

**SURAT MUNICIPAL CORPORATION**  
**HYDRAULIC DEPARTMENT**  
**SURAT SMRAT CITY DEVELOPMENT LIMITED (SSCDL)**

**TENDER NOTICE NO.(ON LINE)**

**GM(Water-Energy)/SSCDL/HYD/ABD(1-B)/01/2016-17**

.....

**NAME OF WORK:-** Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.

<b>VOLUME : I</b> <b>TECHNICAL-BID</b> <b>WORK NO.01</b>
--

<b>LAST DATE OF ONLINE SUBMISSION OF TENDER:</b> <b>(i.e NECESSARY DOCUMENTS, CERTIFICATES, ETC.)</b>	<b>Dt. 23.02.2017</b> up to 18:00 hrs. (On line)
--	---

<b>LAST DATE OF SUBMISSION OF TENDER FEE &amp; E.M.D</b> <b>IN HARD COPY</b>	<b>: On or Before Dt. 04.03.2017</b> up to 17:00 hrs.
---	--

<b><i>(BY SPEED POST / RPAD THROUGH POSTAL AUTHORITY ONLY)</i></b>
--

**To be Submitted to**  
**The Chief Accountant,**  
Accounts Department,  
**SURAT MUNICIPAL CORPORATION**  
Muglisara, Surat-390 003.



SURAT MUNICIPAL CORPORATION

I N D E X

SR. NO.	PARTICULARS	PAGE NO.
1.	NOTICE INVITING TENDER	04
2.	INFORMATION TO TENDERER	07
3.	CHECK LIST	08
4.	INSTRUCTIONS TO TENDERER	10
5.	GENERAL CONDITIONS OF CONTRACT	36
6.	SPECIAL CONDITIONS OF CONTRACT	78
7.	QUALITY ASSURANCE PLAN.	86
8.	APPROVED LIST OF VENDERS	89

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



**NAME OF WORK:-**                    **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.**

<b>Tender Notice No.</b>	:	<b>GM(Water-Energy)/SSCDL/HYD/ABD(1-B)/01/2016-17 Work No.: 1</b>
Last date of On-line submission of Tender Along With Necessary Documents, Certificates etc.	:	<b>23/02/2017 upto 18.00 hrs.</b>
Last date of submission of, Tender Fees, EMD and in Hard Copy :	:	On or before <b>04/03/2017 upto 17.00</b> hrs at the office of Chief Accountant, Surat Municipal Corporation, Muglisara, Surat- 395 003.
<b>Earnest Money Deposit</b>	:	Rs. 15,00,000.00/- should be paid. 50% (i.e. 7,50,000/-) shall be in the form of crossed Demand Draft of Nationalized Bank payable at Surat and remaining 50% (i.e. 7,50,000/-) shall be in the form of Bank Guarantee of Nationalized Bank (revocable at Surat) or 100% EMD amount shall be in form of crossed Demand Draft of Nationalized Bank <b>in favor of "SURAT SMART CITY DEVELOPMENT LTD."</b> payable at Surat.
<b>Pre-Bid</b>	:	Bidders shall have to post their queries on e-mail address <a href="mailto:exen.hydraulic@suratmunicipal.org">exen.hydraulic@suratmunicipal.org</a> on or before <b>Dt. 17/02/2017 upto 17.00 hrs.</b>

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



## SURAT MUNICIPAL CORPORATION

### 1.0 NOTICE INVITING TENDER

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

Online Tenders will be received from the established and reliable contractors on or before 18.00 hrs. on 12/12/2016 on website smc.nprocure.com. The tender received after due time and date specified will not be accepted.

**NAME OF WORK:- Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.**

ESTIMATED COST	: Rs. 14,57,84,135.60
EARNEST MONEY DEPOSIT	: RS. 15,00,000.00/-
TIME LIMIT	: 21 (Twenty One) months ( Excluding Monsoon)
Document Fee	: Rs 18,000/-
Registration required	: 'AA' class and Experienced

#### (B) 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 Price Bid / Commercial Bid will be opened after evaluation of Documents, Certificates etc. mentioned in this Technical Bid.**

#### (C) PURCHASE OF TENDER DOCUMENTS :

Tender Documents can be downloaded from smc.nprocure.com upto 13/02/2017 to 23/02/2017 up to 17.00hrs

Tender documents fees of Rs. 18,000/- (Rs. Eighteen Thousand only ) per set which is required for submission of tender towards the cost of tender documents in cash, pay order or by demand draft of any nationalized bank, **in favour of "SURAT SMART CITY DEVELOPMENT LTD."** 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. The Surat Municipal Corporation shall not be liable for any postal delay in any case.

#### (D) CONTRACT PERIOD :

The total contract period is hereby fixed as **21 (Twenty One) months (Excluding Monsoon)** from the date as detailed in the work order. The Monsoon Period shall be considering from 20th May to 30th September.

(E) 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. 15,00,000.00/- as specified in the IT-07.
- (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 amount equal to (2%) Two percent of the tendered amount as per clause No. IT – 27 & GC -10.
- (f) The successful Tenderer shall furnish insurance in accordance with the contract documents.
- (g) The Surat Municipal Corporation may withhold issuance of the Notice of proceeds for a period not exceeding fifteen days after the date of execution of the contract agreement. 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.  
All intending tenderers will have to purchase digital signatures in order to participate in the online bidding process.

**(F) RECEIPT OF TENDER DOCUMENTS:**

**The following details are to be submitted online on [smc.nprocure.com](http://smc.nprocure.com) :**

( 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 RPA/Speed post so as to reach to Account Department (Main office) within 7 days from the last date of submission of price-Bid . Punitive action shall be initiated for non submission of EMD & Tender fees in original to Account Department ( Main Office ) 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 only.

**“Following Documents shall only be submitted in HARD COPY to Surat Municipal corporation 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/-



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 SMC.”

**(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 date of opening of Price bid for this work and the Tenderer shall not be allowed to withdraw or modify the tender offer on his own during the validity period.

**Rights Reserved:**

Without assigning any reason, the Surat Municipal Corporation 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 Surat Municipal Corporation does not appear to be in its best interest and the tenderer shall have no cause of action or claim against the Surat Municipal Corporation or its officers, employee, successors or assignees for rejection of this tender.

The Surat Municipal Corporation further reserves the right to withhold issuance of the notice to proceed, after execution of the contract agreement by the successful Tenderer. The Surat Municipal Corporation 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 Surat Municipal Corporation 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 Surat Municipal Corporation.

The Surat Municipal Corporation 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.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



## 2.0 INFORMATION TO TENDERER:

[1]	Tender validity period	120 days (One hundred & Twenty days) from the date of opening of price bid.
[2]	Earnest Money Deposit	RS. 15,00,000.00/-
[3]	Security Deposit	Four Percent (4%) of tendered Amount as per Clause No IT-27 & GC-10
[4]	Time of Completion	For the complete contract 21 (Twenty One) Months Excl. Monsoon
[5]	Period of liability for work.	Twelve Months from the date of issuing final completion certificate.
[6]	Penalty for delay	Zero Point two percent (0.2%) of the contract price per day maximum upto ten percent of the contract price.
[7]	Retention Money Deposit	Five (5%) percent of work done and to be deducted from R.A. bill as per GC-36.
[8]	Date of download of tender	Between 13/02/2017 & 23/02/2017 upto 17.00 hrs from smc.nprocure.com
[9]	Last date of submission of on-line tender Along With Necessary Documents, Certificates etc.	Dt. 23/02/2017 up to 18.00 hrs.
[10]	Last date of submission of, Tender Fees, EMD and in Hard Copy :	On or before 04/03/2017 upto 17.00 Hrs.
[11]	Pre-Bid:	Bidders shall have to post their queries on e-mail address <a href="mailto:exen.hydraulic@suratmunicipal.org">exen.hydraulic@suratmunicipal.org</a> on or before Dt. 17/02/2017 upto 17.00 hrs.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



