor on authorization in writing from the Dream city ltd., shall execute if any which is not included in the scope at present.

The rate of such incidental additional work will be worked out by the contractor based on the cost of materials and labor and shall be furnished to the corporation. The contractor shall be entitled for full cost of materials, direct labor and cost of operation of equipment/machinery etc, required to execute the work.

**The corporation reserves the right to ask contractor to furnish copies of bills/ invoices of the materials falling under this heading.**

For such incidental additional work, the contractor shall maintain time sheet of personnel engaged and equipment/ machinery used for the execution of work. Only such labor and other cost based on the above records shall be applicable to the rates payable for above additional work.

## **12) Tools & Tackles to be provided by contractor at site:**

Following is the list of tools/tackles/other items which shall be made available at site by contractor for operation and maintenance work. No payment shall be made to contractor for this.

- Fixed Spanners of sizes 6 mm to 32 mm width across flat : 1 Set
- Ring Spanners of sizes 6 mm to 32 mm : 1 Set
- Box Spanner of size 6 to 32 mm: 1 Set
- Adjustable Spanner: 1172/10", 1170/06" - 1 No each
- Metal trunk to place above all spanner set: 1 No
- Hammer Big with metal rod : 1 No
- Hammer small with wooden rod: 1 No
- Chisel / Grater small and big: 01 each

- Electrical drill machine, rotary, 13 mm with Metal and RCC drill bit sets- 1 No each
- Electrical Tester : 2 nos
- Screw Driver No. 928 & 824 : 1 No. each
- Battery operated megger: 1 No
- Plier 8" : 2 Nos
- Nose Plier 6" - 01 No
- General purpose +/- screw driver: 04 Nos (P3 860/150, P5 861/200): 1 No. each
- Wire Cutter : 01 No
- Crimping tool suitable for up to 35 mm lug size: 01 No
- Hacksaw small and medium : 01 no each with 03 set of blades for each size
- Allen Key-mm : 01 Set
- Heavy Duty screw driver with full size insulated handle and blade length of
  - 100 mm : 1 No
  - 150 mm : 1 No
  - 200 mm : 1 No
- Multi meter cum clamp on meter (Battery operated) satisfying the following-01 No
  1. With 0-1 mA, 0-100 mA, 0-1 A and 0-5A, AC
  2. With 0-100 mV, 0-3 V, 0-30 V, 0-300 V and 0-1000 V
  3. The resistance ranges shall be at least five (0-100) m ohm, (0-1) Ohm, (0-10) Ohm, (0-100) Ohm, (0-100) mega Ohm
  4. The input impedance shall not be less than one mega Ohms for voltage ranges
- Electrically operated air blower -01 No

**3. MEN POWER/STAFF PATTERN:**

- 1) The contractor shall provide experienced managerial, technical, supervisory, administrative, non-technical personnel & labor necessary **to operate and maintain the plant property, safely and efficiently on a continues 24 hours basis** for full term of the O&M contract period. **Agency have to provide safety equipment (Shoes, Helmets, Safety Belt, Hand Gloves etc.) to their manpower.**
- 2) The contractor shall **provide I-card** mentioning name of employee, designation and joining date with signature of authorized person of the contractor. No extra charge shall be given by the Dream city ltd. for the same.
- 3) The contractor may **keep record of presence of his staff** in separate register. However, same may be provided to Engineer-in charge for verify/checking whenever demanded by Engineer-in-charge.
- 4) No extra payment shall be paid by the corporation in case the contractor keeps more staff than specified in tender or for sake of extra duty.
- 5) **Minimum Men Power Required at Each Sewage Pumping Stations for shift wise shall be as per TABLE 1 to 4.**
- 6) **During the initial years flow of incoming sewage shall be lesser compare to design flow. Therefore, Dream city ltd. may operate the shift as per the incoming sewage flow and same shall be accepted by the tenderer.**
- 7) **For the evaluation of the tender, Rate quoted by the tenderer for 3 (Three) Shift shall be considered and accordingly total amount for 05 (Five) years period shall be evaluated. Also Security Deposit and Agreement etc. For Operation and Maintenance period shall be deposited as per the derive total amount considering three shift quoted rate for five years.**
- 8) **staff shall be distributed in three shifts** as per mutual agreement between Contractor & Dream city ltd. The arrangement of reliever for weekly off/ all holidays etc. shall be made by the contractor separately.
- 9) The total staff mentioned here under is should be available for 24 hours & 365 days for normal operation & maintenance. The contractor has **to call respective Maintenance Engineer for rectification of fault** at any time of the day, during contract period.
- 10) Relaxation in qualification and number of staff shall not be allowed under normal circumstance. The above staff shall be distributed in three shifts as per normal agreement between contractor & corporation. Contractors shall make the arrangement of reliever for off/ holidays etc.
- 11) The staff of contractor will remain in contact with Engineer and follow his instructions. The contractor shall have to issue identity cards with photograph to all staff employed for operation & maintenance; otherwise they will not be allowed to enter the plant premises.

- 12) The contractor shall employ all the required staff (and in no case less than the number specified in the tender) within 7 days of award of the contract, otherwise payment will not be made. In such case, the commencement of the contract period & payment thereof shall be reckoned only from the date of employment of full number of staff.
- 13) The contractor shall comply with all safety rules and regulation as all interdisciplinary measures as followed by the Dream city ltd.. Further, the Dream city ltd. will not provide any insurance or medical facility to the staff of the contractor.
- 14) All Central/State Government/Semi- Government/ Local body's rule and regulation pertaining to this contract, all legal formalities pertaining to provident fund, factory act, electricity regulation and all legal formalities shall be followed and observed by the contractor without any extra charge to the corporation. Please note that failure in complying so, all liabilities arising as per laws will be to the contractor's account.
- 15) The corporation will provide no accommodation/guest house/ transportation facility to the contractor.
- 16) Staff pattern mentioned is for shift wise routine operation on 24 x 7 basis only. **Reliever required for daily operations or extra staff during major overhauling/ repairing needs to be arranged by the Contractor.** All weekly off and reliever arrangements shall be made by Contractor.
- 17) **NOTICE BOARD/ DISPLAY BOARD:** -The contractor shall provide a notice board/ Display boards at appropriate location detailing precautions to be taken by operation and maintenance personal in work conformity with Industries and Labor Regulation and Department of Explosives.
- 18) Contractor Shall quote the rate by considering three shifts operations. If Sewage pumping Station is required to be operated for two Shifts, **80 % of quoted rate shall be paid** and if Sewage pumping station is required to be operated for one shift, **60 % of Quoted rate shall be paid.**
- 19) No fitter is required during normal O&M of the pumping station. However, whenever need arises for a fitter, contractor shall have to manage such fitter without any extra cost.
- 20) It may be possible that, commissioning and operation of machineries cannot be done because of various factors (for example, sewage water is not received actually in well). In such situation **non-operational (idle) condition of SPS**, bidder is required to carry out **following activities:**
  - Provide security of entire campus.
  - Up keep all machineries in "ready to use" condition. For these to actually implemented, it is duty of contractor to carry out greasing, cleaning, removing dusting from panel etc and similar activities at regular interval by deputing wireman, fitter etc occasionally.
  - Also, it is responsibility of contractor to initiate any legal action (like lodging FIR) in case on such untoward incidences.