### 3.0 CHECK LIST

1. Tenderers to note last date and time of submission of Tender Fees and EMD, Which are to be submitted in Separate cover and that they are to be posted by Registered Post A. D. / Speed Post only in the covering envelope, Which is to be superscripted as **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission.**
2. Scan Copy of Necessary Documents, Certificates etc. along with **Annexure I to VII** should be signed, Sealed and Attested and **submitted on-line on smc.nprocure.com**
3. Tender Security Bond for Earnest Money Deposit should be submitted as per Articles IT-07 (Earnest Money Deposit)
4. Conditional tender will be rejected outright by the Surat Municipal Corporation, without giving any reason.
5. **‘No Joint Venture Bidding / Application as well as Experience shall be allowed / permitted’.**
6. All information as demanded should be submitted.
7. Information regarding capability etc. as per clause No.IT-04 (General Performance Data) should be submitted in hard copy along with tender fee and EMD.
8. **Please verify before Online submission that Necessary Documents, Certificates etc.) are signed, Sealed and Attested wherever required in each and every respect.**
9. **For laying pipeline parallel to Road and crossing the pipeline across the Railway / NHAI Or State High way Road / Canal , Permission from the concerned authority i.e. Railway, Highway, Irrigation shall be in the scope of bidder. Only documents and legal fees for it shall be furnished by SMC but the laisening with relative body shall be done by successful bidder.**
10. **The Final Demarcation & Alignment of Road shall be in the Scope of work from the Government Approved Surveyor.**
11. **All Fee/Security/Bond like EMD (Earnest Money Deposit), SD (Security Deposit), Tender Fee etc. shall be in favour of “SURAT SMART CITY DEVELOPMENT LTD.” payable at Surat Only. Please note the point for this wherever in tender document.**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.





SIGNATURE OF THE CONTRACTOR:-  
NAME AND ADDRESS:-

DATE:-



**3.1 GENERAL DETAILS OF WORK IN BRIEF :**

1. **NAME OF WORK** : Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission.
2. Estimated cost of the work : Rs. 14,57,84,135.60
3. Amount of Earnest Money Deposit : RS. 15,00,000.00/-
4. Tender cover to be superscribed as :

1. NAME OF WORK: Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission.

2. Tender Notice No. GM(Water-Energy)/SSCDL/HYD/ABD(1-B)/01/2016-17 Work No.: 1

3. Name and Address of Tenderer

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



#### 4.0 INSTRUCTIONS TO TENDERERS:

##### IT-01 GENERAL:

The Tender documents may be secured in accordance with the Detail Tender Notice for the work called. The work shall include supply of materials necessary for construction of the work.

##### IT-02 INVITATION OF TENDER:

The Surat Municipal Corporation hereinafter referred so as the Corporation will receive tenders for the **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.** The tenders will be opened at the office of The Executive Engineer (Housing), Surat Municipal Corporation, Surat, in the presence of tenderers or their representatives who are present. The Corporation reserves the right to reject the lowest or any other or all tenders or part of it which in the opinion of the Corporation does not appear to be in its best interest, and the tenderer shall have no cause of action or claim against the Corporation or its officers, employees, successors or assignees for rejection of his tender.

##### IT-03 LANGUAGE OF TENDER :

Tender shall be submitted in English, and all information in the tender shall also be in English. Information in any other languages shall be accompanied by its translation in English. Failure to comply with this may make the tender liable to reject.

##### IT-04 QUALIFICATIONS OF TENDERERS:

- (A) the Only tenderers who have been registered with the Surat Municipal Corporation, Surat or State Government in India or Government of India or Railways or Military Engineering Services in **'AA' class and Experienced** and who shall comply following.

The applicant who is not capable of meeting requirement listed below shall not be qualified for the work. Qualification will be based on Applicants all the following minimum criteria regarding their particular experience, financial position, personnel and equipment capabilities and other relevant information as demonstrated by the Applicant's responses in the forms attached to the Letter of Application. The qualifications, capacity and resources of proposed subcontractors will not be taken into account in determining the Applicant's compliance with the qualifying criteria. The applicant to note specifically that all information given including those in the form of various formats, must be supported by certificates from respective authorities (not less than Executive Engineer or equivalent).

- (a) Average Annual financial turnover during the last 3 years, ending 31st of March of the previous financial year, should be at least 30% of the estimated cost **(i.e. 30% of Rs. 437.35 lacs).**
- (b) Experience of having successfully completed similar works during last 7 years ending last day of month previous to the one in which applications are invited should be the either of following:
- 1) Three similar completed works, not less than the amount equal to 40% of the estimated cost (i.e 40% of Rs. 583.13 Lacs).**

or



- 2) Two similar completed works, not less than the amount equal to 50% of the estimated cost (i.e 50% of Rs. 728.92 Lacs)

or

- 3) One similar completed work, not less than the amount equal to 80% of the estimated cost (i.e 80% of Rs. 1166.27 Lacs)

**NOTE:- Lowering, laying, jointing of M.S. Pressure pipe line. Agency has also experience for pipe laying by trenchless method/Pushing method below Railway / NHAI or State Highway Road / Canal Crossing Etc.**

**Following enhancement factors will be used for the cost of works executed and the financial figures to a common base for the value of the works completed in India.**

Year Before	Multiplying Factor
Immediate last year of the assessment year	1.10
Second	1.21
Third	1.33
Fourth	1.46
Fifth	1.61
Sixth	1.77
Seventh	1.95

**Applicant should indicate actual figures of cost and amount for the works executed by them in the schedule without accounting for the above mentioned factors.**

- (B) "Demand Draft for 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 EMD and Tender Fee are received for purpose of opening the bid. Accordingly offer of those shall be open whose EMD and tender Fee is received electronically. However for the purpose of realization of DD Bidder shall send the DD in original through RPAD/ Speed Post so as to reach to Account Department (Main Office) with in 07 (Seven) Days from the last date of uploading. Penal Action shall be initiated against bidder for not submitting DD in original to Account Department by putting registration in abeyance and cancelling E-tendering code for 01 (One) year. Any documents in supporting of Bid shall be in electronic format only through online (By Scanning) and hardcopy will not be accepted separately"

The following details are to be submitted on-line on smc.nprocure.com:

- 1) Scan Copy of Tender Document fees and EMD Details
- 2) Scan Copy of Annexure I to VII along with all necessary supporting documents.
- 3) Scan Copy of Necessary Documents, Certificates etc. (as mentioned in This Technical Bid)
- 4) Scan Copy of Addenda and Corrigendum (if any).
- 5) Commercial Bid

**Note :-** ALL Necessary Documents, Certificates etc. are signed, Sealed and Attested.

The following details shall be submitted in hard copy at prescribed address:

- 1) Tender fees in prescribed format



2) Earnest Money Deposit in prescribed format

Please note that only Tender Document fees and EMD shall be submitted to Chief Accountant of S.M.C. in hard copy.

Technical Bid and price Bid are not to be submitted in Physical Form. Please note that Non submission of Technical Bid as well as price bid in physical form does not absolve the bidders from any liability created from the bid condition and bidding process. Technical-Bid & Price bid in Hard copy shall be submitted by Successful Bidders upon intimation from SMC.”

- (C) The tenderer shall furnish all details as asked in “Section 5 (General performance data)” and various other sections of this tender document with all necessary supporting documents.
- (D) The tenderer shall submit ‘**Digitally Signed**’ of their relevant registration certificate with the Surat Municipal Corporation, Surat or State Government in India or Government of India or Railways/ Military Engineering Services.
- (E) The tenderer shall submit ‘Digitally Signed’ of **solvency certificate** of national or schedule bank Amounting at least about 20% of the estimated amount. The Validity of Solvency certificate shall be 01(One) year from the date of issue while opening of the Technical Bid of tender.
- (F) The tenderer shall submit ‘**Digitally Signed**’ of details of his turnover for the last three financial years.
- (G) The tenderer shall submit experience certificates of works as stated in IT-04 (A).
- (H) The tenderer shall submit ‘**Digitally Signed**’ of partnership deed in case of a joint firm.
- (I) The tenderer shall submit ‘**Digitally Signed**’ of Provident fund registration Number.
- (J) **For the necessary modification / alteration / addition to complete 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 SMC is empowered to dispose the said C.D. waste through SMC 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.**

**IT-05**

**TENDER DOCUMENTS:**

Printed documents and set of drawings shall comprehensively be referred to as tender documents. The several sections forming the documents are the essential parts of the contract and a requirement occurring in one shall be binding as through occurring in all. They are to taken as mutually explanatory and describe and provide for complete works.



#### IT-06 EXAMINATION BY TENDERERS:

- (A) At his own expenses and prior to submitting his tender, each tenderer shall (a) examine the contract documents, (b) visit the site and determine local conditions which may affect the work including the prevailing wages and other pertinent cost factors, (c) familiarize himself with all central, state and local laws, ordinance, rules, regulations and codes affecting the material supply including the cost of permits and licenses required for the work and (d) correlate his observations, investigations, and determinations with the requirements of the Tender Documents.
- (B) The quantities of items shown in schedule may vary but such variation will be limited to with plus or minus 30 (thirty percent) of the contract price.
- (C) Tender Documents shall be completed legible in ink, checked in a responsible manner, signed, stamped and returned together with the Earnest Money Deposit by the stipulated date.

All the pages in which entries are required to be made by the Tenderer are contained in the tender documents and the Tenderer shall not take out or add to or amend the text or any of the documents except in so far as may be necessary to comply with any addenda issued pursuant to Clause – IT- 17 hereof

- (D) The tenderer shall complete and furnish all the details asked for in various sections and sub sections of this tender document.

#### IT- 07 EARNEST MONEY DEPOSIT:

- (A) Each tender must be accompanied by a tender guarantee bond (Earnest Money Deposit) of **Rs. 15,00,000.00/-** below. Total amount of EMD shall be deposited in the form of Crossed Demand Draft / Pay order of Local Nationalized Bank or scheduled banks like -IDBI, HDFC, ICICI and AXIS banks, drawn **in favour of "SURAT SMART CITY DEVELOPMENT LTD."** payable **at Surat Only.**

The tender Guarantee bond, shall be valid for a period of not less than One hundred and twenty (120) days from the date of the tender are opened and shall comply with the requirements for Bond as stipulated in the general conditions of contract. The tender guarantee bond will be held by the Corporation as a guarantee that the tenderer. If awarded the contract, will enter into the contract agreement in good faith and furnish the required bonds. Any tender not accompanied by a Tender Guarantee in the form of earnest money deposit by Bank Draft for the sum stipulated in the Tender Document will be summarily rejected.

The tenderer shall have an option to remit the 50% amount of E.M.D. (i.e. **Rs. 7,50,000/-**) in form of bank guarantee revocable at Surat as per enclosed prescribed format. In this case remaining 50% amount draft/pay order as mentioned above in "A".

- (B) The Earnest Money Deposit will be refunded to the unsuccessful Tenderers after the award has been finalized, as per prevailing norms of the Surat Municipal Corporation
- (C) The Earnest Money Deposit (Tender guarantee) will be forfeited in the event, the successful Tenderer fails to accept the contract and fails to submit the performance Guarantee Bond to the owner as stipulated in this tender documents within ten days



after receipt of notice of award of contract. In such case, the Corporation may disqualify the Tenderer from tendering for further works, under the jurisdiction of the Corporation (The Surat Municipal Corporation)

- (D) The Earnest Money Deposit of the successful tender shall be returned after the performance guarantee bond, as required, is furnished by the successful Contractor.
- (E) No interest shall be paid by the owner on any tender guarantee.

#### **IT-08 INCOME TAX CLEARANCE CERTIFICATE:**

In view of the latest circular of IT Department IT clearance certificate is not required. However the contractor shall give photo copy of the PAN card.

#### **IT-09 PREPARATION OF TENDER DOCUMENTS:**

Tenderers are requested to note the following while preparing the Tender Documents:

- A. Tender shall be submitted on the Tender form bound herein in English. All tender items and statements shall be properly filled in. Numbers shall be stated both in words and in figures where so indicated, and signatures of all persons signing shall be in longhand.
- B. Tenderer who submits a tender has to fill up schedule B, giving in the prescribed space his percentage rates according to estimated quantities, and the rate shown to undertake for each items of the work. The tenderer, who proposes any alteration in the work, specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or the tender which contains any other condition of any sort, will be liable to rejection. No erasures will be permitted. Mistakes may be crossed out and correction typed or written in ink adjacent thereto, and must be intimated in ink by the persons signing the tender. All extensions of prices and arithmetic discrepancy in summation, multiplication, etc. in schedule B, the percentage rate given by the Tenderer at the time of tendering shall be used to derive item rates for each item mentioned in schedule B and the total figure shall be worked out by multiplying these derived item rates with executed quantities and summing them all. If there is discrepancy between the percentage rates quoted in figures and in words, the rates expressed in words shall be considered as binding
- C. Each tender shall be accompanied by the tender security bond and other required documents and drawings. All witness and sureties shall be persons of status and probity and their full names, occupations and address shall be stated below their signatures. All signatures in the Tender Documents shall be dated.
- D. Variations to the Contract Documents requested by the tenderer may be affixed to the Tender Document in the space available and duly signed and stamped. Such variations may be approved or refused by the Engineer at the time of adjudications of Tenders, and in either case the Engineer is not obliged to give reasons for his decisions.
- E. Delivery of Tenders shall comply with Detail Tender Notice as to place, date and time. Tenders and tender security shall be enclosed in two different sealed opaque envelopes indicating the identity (tender security and tender offer) and shall be together put in a sealed envelope.



F. Price Bid shall be submitted online.

**IT-10 SUBMISSION OF TENDER DOCUMENT:**

**1) COVER (1) (i) Tender Fees cover and (ii) E.M.D. cover**

(a) Tender Fee and EMD for the work of **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission** as mentioned in tender document shall be submitted in hard copy. Also mention the name and address of tenderer, tender notice number on the cover.

(b) Technical Documents and Price bid (Volume-3) Necessary Documents, Certificates etc. along with Price Bid for the work of **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission** Shall be submitted on line only.

The name of work to be written on cover shall be work of **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission**. Also mention the name and the address of tenderer, tender notice number on the cover and to be submitted to the Chief Accountant, Surat Municipal Corporation Muglisara, Surat – 395 003.

2 Tenderer shall be required to submit the Scan Copy (Online) Necessary Documents, Certificates etc mentioned in this Technical Bid. If Documents, Certificates etc submitted by the bidder found insufficient, then the Price Bid of the tender shall not be opened.

(a) The tender shall be accompanied by Earnest Money Deposit as per Clause IT-07. The tenderer will pay Earnest Money Deposit by Pay Order/Demand Draft issued **in favour of "SURAT SMART CITY DEVELOPMENT LTD."** payable at **Surat Only**. by Nationalized Bank. The Earnest Money in the form of Cheque, FDR shall not be accepted.

(b) An Digitally Signed of Registration as an approved Contractor at MES, Various Department of the State Govt., or Central Government SURAT MUNICIPAL CORPORATION, CPWD etc.

(c) List of the works already completed in prescribed Performa as per **ANNEXURE-I** and attested copies of certificates from head of the office concerned for completion of the works.

(d) Declaration regarding the work on hand with the tenderer shall also be given as per **ANNEXURE-II**. Attested copies of work orders, interim certificates if any shall also be attached as supporting document.





- (e) A covering letter detailing various considerations considered in tender shall invariably be given.
  - (f) **Solvency certificate from Bankers** should be for the amount to meet the requirement for registration of Contractor in relevant class. For experienced Contractor, **amounting at least about upto 20 % of the estimated amount.**
  - (g) Digitally Signed of partnership deed, power of attorney, etc.
  - (h) Passport size photographs of all the partners (incase of partnership firm) to be fixed on relevant page of the tender document.
  - (i) The Contractor shall submit an Digitally Signed of VAT registration certificate with VAT number and proof of residence. The VAT shall be deducted at source as per prevailing norms while making payment.
- 3
- (a) List of tools, plants and equipments with tenderer in detail as per **ANNEXURE-III.**
  - (b) Technical establishment / staff of the tenderer in required Performa with their names, Qualifications and experience as per **ANNEXURE-IV.**
  - (c) Tenderer shall furnish along with the tender, information regarding Income Tax circle of the district in which he is asked for income tax reference no. and year of assessment.
  - (d) Further details required to be furnished as per **ANNEXURE-V and Annexure-VI. The Contractor shall submit all the forms i.e. Undertaking, Declaration and Affidavit duly signed by the contractor and all their partners.**
- 4
- Submission of a tender by a tenderer shall mean that he has read this notice and contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and nature required quantities of materials stores, tools and plants etc. that may be required by him in carrying out the work and of local conditions and laws and byelaws of the Government, Surat Municipal Corporation and other factors bearing influence on the execution and cost of the works.
- 5
- The total amount quoted shall be written both in figures and in words. In the case of figures the words "Rs.'" should be written before the figure of Rupees and the words "Paise" after the decimal figure eg. Rs.2.15 paise. In case of word the word "Rupees" should precede and the word "Paise" shall be written at the end, unless the amount is invariably upto two places of decimal. Tender with erasures, over writing or alteration or mutilations shall stand rejected.
- 6
- Scan Copy of Necessary Documents, Certificates etc. along with Annexure I to VI should be signed, Sealed and Attested and submitted on-line on smc.nprocure.com dated 23/02/2017 upto 17.00 hours.