21) Since security of plant and machineries in campus is contractor's responsibility, bidder may consider **cost of insurance for theft, fire** etc. In any case, Dream city ltd. shall not be responsible for any untoward incidences.

22) Accordingly, following tables specifies man power required for two different situations.

**TABLE 1: MAN POWER REQUIREMENT & QUALIFICATIONS-FOR NORMAL OPERATION OF SPS for One Shift**

Sr.	Designation	Qualification	Experience	No of persons
1	Electrician/ Wireman	ITI (Electrician/ Wireman) having permit of Government of Gujarat.	Two years experience in the field	01
2	Helper Beldar	Should be physically healthy & able to read & write (only male)	Exp. in sewage pumping station operation is preferable OR Exp. in other such type of organization.	03
3	Watchman	Should be physically healthy & able to read & write (only male)	Experienced in the field	03
			<b>Total</b>	<b>07</b>

**TABLE 2: MAN POWER REQUIREMENT & QUALIFICATIONS-FOR NORMAL OPERATION OF SPS for Two Shift**

Sr.	Designation	Qualification	Experience	No of persons
1	Electrician/ Wireman	ITI (Electrician/ Wireman) having permit of Government of Gujarat.	Two years experience in the field	02
2	Helper Beldar	Should be physically healthy & able to read & write (only male)	Exp. in sewage pumping station operation is preferable OR Exp. in other such type of organization.	04
3	Watch Man	Should be physically healthy & able to read & write (only male)	Experienced in the field	03
				<b>09</b>

**TABLE 3: MAN POWER REQUIREMENT & QUALIFICATIONS-FOR NORMAL OPERATION OF SPS for Three Shift**

Sr.	Designation	Qualification	Experience	No of persons
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1.	Electrician/ Wireman	ITI (Electrician/ Wireman) having permit of Government of Gujarat.	Two years experience in the field	03
2.	Helper Beldar	Should be physically healthy & able to read & write (only male)	Exp. in sewage pumping station operation is preferable OR Exp. in other such type of organization.	06
3.	Watch man	Should be physically healthy & able to read & write (only male)	Experienced in the field	03
			<b>Total</b>	<b>12</b>

**TABLE 4: MAN POWER REQUIREMENT & QUALIFICATIONS-FOR  
NON-NORMAL OPERATION (IDLE) CONDITION OF SPS**

	<b>Designation</b>	<b>Qualification</b>	<b>Experience</b>	<b>No of persons</b>
1	Electrician /Wireman	As per table 1	As per table 1	As required, occasional visit to keep equipment in “ready to use” condition.
2	Helper	As per table 1	As per table 1	-do-
3	watchman	Should be physically healthy & able to read & write (only male)	Exp. in the sewage or hydraulic pumping station is preferred.	03
			<b>Total</b>	<b>03</b>

**COST OF TENDER:**

- (1) Bidder shall quote rate on per month basis for every shift wise basis. This quoted cost shall be applicable during FIRST YEAR OF CONTRACT. For remaining years price rise shall be considered on flat 5% basis as per table below:

<b>Sr No</b>	<b>Year of contract</b>	<b>Monthly Rate to be paid</b>
1	First	As per quoted rate
2	Second	1.05 x quoted rate
3	Third	1.10 x quoted rate
4	Fourth	1.15 x quoted rate
5	Five	1.20 x quoted rate

Above table is applicable for both rates i.e. Rates for normal operation for shift basis or rates for non-operation condition.

- (2) Payment shall be made as per table above, as per respective quoted rate of on-going mode (rate of normal operation for shift basis or rate of non-operation, whichever is applicable)

and year of contract. (For example, SPS is running in non-operation mode in third year, then payment shall be 1.10 X quoted rate of non-operation condition).

- (3) During the O & M Period, Complete cleaning of Sewage Pumping Station up to bottom at every Three Month interval as per directed by Dream city ltd. Official shall be done by Contractor.
- (4) It is to remind here that separate sub-work order shall be placed for O&M job; hence, contract period for O & M period shall be considered after placing of O & M sub work order.
- (5) Whether SPS is running in normal operation mode or non-operational mode, contract period shall not exceed 5 years.
- (6) During the period of 5 years of Operation and maintenance, Dream city ltd., have right to terminate the Contract before 5 Years of total period by prior intimation to contractor.

## **GENERAL TERMS AND CONDITIONS:**

### (1) **ELECTRIC POWER AND SEWAGE WATER:**

**Electric Power and sewage water shall be provided free of cost to contractor.** Contractor shall maintain/furnish relevant records of electricity consumption and sewage water related data in the various log sheets/ schedules/registers. Log sheet/ Schedules/ registers shall be provided by the contractor & its format shall be approved by the Dream city ltd..

### (2) **MAINTENANCE TOOL AND EQUIPMENT:**

All miscellaneous items for example vehicles, tools, testing equipment, cleaning or housekeeping materials/ equipment, and safety equipment, electrical equipment etc. shall be provided by the contractor at his expense. All other items and labor shall be in the scope of contractor- including major and minor spares repairing and / or replacement.

Dream city ltd. shall provide electricity & sewage water free of cost. Anything and everything, other than electricity and sewage water, required for smooth trouble free operation and maintenance of pumping station shall be in contractor's scope.

The scope of work also includes **providing necessary tools & tackles** for day-to-day O & M routine maintenance, preventive maintenance and break down maintenance.

The contractor should **provide, keep & maintain at least one set of tools/tackles** to Dream city ltd. for the maintenance of the machinery and equipment supplied by them under this contract.

### (3) **INSURANCE:**

3.1 The contractor shall indemnify the corporation against all losses and claims in respect of

- 1) Death of or injury to any person, or,
- 2) Loss of or damage to any property (other than the work)
- 3) Which may arise out of in consequent of the operation & maintenance of the facility and the rectifying of any defects therein, and against all claims proceedings, damages, costs, and expenses whatsoever in respect thereof or in relation there to.

3.2 The corporation shall not liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the contractor or any sub-contractor, resulting from any act or default of the contractor, his agents or servant.