The same will be opened on the next working day at 16.00 hours (if possible) in the presence of the tenderers, who shall remain present in the office of “Tender Opening Officer, SURAT MUNICIPAL CORPORATION, Surat”.

**7 Tender shall stand rejected if, due to any one or more case as follows,**

- (a) Any erasure is made in the tender unauthenticated or any page or a page is/are removed or replaced.
- (b) The tenderer shall submit the tender who satisfies each and every condition laid down in the notice tender documents, failing which the tender will be liable for rejection.
- (c) Tenderer’s tender/quotation containing conditions shall be liable for rejection outrightly without assigning any reason for the same.
- (d) Conditions specified in the Price-Bid in modification to those conveyed in the tender shall render the price bid offered without assigning any reasons.
- (e) Stipulates the validity period less than what is stated in the form of tender.
- (f) Stipulates his own conditions.
- (g) Does not quote his rates inclusive of Octroi duty and other terminal or sales tax or central taxes in his rates.
- (h) Does not disclose the full names and address of all his partners in the case of partnership firm.
- (i) Does not fill in and sign the tender form as well as the bill of quantities and rates, annexure, specifications etc.
- (j) Does not pay the Earnest Money Deposit by Demand Draft / Pay order in prescribed covers.
- (k) Does not submit the tender before the stipulated time and specified date in the Accountant’s office as directed.
- (l) Does not quote the rates for each part of the Price-bid.
- (m) Does not attach the document mentioned under Point-8.
- (n) The tenderer proposes any alterations in the work specified in the tender or in the time limit allowed for carrying out the work or any other condition.

**8 All the tenderers are instructed to fill up the Schedule-B. All corrections, additions or posted slips to be initialized by the tenderer.**



- 9 All pages of tender documents including specifications should be initialed by the Contractor.
- 10 The tenderer shall submit the tender which satisfies each and every conditions laid down in this notice and tender documents failing which the tender is liable for rejection.
- 11 Notice of inviting tenders shall be a part of the contract documents.
- 12 Acceptance of tenderer/quotation will rest with the competent authority of SURAT MUNICIPAL CORPORATION who does not bind himself to accept the lowest and reserves the right to accept or to reject any or all quotations / tenders and no reasons will be given for acceptance or rejection thereof.
- 13 The Contractor shall also attach list of machineries, tools, plants, equipments which propose to deploy for this work.
- 14 All octroi duty and other taxes chargeable by the Municipal Corporation shall be payable by the Contractor.
- 15 Tender once accepted shall be binding on the contractor even if the formal agreement is not signed.
- 16 Tender once offered can not be withdrawn except with the permission of head of the concerned department, SURAT MUNICIPAL CORPORATION, Surat.
- 17 The successful tenderer shall be required to enter in to an agreement with Municipal Corporation after placing the work order for the said work from SMC.
- 18 The successful tenderer may be required to furnish **surety in accordance with IT-28 on stamp paper.**
- 19 The tenderers are requested to give complete specification of papers quoted.
- 20 Unless specifically mentioned by the tenderer for the extra payment of taxes on price quoted by them it will be presumed that the prices quoted are inclusive of all the taxes and no claim will be entertained for payment of extra taxes, duties and any such incidentals etc. on the bills submitted by them.
- 21 No claim for interest and / or damages shall be entertained for the delay in payment of bills and / or any such dues from the SURAT MUNICIPAL CORPORATION, for any reason, whatsoever.
- 22 The Price-Bids of only the qualified bidders/tenderers will be opened. The date and time of which will be intimated to the qualified bidders/tenderers from the office of the Hydraulic Engineer.
- 23 SURAT MUNICIPAL CORPORATION reserves the right to open or not to open any or all Price-Bid without assigning any reason thereof.



**IT-11 TENDER VALIDITY PERIOD:**

The validity period of the tender submitted for this work shall be of one hundred twenty (120) calendar days from the date of **opening of Price bid** and that the Tenderer shall not be allowed to withdraw or modify the tender offer on his own during the validity period. If any tenderer withdraws, or makes any modifications or additions in the terms and conditions on his own in his tender, then The Surat Municipal Corporation shall, without prejudice to any right or remedy, be at liberty to reject the tender and forfeit the Earnest Money Deposit in full.

**IT-12 SIGNING OF TENDER DOCUMENTS:**

If the Tender is made by an individual, it shall be signed with his full name above his current address. If the tender is made by a proprietary firm it shall be signed by the proprietor above his name and the name of his firm with his current address.

If the tender is made by a firm in partnership, it shall signed by all the partners of the firm above their full names and current addresses or by a partner holding the power of attorney for the firm signing the tender in which case a certified copy of the power of attorney shall accompany the tender. A certified copy of the partnership deed, current addresses of all the partners of the firm shall also accompany the tender.

If the tender is made by a limited company or a limited Corporation, it shall be signed by a duly authorized person holding the power of attorney for signing the Tender in which case a certified copy of the power of attorney shall accompany the tender. Such limited Company or Corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded.

If the tender is made by a group of firms, the sponsoring firm shall submit complete information pertaining to each firm in the group and state along with the bid as to which of the firms shall have the responsibility for tendering and for completion of the contract documents and furnish evidence and for completion of contract documents.

The full information and satisfactory evidence pertaining to the participation of each member of the group of firms in the tender shall be furnished along with the tender.

All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signatures. All signatures in the Tender document shall be dated.

**IT-13 WITHDRAWAL OF TENDERS:**

If, during the tender validity period, the tenderer withdraws his tender, the Tender Security (Earnest Money) shall be forfeited and the Tenderer may be disqualified from tendering for further works under the jurisdiction of Surat Municipal Corporation

**IT-14 INTERPRETATIONS OF TENDER DOCUMENT:**

Tenderers shall carefully examine the tender documents and fully inform themselves as to all the conditions and matters, which may in any way affect the work or the cost thereof. Should a tenderer find discrepancies, error or omission from the specifications or other documents or



should he be in doubt as to their meaning he should at once address query to the concerned authority. Any resulting interpretation of the tender documents will be issued to all tenders as an addenda corrigendum. Verbal clarification and /or information given by the Consulting Engineer shall not be binding on the Municipal Corporation.

**IT-15 ERRORS AND DISCREPANCIES IN TENDERS:**

In case of conflict between the figures and words in the rates, the rates expressed in words shall prevail and apply in such cases.

**IT-16 MODIFICATION OF DOCUMENTS:**

Modification of specifications and extension of the closing date of the tender, if required, will be made by an addendum. Copies of each addendum will be sent to all tenderers. These shall be signed and shall form a part of tender. The tenderer shall not add to or amend the text of any of the documents except in so far as may be necessary to comply with any addenda.

**IT-17 ERRATA, ADDENDA AND CORRIGENDUM:**

Addenda form part of the contract documents & full consideration shall be given to all addenda in the preparation of tenders. Tenderers shall verify the number of addenda issued, if, any and acknowledge the receipt of all Addenda in the Tender. Failure to acknowledge may cause the Tender to be rejected.

- A. The Engineer of the owner may issue Addenda to advise Tenderers of changed requirements. Such addenda may modify previously issued Addenda.
- B. No Addendum may be issued after the time stated in Notice Inviting Tenders.

**IT-18 TAXES AND DUTIES ON MATERIAL:**

All the taxes, duties, Vat, and such all incidentals and such incidental imposed in future must be borne by the Contractor only. "P", "D", or "C" form shall not be supplied by The Surat Municipal Corporation.

**IT-19 EVALUATION OF TENDERS:**

In comparing tenders the Surat Municipal Corporation shall consider such factors as the time of completion, efficiency and reliability of construction method proposed, compliance with the specifications, relative quality, the operation, maintenance and replacement cost of structure and plant, capabilities of the tenderer, their past records for executing works of similar nature, etc.