### (4) **PENALTY CLAUSE (PENALTY SCHEDULE) FOR O&M WORK:**

For various situations arising as enlisted below, penalty will be charged and deducted from running bills, Security Deposit or by other means as decided by Dream city ltd.:

Sr.	Factor Attracting Penalty	Penalty Condition
1	<b>Absence of Men Power</b>	
**	Forth category staff (Beldar, Helper, Watchman)	Rs.200/-per day per person
**	Wireman / Electrician	Rs.300/-per day per person
2	<b>Power Factor Penalty levied by supply company</b>	Full penalty to be recovered from contractor
3	<b>Poor Power Factor Penalty.</b> Poor Power Factor (After three consecutive days) for HT services only. APFC panel / capacitor banks must be kept in working condition to keep average power factor 0.99 (min.). For maintaining power factor between 0.9 to 0.95, penalty of Rs.500/- per incidence shall be levied.	
4	<b>Poor Maintenance</b>	
4.1	Pump set remain out of service due to any Electrical/Mechanical machinery fault/non working.	
(i)	Rs.300/- per day	from the 16th day to 20 th day
(ii)	Rs.500/- per day	from the 21th day to 30th day
(iii)	Rs.1000/- per day	After 30 Days penalty will be applied for whole period of not working of machinery.
4.2	If any Electrical/Mechanical machinery in working condition but their sub parts are damaged or in non-working condition	
(i)	Rs.100/-per day	From the 16th days to 25 days.
(ii)	Rs.200/-per day	After 25 Days penalty will be applied for whole the period of not working of machinery.
4.3	Failed to do daily operation, maintenance, housekeeping, or periodic / routine works or any other work covered in tender or not following instructions as directed by Engineer In Charge.	Rs.200/- per day/work
5	Painting	If painting is not done as per schedule, actual cost of painting as decided by engineer in charge shall be recovered.

6	Failure to comply legal requirements.	Adhoc penalty as decided by competent authority of Dream city ltd..
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**Note : Dream city ltd. may, if it feels so on it's part, for circumstances out of control of contractor, waive full/part of the above penalties listed above in clause 4 & 5. There is no ceiling limit in penalty of operation and maintenance work.**

(5) COMPLETION OF THE CONTRACT:

On the date of contract completion or if contract is terminated, all the installations, works and equipment placed under the contractor's responsibility shall be handed over to the corporation in good working order. The corporation may perform any inspection, test or expert appraisals he shall consider necessary with a view to checking that the property is in good working order and will certify to that effect to the contractor while taking over.

A joint visit shall be made by officer in charge of contractor and concern counter part of Dream city ltd. well before the completion date of contract and all points needing rectifications/replacements shall be noted and shall be set aright by the contractor. A Minutes of Meeting is to be created indicating that all machineries mechanical, electrical and others are in order and no part is needs now to be replaced. If any defects found during handing over, the cost of rectification shall be recovered from final bill/ security deposit. This formal document must be created in presence of Engineer-in-charge, the contractor and manufacturer and duly signed and sealed by all of them.

- (6) The contractor must have valid Electrical Contractor License on firm's name.
- (7) No accommodation /guest house/ transportation facility will be provided by the corporation to contractor.
- (8) In case of any interruption of sewage water pumping due to any reason like failure of power supply etc. will be duly and immediately communicated to Engineer-in-charge. The contractor's staff must remain in association with Engineer-in-charge responsibly till that interruption is removed.
- (9) All operation required for sewage water pumping must be done in accordance with the instruction of Engineer-in-charge and all instructions given by him must be followed-up by the staff of the contractor. Any dispute, emergency or disturbance raised due to non-follow-up of instructions given by Engineer-in-charge shall be viewed seriously and the contractor may penalize for the same as decided by the Corporation.
- (10) Contractor shall be attending any work as instructed by Station In-Charge Engineer with in campus of SPS.

(11) APPLICATION:

The general condition of the contract shall apply to the extent that they are not superseded by provision in other parts of the contract.

**GENERAL ROUTINE MAINTENANCE: -**

General routine preventive maintenance scheduled for various equipment shall be adopted from O & M manual. However, the general routine maintenance to be carried out by the contractor's personals will include but not limited to the following: -

- A. If it is observed that power consumption per MLD of sewage water pumped is increased, the contractor has to trace out the fault and rectify the same to bring it the standard/normal value.
- B. De – watering and cleaning of the transformer yard and other places.
- C. Drying and refilling of silica gel in the breather of the transformer.
- D. Regular watering on the earth – pits.
- E. Check for any oil leakage in the transformer and initiating and repairing of the same.
- F. Air blowing of motors, HT & LT panel etc.
- G. Check for any loose connection in all electrical equipment and rectification of same.
- H. Replacement of gland packing for the sluice valves / knife gate valves, etc, whenever required.
- I. Mechanical/Manual Screen shall be cleaned on daily basis.
- J. De-gritting of grit chamber shall be done at least twice in a year.
- K. De-watering of all chambers on regular basis.
- L. Greasing of bearing and lubricating all moving parts as per the scheduled.
- M. Tightening of all loose nuts – bolts and other fasteners.
- N. General cleaning of all equipments and buildings.
- O. Checking and replacement of bulbs, tubes, chocks, starters, switches, LED etc. throughout the plant and including street and head lights.
- P. Watering of plants and tree.
- Q. Cleaning of entire premise including toilets.

#### PREVENTIVE MAINTENANCE CHECKS: -

The contractor shall adopt a preventive maintenance check's scheduled as agreed mutually between the contractor and the corporation. The preventive checks and their tasks frequencies are mentioned in **Annexure- IV. This is general guideline only for reference purpose. Please note frequency mentioned is minimum required, however, Engineer In Charge shall have right to alter this frequency in the interest of the work, and contractor shall carry out the job without extra cost.**

**ANNEXURE – IV**  
**Preventive Maintenance Guidelines**

**Centralized Preventive Maintenance Guidelines**

**Mechanical Item**

Sr. No	Items	Mechanical Preventive Maintenance Required	Frequency
1	Sluice Valve & KGV	1. Leakage through Stuffing Box/Gland.	Weekly
		2. Noise/Vibrations while Opening or Closing the valve.	
		1. Lubrication of Exposed Moving Parts	Six Monthly
		1. Condition of Body Seat Ring/Wedge Seat Ring faces-scratches, dent marks, intactness	Every Three Years During O/H
		2. Condition of Spindle & Spindle nut/Yoke sleeve threads	
2	NRV	1. Leakage through Valve Seat.	Weekly
		2. Noise/Vibrations while Opening or Closing	
		1. Condition of Door Face/Body Ring faces-scratches, dent marks, intactness.	Every Three Years During O/H
		2. Condition of Hinge Pin	
3	Air Valve	1. Leakage through gasket for small orifice nipple	Weekly
		2. Leakage through Rubber Seal in Low Pressure Chamber	
		3. Continuous leakage through the Low Pressure (Large) Orifice/High Pressure (Small) Orifice	
		4. Eventual passage of air through vent in small orifice plug (for High Pressure Chamber)	
		1. Condition of Float Balls, Rubber Seal in Low pressure chamber.	Yearly
4	Sluice Gate	1. Smooth operation of the gate	Weekly
		2. Noise/Vibrations while Opening or Closing the valve.	
		3. Lubrication of Exposed Moving Parts	
		1. Condition of Spindle & Spindle nut/Yoke sleeve threads	Monthly
		2. Condition of spindle guide & guide support	
		3. Check head stock foundation	
		4. Check and Tightening of all Fasteners	
1. Check the setting & tightening of wedges	Six Monthly		

Sr. No	Items	Mechanical Preventive Maintenance Required	Frequency
		1. Condition of Frame Seat Ring/Gate Seat Ring faces-scratches, dent marks, intactness	Yearly
		2. Complete Overhauling of the Gate	
		3. Painting of the gate	
5	Actuator	1. Checking alignment of actuator with its equipment	Weekly
		Check Noise & Vibrations	
		Check limit switch & torque switch settings	
		General cleaning of Actuator	
		Check manual function of actuator	Monthly
		Check tightening of fasteners	
		Check moisture in control section	
		Check tightening of wire terminals	Yearly
		Lubrication of actuator	
Painting of actuator & adaptation kit.			
6	Pump Sets	<b>Progressive Cavity Pump Set</b>	
		Gland packing check	Monthly
		Grease lubrication of Bearings	Quarterly
		Inspection of the pumping elements for wear & tear	Yearly
		<b>C/HNC Pump Set</b>	
		Check pressure Gauge Reading	Daily
		Check Bearing Temperature	
		Check leakage through stuffing box	
		Check noise and vibration	
		Check voltage and current	
		Check alignment of pump set	Quarterly
		Check of Delivery pressure	
		Check Flow	
		Replenish Grease / oil to Bearing	
		Over haling (every 5000 Working Hrs.)	Yearly
		<b>of priming pump set</b>	
		Check priming time	Monthly
		Check pump noise	
		Check All pipe connections	
		Check suction- strainer (if any)	
Open the pump. check & clean interior parts	Six Monthly		
Check impeller	Yearly		
Check clearance between impeller and wearing plate			



Sr. No	Items	Mechanical Preventive Maintenance Required	Frequency	
		(Range:0,25 & 0.35 mm)		
		Check shaft sleeve. Replace if wearied out		
		Replace Gland potting		
		Replace wear plates, if worn out		
			<b>Immersible Pump Set</b>	Daily
		Check delivery pressure, current and voltage		
		Check Noise and vibrations	Quarterly	
		Check the oil in the chamber once every 1000 operating hours.		
		Check the condition of the Mechanical seals	Six Monthly	
		Check clearance between Impeller and setting plate	Yearly	
		Over Hauling (This work is to be done by Autho. personnel only.	Every Three Years	
			<b>Pump Set</b>	Daily
		Check Grease in thrust bearing housing (If applicable)		
		Check oil level in lub oil tank		
		Check pressure Gauge Reading		
		Check Bearing Temperature		
		Check leakage through stuffing box		
		Check noise and vibration		
		Check water level, voltage and current		
		Change of Grease in thrust bearing housing (If applicable)	Quarterly	
Change of Gland packing				
Change of Oil in thrust bearing housing	Six Monthly			
Over haling (every 8000 Working Hrs.)	Every ThreeYears			
7	EOT/HOT Crane	Check push bottom operations	Monthly	
		Check limit switch		
		Lubricate load chain wheel and load chain	Quarterly	
		Check brake operations		
		Check smooth movement of hook		
		Check oil	Yearly	
		Check oil by replaced by new		
		2. Check Clearance between trolley and runway beam flange (range : 5 to 10 mm)		
Check wearing in chain				

Sr. No	Items	Mechanical Preventive Maintenance Required	Frequency
		Seeking safety license / certificate from consultant	
8	Deep water coarse Bar screen	Observe and Check abnormal vibration in operating condition	Daily
		Check smooth movement of rake. if any misalignment found, informs it concerned authority.	
		Check the bar assembly and rack tines for waste collection. If found malfunctions, inform to concerned authority	
		Check Home position limit switch	
		Cleaning of operating chain (if regained)	
		1. Check lubrication of chains. (If not well lubricated, lubricate with oil or special VISCOTAKE lubricant.	Weekly
		2. Check the motor temperature (if abnormal, inform to concern authority.)	
		3. Check torque switch and limit switch by pressing for there function	
		4. Check trapped waste material on screen. If found, clean it.	
		Check tightening of all fasteners	Monthly
		Check tension of chains	
		Check chain link and lock condition	
		Check the play in rack roller, bearing upper & lower chain sprocket etc.	
		Check oil level of gear bar	
Check brake's function of motor			
9	DG Set	Check leakage from Engine fuel system, cooling system & lubrication seals	Daily
		Check the alternator for obstruction in the cooling air ventilation screen	
		Check the alternator & control box heavy accumulation of dust & dirt	
		Check fuel level & coolant level	
		Check for any abnormal noise, vibration & high temperature	
		Check the control panel functions	Weekly
		Check the air filter	
		Check the condition of fan & alternator belt & their tension	
		Check all hose connection & hose conditions	
		Check the engine oil level	
Check battery terminals			

Sr. No	Items	Mechanical Preventive Maintenance Required	Frequency
		Check the battery electrolyte level	Monthly
		Cleaning of alternator	
		Greasing of bearings of alternator	
		Check all functions of the DG sets	Six Monthly
		Clean battery cap vents	
		Check all functions of the instrument & control panel	
		Tighting of all fasteners of DG set & control panels	
		Change the air filter if required	
10	Street Light Pole and Luminaries	Paintings of pole:- Scrapping, cleaning and coating with red oxide and two coat of aluminum paint	Yearly
		Luminaire:- Cleaning and checking for its illumination level	Yearly
		Foundation of street light pole:- White wash with necessary civil repairing	Yearly

Sr.	Item		Electrical & Instrumentation Preventive Maintenance Required	Frequency	
1	HT Panel (Breaker)	1	Complete Circuit breaker	Tighten if found loose	Once in Year
				Clean with Air blower & clean the accessible parts by dry lint free cloth.	
				Remove cause and replace the part	
		2	Operating Mechanism	Clean with Air blower	
				---	
				Apply PTFE grease or its equivalent	
		3	Vacuum Interrupter	Do Mechanical setting & replace if req.	
				Vacuum Interrupter should be replaced, if resistance is not OK	
		4	Auxiliary Switch	Vacuum Interrupter should be replaced, if vacuum is not OK or when counter reaches 20,000 operation	
				Re-tighten if found loose	
		5	Main Power Circuit	Replace if found damaged	
				Check contacts and joints. Apply petroleum jelly, if required	
		6	Control Circuit	Check circuit and operation of micro switches and auxiliary switch	
				Replace if required.	