**IT-20 EVALUATION OF TIME REQUIRED FOR COMPLETION:**

The time schedule for completion of work shall be considered as indicated by the tenderer in the form "Tenderer's proposed completion schedule" annexed with the tender document. The completion period mentioned in this schedule is to be considered from the date of notice to



proceed. Total completion period **21 (Twenty One) months Excl. Monsoon** from the date as mentioned in the final work order and Tenderers should adhere to this delivery time.

**IT-21 POLICIES FOR TENDER UNDER CONSIDERATION:**

Tenders shall be termed to be under consideration from the opening of the tender until such time an official announcement of award is made.

While tenders are under consideration, Tenderers and their representative or other interested parties are advised to refrain from contacting by any means The SURAT MUNICIPAL CORPORATION or representatives on matters related to the tenders under study. The Engineer's representative if necessary will obtain clarification on tenders by requesting information from any or all the tenderers either in writing or through personal contact, as may be necessary. The tenderer will not be permitted to change the substance of his tender after price revision. Non-compliance with this provision shall make the tender liable for rejection.

**IT- 22 PRICES AND PAYMENTS:**

The Tenderer must understand clearly that the price quoted are for the total works or the part of the total works and include all costs due to materials, labour, equipment, supervision, other services, royalties and octroi etc. and to include all extras to cover the cost. No claims for additional payment beyond the prices quoted will be entertained and the Tenderer will not be entitled subsequently to make any claim on any ground excepting for the condition laid down in GC-96.

**IT-23 PAYMENT TERMS:**

The terms of payment are defined in the General Conditions of Contract. The Municipal Corporation shall not under any circumstances relaxes, the terms of payment and will not consider any alternative payment terms. Tenderers should therefore in their own interest note this provision to avoid rejection of their tenders.

**IT-24 AWARDS:**

Award of the contract or the rejection of tenders will be made during the Tender validity period.

- A. After all contract contingencies are satisfied and the Notice of Award is issued, the successful Tenderer shall execute the Contract Agreement and shall furnish the Performance Guarantee Bond as required. The Contract Agreement shall be executed in the form stipulated by the owner. The tenderer can have a look at the copy of Contract Agreement at the office of The Surat Municipal Corporation
- B. If the Tenderer receiving the Notice of Award fails or refuses to execute the Contract Agreement within the stated time limit or fails or refuses to furnish the Bond as required herein, The Surat Municipal Corporation may annul his award and declare the tender security forfeited.
- C. A corporation, Partnership firm acting as the Tenderer and receiving the Award shall furnish evidence of its existence and evidence that the officer signing the Contract Agreement and Bonds for the corporation, partnership firm acting as the Tenderer is duly authorized to do so.



#### **IT-25 SIGNING OF CONTRACT:**

On receipt of notice of Award, the successful Tenderer shall be required to execute the contract within time period as specified in clause No. GC-19 of conditions of Contract, failing which the Municipal Corporation will be entitled to annul the award and forfeit the Earnest Money Deposit. The person to sign the contract documents shall be person etailed in Article IT-12

#### **IT-26 DISQUALIFICATION:**

A Tenderer shall be disqualified and will not be taken for consideration if :-

- (a) The outer envelope does not show on the outside the reference of bid and thus get opened before the due date of opening (as per Article IT-10 i.e. Submission of Tender Documents)
- (b) The Earnest Money Deposit is not deposited in full and in the manner as specified (as per Article – IT – 07 i.e. Earnest Money Deposit)
- (c) The tender is in a language other than English or does not contain its English Translation in case of other language adopted for tender preparation.
- (d) The tender documents are not signed by an authorized person (as per Article IT-12 i.e. signing of tender documents)
- (e) The general performance data not submitted (as per Section 4 of this tender document).
- (f) The tenderer does not agree to deposit Performance Guarantee (security deposit) as mentioned in IT-27.
- (g) The Tenderer does not agree to Payment terms as defined in IT-23.
- (h) Conditional tender.

Tenderer may further be disqualified if:

- Price variation is proposed by the Tenderer on any principles other than provided in the Tender Documents.
- Completion schedule offered is not consistent with the completion schedule defined and specified in tender documents.
- The validity of tender is less than that mentioned in Article IT-11 i.e. Tender validity period.
- Any of the page or pages of tender is/are removed / replaced.
- All corrections or posted slips are not initialed by Tenderer.
- Any erasure is made in the tender.

#### **IT-27 PERFORMANCE GUARANTEE (SECURITY DEPOSIT):**

**The total Security Deposit is 4% (Four) percent of contract value and shall be as under:**

**The successful tenderer shall have to pay as initial security deposit at 2% (two) percent of the tendered amount. Security Deposit (2%) shall be in cash or in the form of Demand Draft/ Bank Guarantee (revocable at Surat) / Fixed deposit of nationalized bank or scheduled banks like - IDBI, HDFC, ICICI and AXIS banks issue in favour of "SURAT SMART CITY DEVELOPMENT LTD." payable at Surat . The duration of F.D.R shall be the Scheduled time required to complete the work plus twelve months of defect liability period.**



The remaining amount of the Security Deposit i.e. 2% of tendered amount shall be recovered from the running bills 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. The amount recovered from the running bills 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 R.A.Bills will be allowed for conversion in the form of interest bearing fixed deposit receipt, issued in favour of **“SURAT SMART CITY DEVELOPMENT LTD.” payable at Surat** . by a Nationalized Bank located at Surat only. **The initial security deposit 2% submitted will be refunded after payment of final bill and remaining 2% of security deposit deducted from the running bill will be refunded only after the expiry of defect liability period and after payment of final bill, and after rectifying the defects found if any, within defect liability period as intimated by S.M.C**

If the security deposit is not paid within 15 days from the date of work order then the 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, the contract already accepted shall be considered as canceled and his Earnest money deposit shall be forfeited.

**IT-28 STAMP DUTY:**

The successful Tenderer shall have to enter in to an agreement in a non-judicial stamp paper of Gujarat State of necessary amount as per the **Government Norms and in the** form of the agreement approved by the Municipal Corporation, **Surat with required Surety and Undertaking.**

**IT-29 BRAND NAMES:**

Specific references in the specifications to any materials by brand name, or catalog number shall be considered as establishing a standard or, quality and performance and not as limiting competition and the Tenderer in such cases, may at their option freely use any other product, provided that it ensures and is of equal or higher than the standard mentioned and meets Municipal Corporation approval.

**IT-30 NON – TRANSFERABLE:**

Tender documents are not transferable.

**IT-31 COST OF TENDERING:**

The owner will not defray expenses incurred by Tenderer in tendering.

**IT-32 DEFECT OF TENDER:**

The Tender for the work shall remain open for the period of 120 calendar days from the date of opening of the tenders for this work and that tenderer shall not be allowed to withdraw or modify the offer on his own during the period. If any tenderer withdraws or makes any modifications or additions in the terms and conditions on his own, then the Mahanagar Seva Sadan, shall without prejudice to any right or remedy, be at liberty to reject the tender and forfeit the earnest money in full.





**IT-33 CHANGE IN QUANTITY:**

The SURAT MUNICIPAL CORPORATION reserves the right to waive any informality in any tender and to reject one or all tenders without assigning any reasons for such rejection and also to vary quantities of items or group as specified in the schedule of price as may be necessary but such variation will be limited to within plus or minus 30% (thirty percent) of the contract price.

**IT-34 NEW EQUIPMENT AND MATERIALS:**

All materials, equipment and spare parts thereof may be new, unused and originally coming from manufacturer's plant to the Corporation. The equipments plant and machinery may be in full working condition. The rebuilt or overhauled equipment/materials may not be allowed to be used on work.

**IT-35 RIGHTS RESERVED:**

The SURAT MUNICIPAL CORPORATION reserves the right to reject any or all tenders, to waive any informality or irregularity in any tender without assigning any reason. The SURAT MUNICIPAL CORPORATION further reserves the right to withhold issuance of the notice to proceed after execution of the contract agreement, for the period of 15 days and no additional payment will be made to the successful Tenderer on account such withholding. The SURAT MUNICIPAL CORPORATION is not obliged to give reasons for any such action.

**IT-36 RIGHTS TO REDUCE THE SCOPE OF WORK:**

Municipal Commissioner reserves the right to reduce the scope of work and split the tender in two or more parts without assigning any reason even after the award of contract.

**IT-37 MOBILIZATION ADVANCE:**

No mobilization advance or on machinery will be given.