Sr.	Item		Electrical & Instrumentation Preventive Maintenance Required	Frequency				
		7	Panel cubical	Replace fuse if required Blow dust by Air blower Re-tighten if found loose Replace if required. Replace if required.				
		8	Measurement of Insulation resistance	Tighten if found loose Clean with Air blower & clean the accessible parts by dry lint free cloth. Remove cause and replace the part				
		9	Protection Relay	Clean the relay If not found OK , replace it.				
		10	SF6 Gas Medium Interputer	Replace Interputer, if required				
		11	Oil medium Interputer	Top up the oil level Sealing of oil leakage Filter the oil & replace if required.				
		12	Earth resistance	Take suitable action if earth resistance is high If found damage, replace/repair the earth strip.				
		2	LT / Starter Panel	1		Air Circuit Breaker	Tighten if found loose	Once in Year
							Clean with air blower & clean the accessible parts by dry lint free cloth.	
							Remove cause and replace the part	
							Apply PTFE grease, Beacon Q2 grease or its equivalent	
							Take necessary action if not found OK	
							Take necessary action if not found OK	
Take necessary action if not found OK								
Take necessary action if not found OK								
Take necessary action if not found OK								
2	MCCB			Tighten if found loose Take necessary action if not found OK	Once in Year			
3	Soft-Starter & its cubical	Tighten if found loose Take necessary action if not found OK	Monthly					

Sr.	Item		Electrical & Instrumentation Preventive Maintenance Required	Frequency		
3	Transformer		Blow dust by Air blower			
			Take necessary action if not found OK			
		4	Contactor		Tighten if found loose	
					Clean the contact by using smooth Emery paper or CRC spray	
					Take necessary action if not found OK	
					Take necessary action if not found OK	
					Take necessary action if not found OK	
					Take necessary action if not found OK	
		5	Auto-Transformer		Tighten if found loose	
					If megger value not achieved, placed for heating & revarnishing if req.	
					Filter the oil & replace if required.	Yearly
					Take necessary action if not found OK	
					Take necessary action if not found OK	
		6	Capacitor		Replace if not found OK	Monthly
					Replace if not found OK	
					Take necessary action if not found OK	
		7	Panel cubical		Blow dust by Air blower	
					Re-tighten if found loose	
					Replace if required.	
					Take necessary action if not found OK	
8	Earth resistance	Take suitable action if earth resistance is high	Yearly			
		If found damage, replace/repair the earth strip.				
		1	Bushing	Clean the bushing & replace if found damage	Half Yearly	
				Sealing the oil leakage		
				Re-tighten if found loose		
		2	Tap changer Switch	If not found OK replace it.		
				Sealing the oil leakage		
3	Transformer Oil	Filter the oil & replace if required.	Yearly			
4	Gasket joint	Sealing the oil leakage	Half Yearly			
5	Breather&	Replace if found damage				

Sr.	Item		Electrical & Instrumentation Preventive Maintenance Required	Frequency	
			Silica gel	The old silica gel may be reactivated. If silica gel is pink replace it by new.	
		6	Winding	If not found OK, do filtration or reinsulating/revarnishing the winding	
				Replace fuse/connector if required	Yearly
		7	Earth resistance	Take suitable action if earth resistance is high	Yearly
If found damage, replace/repair the earth strip.					
4	Motor	1	Terminal Box	Tighten if found loose	
				Clean with compressed air & clean the accessible parts by dry lint free cloth.	
				Replace if not found OK	
				Replace if not found OK	
		2	Winding	If megger value not achieved, placed for heating & revarnishing if req.	Monthly
		3	Earthing Strip	Replace if not found OK	
		4	Heater	Replace if not found OK	
Take necessary action if not found OK					
5	LT / HT Cable	1	Terminal	Tighten if found loose	
		2	Cable Insulation	Take necessary action if not found OK	
				Take necessary action if not found OK	
		3	Earthing Strip	Tighten if found loose	Once in Year
6	Outdoor Yard	1	Terminal/Jumper	Tighten if found loose	
		2	Insulator	Clean with dry lint free cloth.	
				Replace, if damage found	
		3	GOD switch	Take necessary action if not found OK	
				Take necessary action if not found OK	
		4	Drop out Fuse	Take necessary action if not found OK	Once in Year
		5	Earthing Strip	Take necessary action if not found OK	
				Take suitable action if earth resistance is high	
If found damage, replace/repair the earth strip.					

Sr.	Item	Electrical & Instrumentation Preventive Maintenance Required	Frequency
7	Ultrasonic Level Indicator/ Ultrasonic Differential Level Transmitter	1. Physical cleaning, 2. Physical condition of sensor, 3. Display checking of Indicator, 4. Cable connection checking	Monthly
8	SCADA/ PLC Panel	1. Physical cleaning of panel, JB panel 2. Indicating lamps checking, 3. Communication failure checking through display, 4. UPS checking ensuring its online connectivity.	Bi-monthly
9	MCC Panel	1. General Cleaning 2. Cable Lugs Tightening 3. Contactors 4. Fuse Unit 5. Bus bars 6. Meters 7. ON/OFF Switch 8. Check of Earthing	Monthly
10	APFC Panel	1. General Cleaning 2. Cable Lugs Tightening 3. Contactors 4. Fuse Unit 5. Bus bars 6. Meters 7. ON/OFF Switch 8. Check of Earthing 9. Relay operation checking in auto mode	15 days
11	Variable Frequency Drive (VFD) / Soft Starter	1. General Cleaning 2. Cable Lugs Tightening 3. Bypass Contactor operation checking 4. Fuse Unit 5. Bus bars 6. Meters 7. ON/OFF Switch 8. Check of Earthing 9. Parameter setting	15 days
12	GOAB switch structure	1. General Cleaning 2. Cable Lugs Tightening 3. DO Fuse Unit 4. GOAB Switch alignment 5. Check of Earthing 6. Lightning arrestor checking 7. CTPT terminal testing	Monthly

## 1. CONSOLIDATED VENDOR LIST

### VENDOR'S LIST- ELECTRICAL ITEMS:

NO.	PRODUCT	VENDOR
(1)	H.T VCB PANEL	CGL, ABB, JYOTI, SIEMENS, AREVA, SCHEINDER, L & T
(2)	AIR BREAK SWITCH	ATLAS, PACTIL, NATIONAL, POWER SYSTEM GUJARAT, DANKE
(3)	LIGHTING ARRESTOR	CGL, LAMCO, OBLUM, NATIONAL, POWER SYSTEM GUJARAT, ATLAS
(4)	D.O.FUSE ASSEMBLY WITH FUSE	ATLAS, PACTIL, NATIONAL, POWER SYSTEM GUJARAT, DANKE
(5)	PIN, POST INSULATOR	ATLAS, PACTIL, NATIONAL, POWER SYSTEM GUJARAT DANKE, JAYSHREE
(6)	TRANSFORMER	AREVA, CROMPTON GREAVES, SIEMENS, VOLTAMP, ABB, KIRLOSKAR
(7)	HT PROTECTIVE RELAYS	L & T, SIEMENS, AREVA, ABB, ESSUN RAY RULL, SCHNEIDER
(8)	L.T POWER CABLE	CCI, UNIVERSAL, FINOLEX, INCAB, TORRENT, HAVELLS
(9)	H.T POWER CABLE	CCI, UNIVERSAL, FINOLEX, INCAB, TORRENT, HAVELLS, GLOSTER
(10)	H.T, LT JOINTING KITS	RAYCHEM, XICON, M-SEAL
(11)	AIR CIRCUIT BREAKER	L&T, SIEMENS, SCHNIDER, ABB, CONTROL & SWITCH GEAR
(12)	MCCB	SIEMENS, SCHNIDER, ABB, CONTROL & SWITCH GEAR
(13)	MCB, ELCB	SIEMENS, MDS, MG, INDOKOPP, SCHNEIDER, HAGER, HAVELLS, ABB, C & S, LAGRAND
(14)	LT SWITCHGEARS	SIEMENS, SCHNEIDER, TELEMECHANIQUE, ABB, CONTROL & SWITCH GEAR
(15)	SOFT STARTERS	EMOTRON, SIEMENS, AB, ABB, SCHNEIDER
(16)	A.C. DRIVES	SIEMENS, AB, ABB, SCHNEIDER, YASKAWA, YOKOGAVA, DENFOSS
(17)	ELECTRONIC TIMERS, TIME SWITCH	GEC, HAGER, SIEMENS, SCHNEIDER, ABB, LEGRAND
(18)	MANUAL CHANGE OVER SWITCH	SIEMENS, SCHNEIDER, ABB, HPL



NO.	PRODUCT	VENDOR
(19)	FUSES	SIEMENS, SCHNEIDER, ABB, BUSSMAN
(20)	LED INDICTORS	ESBEE, SIEMENS, SCHNEDIER, ABB, RAAS CONTROL, TEKNIK, VAISHNO
(21)	PUSH BUTTON	SIEMENS, SCHNEIDER, ABB, RAAS CONTROL
(22)	SELECTOR SWITCH	KEYCEE, SALZER, SIEMENS
(23)	EPOXY CAST RESIN C.T	PACTIL, ASHMOR, KAPPA, C & S, SILKANA, GILBERT, PRECISE
(24)	ELECTRONIC MOTOR PROTECTION DEVICE	SCHNEDIER, SIEMENS, C & S, ABB, SOFTHARD
(25)	CABLE TERMINATION KIT (LUGS & GLANDS)	DOVELLS, JENSON, HEX, 3D, HMI
(26)	DIGITAL METERS	SECURE, ABB, CONSERV, SOCOMEC, SIEMENS, TRINITY
(27)	ANALOG METERS	MECO, RISHLINE, IMP, AE, RISHABH
(28)	APFC RELAYS	EPCOS, KBR, DUCATII, BELLUK, TRINITY, SCHNEIDER, ABB
(29)	CAPACITOR	EPCOS, SCHNEIDER, DUCATII, CROMPTON, YESHA, KHATAU, SUBODHAN, ASIAN, ABB.
(30)	TERMINAL CONNECTOR	CONNECTWELL, WAGO, PHOENIX, ELEMEX
(31)	ON LINE UPS	TATA LIBERT, MERLIN GERIN, SOCOMAC, APC
(32)	SMF BATTERY	PANASONIC, EXIDE, BASE, PRESTOLITE, AMRON, TATA-GREEN
(33)	ENGINE OF D.G. SET	GREAVES, CUMMINS, LEYLAND, KIRLOKAR, CATERPILLAR
(34)	ALTERNATOR OF D.G.SET	CROMPTON, KEC, STAMFORD
(35)	TOOLS & TACKELS	TAPARIA
(36)	TEST EQUIPMENT	KUSUM, RISHABH, WACO, FLUKE, MOTWANE
(37)	PANEL BOARD MANUFACTURER	CPRI &FIA APPROVED (to be got approved prior to supply)
(38)	CRIMPING TOOLS	JAISON, ISMAL
(39)	H.T CONNECTORS	NUTAN, POWER SYSTEM GUJARAT
(40)	CABLE TRAYS	INDIANA, SHARDA, B.M.ENGINEERING, TUSHARTECH, SUPERFAB, BVK ENTERPRISE

NO.	PRODUCT	VENDOR
(41)	Copper / Aluminum Lugs	Dowels / Jenson / Hex
(42)	Street Light Pole	Bajaj / Transrail / Crompton / Valmont
(43)	Luminaries	Philips / Osram / Schreder
(44)	SONT Lamp	Philips / Osram / Schreder
(45)	Fluorescent Light Fixture etc.	Philips / Osram / Schreder
(46)	Electronics Ballast	Philips / Osram / Schreder
(47)	Time Switch	Hager / Siemens / Legrand / GE / ABB / Schneider
(48)	Accessories of Wiring	Gewiss / Legrand / MG / LK / Precision / ABB / Anchor / Clipsel / or equivalent
(49)	Exhaust Fan	GEC / Crompton / Bajaj / Orient/ Khetan /Ortem
(50)	Ceiling Fan	GEC / Crompton / Bajaj / Orient/ Khetan / Ortem
**	INSTRUMENTATION	
(51)	PROGRAMMABLE LOGIC CONTROLLERS (PLC)	ABB, HONEYWELL, ROCKWELL (ALLEN BRADELY), SCHNEIDER, SIEMENS
(52)	AUXILIARY CONTROL RELAYS	OEN, PLA, OMRON, PHOENIX, ABB
(53)	SIGNAL (ANALOG) CABLES	ASSOCIATED CABLES, ASSOCIATED FLEXIBLES & WIRES, BROOKS CABLES, DELTON, LAPP, FINOLEX, MOLEX, LEGRAND, HAVELLS, RR KABEL
(54)	COMMUNICATION CABLES	LAPP, D-LINK, DELTON, FINOLEX, MOLEX
(55)	DC POWER SOURCE	PHONIX, INTEX, MICROTEx, SCHNEIDER, SIEMENS, ALLEN BRADELY, OMRON, APLAB, IFM
(56)	ULTRASONIC TYPE LEVEL / DIFF. LEVEL / LOH & ROF / OPEN CHANNEL FLOW TRANSMITTER	ABB, E + H, KROHNE, SIEMENS, VEGA, EMERSON (ROSEMOUNT), HONEYWELL, YOKOGAWA, WIKA
(57)	RESISTANCE TEMPERATURE DETECTOR	ABB, ALTOP, DETRIV, GENERAL INSTRUMENTS CONSORTIUM (GIC), WIKA
(58)	PRESSURE SWITCH	DAG PROCESS INSTRUMENTS, DANFOS, INDFOS, E+H, N.K.INSTRUMENTS
(59)	FLOAT LEVEL SWITCH	ATMI, E+H, NIVELCO, P+F
(60)	SMOKE DETECTOR	GE, HONEYWELL, INVENSYS
(61)	CCTV STSTEM & DVR	BOSCH, PELCO, SENSORMATIC, ZICOM,