**IT-38 CONDITIONAL TENDER:**

The scope of work is clearly mentioned in the tender documents. The Contractor shall have to carry out the work in accordance with the detailed specifications. No conditions will be accepted. The conditional tender will be liable to be rejected.

**IT-39 ROYALTIES:**

Tenderer/Supplier shall have to pay, and furnish all receipts of materials to The Engineer-in-charge, whenever required.

**IT-40 INSURANCE:**

The successful Tenderer shall furnish insurance in accordance with clause No. GC-83 of the Conditions of Contract.



**IT-41 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, and 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.

**IT-42 The contractor shall have to intimate all the agencies for U.G. services like electrical cable, telephone cable, gas pipeline, water/ sewage / storm water lines prior to digging and well in advance.**

The contractor shall take utmost care during excavation to protect existing under ground Utilities. All water main lines/ water connections/ storm/sewage drains/house connections, electrical cable, telephone cable, gas pipe line or any other utility and structures shall be protect by contractor. However, if met during excavation, any damages caused shall be rectified by the contractor at the earliest and all the rectification cost shall be borne by the contractor. If the bill for rectification wrok (if carried out by the concerned agencies/ departments) is put by such agencies/department, the same shall be payable by the contractor, if not so it will be deducted and recovered from the running bills to be paid to contractor. Surat Municipal Corporation shall extend help to obtain details of underground and other utilities from respective agencies. The data available if any shall be informed to contractor. However, all responsibilities for acquiring information of utilities and intimation to all agencies shall lie with contractor.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE



**SURAT MUNICIPAL CORPORATION**  
**ANNEXURE-I**  
Refer to Cl. no. IT-10, Point no 2 (c)

Statement showing the works completed in the last seven years, i.e. for a period starting **from immediate last year to the passed seventh years**

Sr. No.	Name of Department/ Client	Name of work	Type of Structure	Tendered amount	Date of award of contract	Target date of completion of work as per contract and Date of completion of work.		Actual Amount of work completed	Time limit in year and months		Percentage & amount of penalty	Reasons for delay in completion of work	Completion Certificates given by competent Authority  (Name & Contact No.)	Type of Super Structure	Remarks
						Target Date	Completion Date		Original Y M	Extended Y M					
1.	2.	3.	4.	5.	6.	7a.	7b.	8	9a.	9b.	10.	11.	12	13	14

**Note :-** Original or attested Copies of Work Order and Completion certificates from client have to be attached.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**SURAT MUNICIPAL CORPORATION**

**ANNEXER-II**

Refer to Cl. no. IT-10, Point no 2 (d)

**Statement showing No. of similar works on hand**

Sr. No	Name of Department/ Client	Name of work	Type of Foundation	Type of Super Structure	Tendered amount	Date of award of contract	Target date of completion of work as per contract	Actual Amount of work done till date	Time limit in year and months	Competent Authority (Name & Contact No.)	Remarks
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.

**Note :-** Original or attested Copies of Work Order and Completion certificates from client have to be attached.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**SURAT MUNICIPAL CORPORATION  
ANNEXER-III**

Refer to Cl. no. IT-10, Point no 3 (a)

List of Machinery and Equipments to be deployed at said project, by the tenderer.

Sr. No.	Name	Nos.	Capacity or Type	Age	Condition	Ownership Status			Current Location	Remarks
						Presently owned	Leased	To be purchased		
1	2	3	4	5	6	7	8	9	10	11
	<b>Earth moving equipment</b>									
1	Excavators (various sizes)									
	<b>Equipment for hoisting and lifting</b>									
1	Tower crane									
2	Builder's hoist									
	<b>Equipment for concrete work :</b>									
1	Concrete batching plant									
	a) having capacity of 16 cum/hr.									
	b) having capacity of 8 cum/hr.									
2	Concrete pump									
3	Concrete transit mixer									
4	Concrete mixer (diesel)									
5	Concrete mixer (electrical)									
6	Digital way batch mixer									
7	Needle vibrator (electrical)									
8	Needle vibrator (petrol)									
9	Table vibrator Elect./petrol.									
	<b>Equipment for building work</b>									
1	Block making machine									
2	Bar bending machine									
3	Bar cutting machine									
4	Wood thickness planner									
5	Drilling machine									
6	Circular saw machine									
7	Welding generators									
8	Welding transformers									
9	Cube testing machines									
10	M.S. Pipes									
11	Steel shuttering									
12	Steel scaffolding									
13	Grinding / polishing machines									
	<b>Equipment for road works</b>									
1	Road Rollers									
2	Bitumen paver finishers									
3	Hot mix plant									
4	Spreaders									
5	Earth rammers									



Sr. No.	Name	Nos.	Capacity or Type	Age	Condition	Ownership Status			Current Location	Remarks
						Presently owned	Leased	To be purchased		
1	2	3	4	5	6	7	8	9	10	11
6	Vibratory road rollers									
	<b>Equipment for Transportation</b>									
1	Tipplers									
2	Trucks									
	<b>Pneumatic equipment</b>									
1	Air compressors (diesel)									
	<b>Dewatering equipment</b>									
1	Pump (diesel)									
2	Pump (electric)									
	<b>Power equipment</b>									
1	Diesel generators									
2	Pile foundation Equipment (rotary driller)									
	- In-house laboratory									
	- Others									

Note :- If owned attach Registration Book.  
If Rented attach agreement with the Party.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**SURAT MUNICIPAL CORPORATION**  
**ANNEXURE-IV**

Refer to Cl. no. IT-10, Point no 3 (b)

List of Main Technical Staff Employed by the firm as on Date

Sr. No.	Name	Designation	Educational Qualification	Experience in the field	Duration of Service in the firm

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

- Enclosure:-
- 1] Photograph
  - 2] Educational Certificates
  - 3] Experience Certificates
  - 4] Salary Proof / Documents

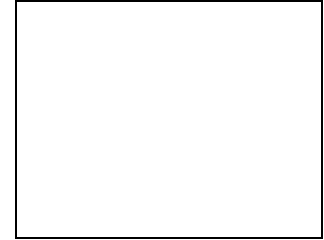
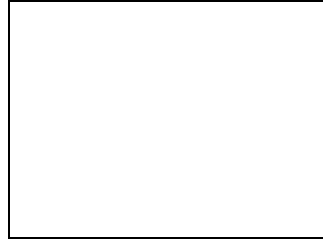
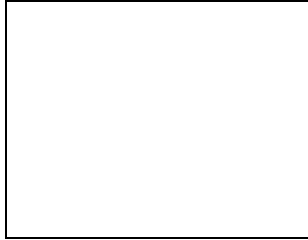


**ANNEXURE-V**

Refer to Cl. no. IT-10, Point no 3 (d)

**UNDERTAKING**

**Photographs of Partners, Managing Director**



1. I/We agree that the decision of the Surat Municipal Corporation in pre-qualification/selection of applicants/contractor, phasing of work and in any other project related matter, will be final and binding to me/us.
2. All the information and data furnished herewith and correct to my/our best of knowledge.
3. I/We agree that we have no objection if inquiries are made about our works, its related areas and any other inquiry regarding all details, projects and works listed by us in the pre-qualification document at any state.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:





**ANNEXURE-VI**

Refer to Cl. no. IT-10, Point no 3 (d)

**FORM - V**

**'DECLARATION OF THE CONTRACTOR'**

I / We hereby declare that I / We have made me / us thoroughly conversant with the local conditions regarding all materials and labour on which I / We have based my / our rates for this tender. The specifications and leads on this work have been carefully studied and understood before submitting this tender. I / We undertake to use only the best materials approved by the Engineer or his duly authorized representative during execution of the work and to abide by the decision.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**ANNEXURE-VII**

Refer to Cl. no. IT-10, Point no 3 (d)

**"AFFIDAVIT"**

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct. I also understand that in case of Wrongful / False information, corporation is entitled to take any civil and criminal punitive action against me/us.
2. 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 has been rescinded, during last five years prior to the date of this bid.
3. The undersigned hereby authorize(s) and request(s) any bank, person, authorities, government or public Ltd. Intuitions, firm or cooperation to furnish pertinent information deemed necessary and requested by the SMC to verify our statements or our competence and general reputation etc.
4. The undersigned understands and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the S.M.C
5. The S.M.C and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents and information submitted in connection with this bid and to seek clarification from our bankers and clients regarding any financial and technical aspects. This affidavit will also serve as authorization to any individual or authorized representative to any institution referred to in the supporting information, to provide such information deemed necessary and requested by representative of Surat Municipal Corporation to verify statements and information provided in the tender or with regard to the resources, experience and competence of the applicant.