NO.	PRODUCT	VENDOR
		SONY
(62)	DIFFERENTIAL PRESSURE / PRESSURE /TEMPERATURE TRANSMITTER	ABB, EMERSON, HONEYWELL, SIEMENS, YOKOGAWA
(63)	TEMPERATURE SCANNER	MASIBUS, LECTROTEK, INTAKE, ABB, FUJI
(64)	DIFFRENTIAL ULTRASONIC LEVEL TRANSMITTER	ABB, E+H, KROHNE, SIEMENS, VEGA
(65)	ELECTROMAGNETIC FLOWMETER (FULL BORE)	SIEMENS, ABB, KROHNE MARSHALL, E+H
(66)	WATER METER	ELSTER, ITRON(ACTRIS), ZENER, SAPPLE
(67)	ULTRARSONIC FLOWMETER	SIEMENS, ABB, KROHNE MARSHALL, E+H, ULTRAFLUX
(68)	ULTRASONIC PORTABLE FLOW METERS (FOR PIPE LINE)	DYNASONICS, GE PANAMETRIC (GE SENSING), KROHNE (FORBES MARSHALL), POLYSONICS (THERMO ELECTRON), SIEMENS, YOKOGAWA
**	LABORATORY INSTRUMENTS	
(69)	PH / D.O. / RESIDUAL CHLORINE ANALYSERS	ABB, YOKOGAVA, FORBES MARSHALL, EMERSON, E + H, HACH
(70)	POCKET COLORIMETER, PORTABLE OR DESKTOP PH / TURBIDITY / DO / TDS /CONDUCTIVITY METERS, DATA LOGGING PRE-PROGRAMMED SPECTROPHOTOMETER, ANALYTICAL BALANCE	HACH, ORION, YSI, RADIOMETER, DENVER, THERMO SCIENTIFIC
(71)	WATER QUALITY ANALYSERS (TURBIDITY, FREE RESIDUAL CHLORINE, ETC.)	HACH, DKK-TOA, WTW, GLI, RADIOMETER
(72)	TOC ANALYSER	HACH, DKK-TOA, SHIDMATZU, TRL, CHEMITEC
(73)	RECORDER	ABB, HONEYWELL, YOKOGAWA
(74)	JAR TEST, AUTOCLAVE, LABORATORY OVEN, BACTERIOLOGICAL INCUBATOR, WATER STILL	HACH, ORBIT, LAB HOSP

NO.	PRODUCT	VENDOR
(75)	AUTO SAMPLER	HACH / E + H
(76)	COMPUTER SYSTEM	WIPRO / DELL / ACER / LENOVO / HP-COMPAQ /IBM

**Vendor's List- Mechanical Items**

NO.	Product	Vendor
**	PUMPS	
(1)	NON CLOG SUBMERSIBLE PUMPS WITH GUIDE RAIL, AUTO COUPLING ETC.	GRUNDFOSS, AQUA, KIRLOSKAR, KISHOR, WORTHINGTON (WPIL), KSB, PULLEN,ABS, M&P (WILO)
(2)	HORIZONTAL NON CLOG PUMPS	KSB, M&P, BEACON WEIR, KIRLOSKAR, WPIL, GRUNDFOSS, AQUA, PULLEN
(3)	VERTICAL NON CLOG PUMPS	KSB, M&P, BEACON WEIR, KIRLOSKAR, WPIL, GRUNDFOSS, AQUA, PULLEN
(4)	VERTICAL TURBINE PUMPS	JYOTI, KIRLOSKAR, WORTHINGTON (WPIL), MATHER & PLATT, FLOW MORE.
(5)	HORIZONTAL SPLITCASE PUMPS	JYOTI, KIRLOSKAR, WORTHINGTON (WPIL), MATHER & PLATT, FLOW MORE, BEACON.
(6)	SUBMERSIBLE PUMP	KSB, KISHORE, AQUA, GRUNDFOSS, KIRLOSKAR, ABS
(7)	SCREW/POSITIVE DISPLACEMENT TYPE PUMP	ROTO, NETZEH, TUSHACO, SEEPEX
(8)	SAMPLING PUMPS	MAIMOON MACHINE TOOLS, TULLU, KIRLOSKAR, CROMPTON
(9)	DOSING PUMPS	SWALLORE, V.K.PUMPS, SHAPOTOOLS, SEEPEX
**	MOTORS	
(10)	TEFC MOTOR FOR MECHANICAL SCREEN	ALSTOM, SIEMENS, ABB, NGEF, KIRLOSKAR, BHARAT BIJLEE, WEG, AEG, LOREYSOMER, BONFIGLOLI
(11)	MOTOR	KEC, JYOTI, CROMPTON, ABB, MARATHON, BB, SIEMENS, NGEF, BHEL, HAVELLS
**	VALVES, GATES ETC	
(12)	KNIFE EDGE GATE VALVE	JASH, DEZURIK, KSB, IVC, FOURESS, ORBINOX
(13)	NON RETURN VALVE	KIRLOSKAR, IVC, IVI, FOURESS
(14)	NON RETURN VALVE	KIRLOSKAR, IVC, FOURESS, IVI, NORMAX,

NO.	Product	Vendor
	(BALL TYPE)	KISHOR
(15)	SLUICE VALVE & AIR VALVES	KIRLOSKAR, IVC, IVI, FOURESS
(16)	BUTTERFLY VALVE	KIRLOSKAR, IVC, IVI, FOURESS
(17)	DUAL PLATE CHECK VALVE	ADVANCE, FLOVEL, KIRLOSKAR, IVC
(18)	METALLIC EXPANSION BELLOWS	D. WREN, PRECISE ENGR. (VEDANTA), PROCO, BELOFLEX
(19)	SLUICE GATE	JASH, I.V.C., YASHWANT, IVI
(20)	ELECTRICAL ACTUATOR	BEACON ROTORK, AUMA, LIMITORK, MARSH
(21)	S.S. ELBOW	PROCO, DHRUV, BELOFLEX, DWREN
(22)	C.I. PIPES, FITTINGS & DISMANTLING JOINTS	KESORAM, ELECTROSTEEL, KEJRIWAL, TISCO, UPADHYA, NEW JANTA.
**	LIFTING EQUIPMENTS	
(23)	ELECTRIC HOIST & CHAIN PULLEY BLOCK	INDEF, MORRIS
(24)	E.O.T. CRANE	ACME MFG, MUKAND, EDDY CRANES, MORRIS, INDEF, SAYAJI, W.H.BRADY, BATLIBOI, MEEKA MACHINERY
**	PNEUMATIC SYSTEM	
(25)	AIR COMPRESSOR	INGERSOL RAND, KIRLOSKAR
(26)	AIR FILTER	GEM, NORGEN, ULTRA
(27)	AIR FILTER REGULATOR	ABB, DIVYA, JANATICS, PLACKA, SHAVO NORGREN
(28)	PPRC TUBES	VECTUS, FUSION, LEGRIS
(29)	PNEUMATIC CYLINDERS	SCHRADDER, FESTO, SMC, NUCON
(30)	SOLENOID VALVE	JANATICS, SCHRADER ROTEX, ASCO
(31)	LIMIT SWITCHES	TATA HONEYWELL, SIEMENS, BCH
**	CHLORINATORS	
(32)	CHLORINATOR	PENNWALT, ADVANCE, CHLOROTECH, JASCO, METITO, F & P
(33)	CHLORINE PRESSURE GUAGE	WIKA, H. GURU, WAREE, GLUCK