\_\_\_\_\_  
Signed by an Authorized Officer of the Firm

\_\_\_\_\_  
Title of Officer

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Date

**\* To be given on Non-judicial stamp paper duly signed by authorized notary.**



## FORMAT FOR BANK GAURANTEE

To,  
The Chairman,  
SURAT SMART CITY DEVELOPMENT LIMITED  
Surat Municipal Corporation,  
SURAT.

[1] In consideration of the Terms and Conditions of an Agreement made between The Chairman, SURAT SMART CITY DEVELOPMENT LIMITED, Surat Municipal Corporation, and ..... (Contractor) (hereinafter called "Contractor") for the work of “ **Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission**” (Name of work) for the Earnest Money deposit for the due fulfillment by the contractor of the terms and conditions contained in the said agreement, We Bank of....., ..... (hereinafter referred to as the Bank) at the request of ..... (Name of Contractor) do hereby undertake to pay the Surat Municipal Corporation an Amount not exceeding **Rs.7,50,000.00 (i.e. 50% of Total E.M.D. Amount)** against any loss or damage caused to or suffered by Surat Municipal Corporation by reason of any breach of any term or condition contained in the said agreement by the said Contractor.

[2] We Bank of....., ..... do hereby undertake to pay the amount due and payable under this Guarantee without any demur merely on a demand from the Surat Municipal Corporation stating that the amount claimed in due by way of loss of damage caused to or would be caused to or suffered by the Surat Municipal Corporation by the reason of breach by the said contractor of any of the terms and conditions in the said agreement of by reason of the contractor failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee shall be restricted to an amount not exceeding **Rs.7,50,000.00 (50% of Total of Amt. of EMD)**

[3] We undertake to pay the Surat Municipal Corporation any money so demanded notwithstanding dispute or disputes raised by the contractor. In any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by under this bond shall be a valid discharge of our liability for payment there under and the contractor shall have no claim against us for making such payment.



- [4] We Bank of....., ..... further agree that the guarantee herein contained shall remain in full force and effecting during the period that would be taken for the performance of the said agreement and that under or by virtue of said agreement have been fully paid and its clime satisfied or discharged **or till** The Chairman, SURAT SMART CITY DEVELOPMENT LIMITED, Surat Municipal Corporation, clarified that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor and accordingly discharge this guarantee. Unless a demand or claim under this agreement is made on us in writing on or before **Dt.31/07/2017** we shall be discharged from all liability under this Guarantee thereafter.
- [5] We Bank of....., ..... further agree with the Surat Municipal Corporation that the Surat Municipal Corporation shall have the fullest liberty without our consent and without in any manner our obligations hereunder to vary and of the terms and conditions of the said agreement or to extend the time of performance by the said contractor from time to time or to postpone for any time or time to time any of the power exercisable by the Surat Municipal Corporation against the said contractor and to Forbes or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any variation or extension being granted to the said contractor or for any béarnaise, act or omission of the part of the Surat Municipal Corporation or any indulgence by the Surat Municipal Corporation to the said contractor or by any such matter or thing whatsoever which under the law relating to sureties would but for his provision have of a relieving us.
- [6] This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.
- [7] We Bank of ....., ..... lastly undertake not to revoke during its currency except with the previous consent of the Surat municipal Corporation in writing.
- [8] Not withstanding anything contained here-in-above our liability under this guarantee is restricted to **Rs.7,50,000.00 (50% Amt. of EMD)** shall remain in force until .....unless a claim or demand under the guarantee is made against us in writing and received on or before **Dt.31/07/2017** all your rights under the said guarantee shall be forfeited and we shall be relieved discharged from all liabilities there under.

Seal, stamp and signature  
of Bank's authorized signatory



## **5.0 GENERAL CONDITIONS OF CONTRACT:**

### **GC-01 DEFINITIONS AND INTERPRETATIONS:**

1. In the contract documents, as herein defined the following words and expressions used shall unless, repugnant to the subject or context thereof, have the following meaning assigned to them.
2. The “owner” shall mean The SURAT MUNICIPAL CORPORATION, Surat represented by City Engineer / Additional City Engineer / Divisional Head of the department or any other officer authorized by the Municipal Corporation.
3. The “Contractor” shall mean the persons, firm, or company whose tender has been accepted by the owner and includes his legal representative, successors and permitted assignees.
4. The “Engineer-in-charge” shall mean the technical representative of SURAT MUNICIPAL CORPORATION, Surat viz. Hydraulic Engineer or his technical subordinates who are authorized to carry out the work and having such technical powers and responsibilities that may be given by the owner from time to time.
5. The “Engineer-in-charge’s representative” shall mean any Engineer or Asstt. to the Engineer-in-charge designated from time to time by Engineer-in-charge to perform duties set forth in the Tender documents whose authority shall be notified in writing to the Contractor by the Engineer-in-charge.
6. The “Tender” shall mean the offer or proposal of the Tenderer submitted in the prescribed form setting forth the prices for the work to be performed and the details thereof.
7. The “Contract price” shall mean total money payable to the Contractor under the contract documents.
8. The “Addend” a shall mean the written or graphic notices prior to submission of tender which modify or interpret the contract documents.
9. The “Contract Time” shall mean the number of consecutive calendar days/ months for the completion of work as stated in the executed contract agreement.
10. The “Contract” shall mean agreements between the parties for the execution of works including therein all contract documents.
11. The “Tender document” shall mean Designs, Drawings, specifications, agreed variations, if any, and such other documents constituting the tender and acceptance thereof.
12. The “Sub-Contractor” means any person, firm or company (other than the Contractor) to whom any part of the work has been entrusted by the Contractor with the written



consent of the Engineer-in-charge and the legal personnel representative, successors and permitted assignees of such person, firm or company.

13. The “Specifications” shall mean all directions, the various technical specifications, provisions and requirements attached to the contract which pertain to the method and manner of performing the work to the quality of the work and the materials to be furnished under the contract for the work and any order(s) or instruction(s) there under. It shall also mean the latest Indian Standards Specifications for or relative to the particular work or part thereof, so far as they are not contrary to the Tender specifications or I.S. specifications and in absence of any tender specifications, the specifications of any other country applied in India as a matter of Standard Engineering practice and approved in writing by the Engineer-in-charge with or without modifications.
14. The “Drawing” shall include maps, plans, tracings or prints thereof with any modifications approved in writing by the Engineer-in-charge and such other drawings, as may from time to time be furnished or approved in writing by the Engineer-in-charge in connection with the work.
15. The “work” shall mean the works to be executed in accordance with the context or the part thereof as the case may be and shall include extra, additional altered or substituted works as required for the purpose of the contract. It shall mean the totality of the work by expression or implication envisaged in the contract and shall include all material, equipment and labor required for or relative or incidental to or in connection with the commencement, performance and completion of any work and/or for incorporation in the work.
16. The “Permanent work” means works which will be incorporated in and form part of the work to be handed over to the owner by the Contractor on completion of the contract.
17. The “Temporary work” shall mean all temporary works of every kind required in or about the execution, completion and maintenance of the work.
18. The “site” shall mean the land and other place on, under or through which the work is to be carried out. Any other lands or places provided by the Municipal Corporation for the purpose of the contract together with any other places designated in the contract as forming part of the site.
19. “The Construction Equipment” means all appliances/equipments of whatever nature required in or for execution, completion or maintenance of work or temporary works(as hereinafter defined) but does not include materials or other things intended to form or forming part of the permanent work.
20. “Notice in writing” or “written Notice” means a notice written, typed or printed form delivered personally or sent by registered post to the latest known private or business address at Registered office of the Contractor.
21. The “Alteration / Variation order” means an order given in writing by the owner within the provisions of the Contract.