NO.	Product	Vendor
(34)	VACUUM GUAGE	WIKA, H. GURU, WAREE, GLUCK
(35)	CHLORINE BOOSTER PUMP	GRUNDFOSS, ABS, EBARA, FLYGT, KSB, KIRLOSKAR, WILO
(36)	NRV/DIAPHRAM VALVE	DPP, PARCH
(37)	INTERCONNECTING PIPES	ASTRAL, SUPREME, PRINCE
**	PIPES	
(38)	G.I.PIPES	GST, AMBICA, TATA OR ANY MAKE BEARING ISI MARK
(39)	HDPE PIPES	PIL, MANEKYA, DURALINE, JAIN IRRIGATION, RIL, SANGHIR
(40)	GRP PIPES	GRAPHITE / BALAJI-BFRPL / EPP / CPP
(41)	AIR DIFFUSER	OTT / EDI / OVIVO
(42)	FRP PIPES & ACCESSORIES	SINTEX / SUMIP / DAKLE / RANI & CO. / GANDHI & ASSOCIATES, BALAJI-BFRPL, REINFORCED INDS.
(43)	PVC SHEETS	FINOLEX, BALAJI-BFRPL, TAINWALA
(44)	PAINT	ASIAN PAINTS / BERGER / SHALIMAR / DULUX
**	OTHER PRODUCTS	
(45)	AUTOMATIC MECHANICAL MULTI RAKE COURSE BAR SCREEN	JASH, HUBER-CLIMBMAX, DEGREMONT-CLIMBER, JOHNSON, VOLTAS, HYDRODYNE, BRACKETTI-GREEN, SERECO SRL
(46)	GEAR BOX FOR MECHANICAL SCREEN & FOR ACTUATOR	MASTERGEAR, EMTROK, TRANSPower, MARSH, PERFECT, SUPRIYA, ELECON, GREAVES, CPEC, NUTEK, ESSENPRO, SANTHI, BONFIGLOLI
(47)	PROCESS EQUIPMENTS	EMCO KCP, HINDUSTAN DORR-OLIVER, VOLTAS, HYDRAULIC & GENERAL ENGINEERS, GEO MILLER, TRIVENI ENVIREX, DEGREMOUNT, OVIVO, SHIVPAD ENGINEERS PVT. LTD., HUBER
(48)	FINE SCREEN / MULTI RAKE BAR SCREEN	JASH ENGINEERING, EGNER UMWELLTECH NOLOGIE GMBH, SPAANS BAB COCK BV., VOLTAS, HUBER, JHONSON
(49)	BELT FILTER PRESS	TRIVENI ENVIREX, FLOTTWEG, DORR-OLIVER, DEGREMONT, VOLTAS

NO.	Product	Vendor
(50)	CENTRIFUGE	ALFA LAVAL, HUMBOLDT WEDAG, FLOTTWEG,
(51)	ASPRIRATOR AERATORS	WATER MATRIX, AIRE-O2, CIRCUIT SA, HITACHI
(52)	ARCHIMEDIAN SCREW THICKENER	TEKNOFANGHI, ANDRITZ, SERNAGIOTTO, HUBER
(53)	SURFACE AERATORS	VOLTAS, TRIVENI, BATLIBOI
(54)	BEARINGS	SKF, FAG, RHP, ABC.
(55)	PD AIR BLOWERS	SLM, KAY INTERNATIONAL, SWAM PNEUMATIC, EVEREST, AIR EQUIP, USHA.
(56)	CENTRIFUGAL SINGAL STAGE INTEGRALLY GEARED AIR BLOWER	SIEMENS / HOWDEN / H.CEGLIELSKI-POZNAN S.A.
(57)	AGITATORS / STIRRER / MIXER	REMI, SCHURTEK GANSONS LTD., STD. ENGG., MIXRITE FIBRE & FIBRE.
(58)	GEAR BOX	RADICON, ELECON, NUTEK, SAFEX, GREAVES, SHANTHI
(59)	PRESSURE GAUGE	H. GURU, BELLS, AIR MASTER, PRECISION.
(60)	FRP CHEQUERED PLATE	SINTEX
(61)	FABRICATION STEEL PLATES	TATA, SAIL, ESSAR, JINDAL, RASHTRIYA ISPAT
**	MISCELLANEOUS ITEMS	
(62)	FASTENERS	PRECISION TAPS, FIT TIGHT, F.E.DARUKHANAWALA, GWK, ECHJAY, SUNDARAM FASTENERS, AEP& CO., TATA, V.CHUNILAL & CO., STEEL & ALLIED, PRECISION ENGG., .
(63)	FLOAT TYPE FLOW INDICATOR	S.B.ELECTRONICS, NIVO CONTROL (P) LTD., DG CONTROLS, IMPERIAL FLOATS
(64)	REFRIGERATOR	VOLTAS, GODREJ, WHIRLPOOL, VIDEOCON.
(65)	AIR-CONDITIONERS	VOLTAS, BLUESTAR, SAMSUNG, LG, HITACHI, LLOYDS, CARRIER
(66)	HOTAIR BLOWER	WOLF, ARVY
**	GAS ENGINE	
(1)	Bio Gas Engine Generator set	GE Jenbechar/Gauscor/Watsilla/Waukesha/Sulzer-HCP/Deutz/Perkins/ Detroit/ Mitsubishi/ Hyundai

NO.	Product	Vendor
(2)	Alternator	Kirloskar / Crompton / Stemphord/Siemens/Loreysomeer
(3)	H2S Scrubber System	CRA / WessoVarac
(4)	Bio Gas Holder / Digester Double Membrane	ATT / SETTLER

**Note: 1.**

The contractor shall distinctly understand that efficiency of equipment and energy saving is one of the important aspect of consideration of tender. Hence, Dream city ltd. hereby reserves its right to decide final selection of make of each equipment/machineries upon the energy saving aspect. Final options to select any particular make shall rest with Dream city ltd. In this regard the decision of Divisional head of the Department will be final and no dispute of the contractors will be entertained at a later date for the same.

**NOTE: 2.**

The Make of any equipment not covered under above list shall be got improved prior to manufacture during approval of drawings.



**27. TENDERER'S / CONTRACTOR'S CERTIFICATE / UNDERTAKING**

I/We hereby declare that I/We have perused in detail and examined closely the specifications / general terms and conditions / special terms/important instructions/notes described in the tender documents. I/We hereby agree to be bound by and comply with all such specifications/terms, conditions, etc.

I/We also certify that I/We have visited the site and inspected the location of the proposed work and have collected all information required before quoting my / our rates.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

## **28. DRAWINGS**