22. The “Final Test Certificates” shall mean the final test Certificate issued by the Engineer-in-charge when the work has been completed to his satisfaction.
23. The “Completion Certificate” shall mean a certificate to be issued by the Engineer-in-charge when the work has been completed to his satisfaction.
24. The “Final Certificate” shall mean the final certificate issued by the Engineer-in-charge after the work is finally accepted by the owner.
25. “Defect Liability Period” shall mean the specified period between the issue of completion certificate and the final certificate as specified in the tender.
26. “Approved” shall mean approved in writing including subsequent modification in writing of previous verbal approval and “Approval” means approved in writing including as aforesaid.
27. “Letter of Acceptance” shall mean a letter to the Tenderer, intimating that the tender has been accepted in accordance with provisions contained therein.
28. “Order” and “Instruction” shall respectively mean any written order or instruction given by the Engineer-in-charge within the scope of his powers in terms of the contract.
29. “Running Account Bill” shall mean a Bill for the payment of “On Account” money to the Contractor during the progress of work on the basis of work done and the non-perishable materials to be incorporated in the work supplied by the Contractor.
30. “Security Deposit” shall mean the deposit to be held by the owner as security for the due performance of contractual obligations.
31. “Retention Money” shall mean the money retained from R.A. bill for due completion of work.
32. Unless otherwise specifically stated, the masculine gender shall include the feminine and neutral genders and vice versa and the singular shall include the plural and vice versa.

#### **GC-02 LOCATION OF SITE AND ACCESSIBILITY:**

The site of works is within the limits of SURAT MUNICIPAL CORPORATION It is served by all weather roads and Western Railways Broad Gauge line. The intending Tenderer should inspect the site and make him familiar with site conditions and available communication facilities.

Non availability of access/roads shall in no case be the cause to condone any delay in the execution of work or be the cause for any claims or extra compensation.

#### **GC-03 SCOPE OF WORK:**

The scope of work shall be in accordance with General conditions of contract, Special conditions of contract, memorandum, schedule of quantity and rates, General Specifications of materials, item wise detailed technical specifications, various sections and subsections of this tender document. The Contractor shall provide all necessary materials equipment and labour etc. for the



execution of the work till completion. All materials for the work shall be approved by the Engineer-in-charge prior to procurement and use.

Owner at his discretion may endeavor to provide water to the Contractor at the owner's source of supply at one point at the rate charged for such works.

The Contractor shall make his own arrangement for the distribution pipe net works from the source of supply after getting prior permission for the same from the Engineer-in-charge. Supply of water shall not be free and the necessary charges as fixed by the local body shall have to be paid by the Contractor.

However, owner does not guarantee the supply of water and this does not relieve the Contractor of his responsibility in making his own arrangements and for the timely completion of the work as stipulated.

**POWER SUPPLY:**

The Contractor shall have to make his own arrangements for power supply.

**LAND FOR CONTRACTOR'S FIELD OFFICE, GODOWN AND WORKSHOP:**

Owner will not be in a position to provide land required for Contractor's field office, go down and workshop. The Contractor shall have to make his own arrangement for the same.

**GC-04 RULING LANGUAGE:**

The language according to which the Contractor shall be instructed and interpreted shall be English. All entries in the contract documents and all correspondence between the Contractors and the Municipal Corporation or the Engineer shall be in English. All dimensions for the materials shall be given in SI/Metric units only.

**GC-05 INTERPRETATION OF TENDER DOCUMENT:**

- (1) The provision of the General conditions of contract and special conditions of contract shall prevail over those of any documents of the contract unless specifically provided otherwise. Should there be any discrepancy, inconsistency, error or omission in the several documents forming the contract, the matter may be referred to the Engineer-in-charge for his instructions and decisions. The Engineer-in-charge's decision in such case shall be the final and binding to the Contractor.
- (2) Works shown upon the drawings but not described in the specifications or described in the specific specifications without showing on the drawings shall taken as described in the specifications and shown on the drawings.
- (3) The heading and the marginal notes to the clauses of those general conditions of contract or to the specifications or to any other part of tender documents are solely for the purpose of giving a concise indication and not a summary of contents thereof or be used in the interpretation or construction thereof of the contract.
- (4) Unless otherwise stated specifically in this contract documents the singular shall include the plural and vice versa wherever the context so requires. Works implementing persons





shall include relevant corporate companies/registered associations / body of individual / firm of partnership etc.

- (5) Notwithstanding the sub division of the documents into separate sections and volumes every part of such shall be supplementary to and complementary of every other part and shall be read with and into the context so far as it may be practicable to do so.
- (6) Where any portion of the conditions of contract is repugnant to or in variance with any provisions of the special conditions of contract, then, unless different intension appears the provisions of the special conditions of contract shall be deemed to override the provisions of general conditions of contract and shall to the extent of such repugnancy or variance prevail.
- (7) The materials, design and workmanship shall satisfy the latest relevant I.S.S. and codes referred to. If additional requirements are shown in the specifications, the same shall be satisfied over and above I.S.S. and Codes.
- (8) If the specifications mention that the contract shall perform certain work or provide certain facilities, it will mean that the Contractor shall do so at his own cost.
- (9) **CONTRACTOR TO OBTAIN HIS OWN INFORMATION:**  
The correctness of the details given in the tender documents is not guaranteed. The Contractor shall independently obtain all necessary information for making the tender. The Contractor shall be deemed to have examined the contract documents to have generally obtained his own information in all matters that might affect carrying out of the work or the Tenderer rates. Any error in description of quantity or commission there from shall not vitiate the contract or release the Contractor from executing the work comprised in the contract according to the Drawings and specifications at the tenderer rates. He is deemed to have known the scope, nature and magnitude of the work and the requirements of materials and labor involved and as to what all works he has to complete in accordance with the contract whatsoever be the defects, omission or errors that may be found in the surroundings to have satisfied himself to the defects, omission or errors that may be found in the contract documents. The Contractor shall be deemed to have visited the site and the surroundings to have satisfied himself to the nature of all existing structures, if any, and also as to the nature and the conditions of Railways, roads, bridges and culverts, means of transport and communication whether by land, air or water and as to possible interceptions thereto and the access and agrees from the site, to have made inquires, examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials, the available accommodation as to whatever required the depicts and such other buildings as may be necessary for executing and completing the work to have local independent inquires as to the subsoil water and variation thereof, storms, prevailing winds, climatic conditions and all other similar matters affecting the work. He is deemed to have acquainted himself as to his liability for payment of Government taxes, custom duty and other charges.

Any neglect or failure on the part of the Contractor in obtaining necessary and reliable information upon the forgoing or any other matters affecting the contract shall not relieve him from any risks or the entire responsibility from completion of the work at the tendered rates and time in strict accordance with the contract documents.



No verbal agreement or inference from conversation with any officer or employees of the owner before, during or after the execution of the contract agreement shall in any way affect or modify the terms of obligations herein contained.

**GC-06 CONTRACTOR TO UNDERSTAND HIMSELF FULLY:**

The Contractor by tendering shall be deemed to have satisfied himself, as to considerations and circumstances affecting the tender price as to the possibility of executing the works as shown and described in the contract and to have fixed his prices according to his own view on these matters and to have understand that no additional allowances except as otherwise expressly provided, will afterwards, be made beyond the contract price. The Contractor shall be responsible for any misunderstanding or incorrect information given in writing by the Engineer.

**GC-07 ERROR IN SUBMISSION:**

The Contractor shall be responsible for any errors or omissions in the particulars supplied by him. Whether such particulars have been approved by the Engineer or not, provided that such discrepancies, errors or omissions be not due to inaccurate information or particular furnished in writing to the Contractor by the Municipal Corporation or the Engineer.

**GC-08 SUFFICIENCY OF TENDER:**

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness of the tender rates which rates shall, except as or other wise provided for, cover all the Contractor's liabilities obligations set further or implied in the contract for the proper execution of work for compliance with requirements of Articles GC-19 thereof.

**GC-09 DISCREPANCIES:**

The drawings and specifications are to be as mutually explanatory of each other, detailed drawings being followed in preference to small-scale drawings and figures, dimension in preference to scale and special condition in preference to general conditions. Special direction or dimension given in the specifications shall supersede all else should any discrepancies however, appear or should any misunderstanding arise as to the meaning and intent of the said specifications or drawings or as to the dimension or the quality of the materials or the due and proper execution of the works, or as to the measurement or quality and valuation of the works executed under this contract or as extra there upon the same shall be explained by the Engineer-in-charge and his explanation shall subject to the final decision of the Hydraulic Engineer in case reference be made to him, be binding upon the Contractor shall execute the work according to such explanation (subject to aforesaid) and without addition to or deduction from the contract and shall also do all such works and things necessary for the proper completion of the works as implied by the drawings and specifications, even though such works and things are not specially shown and described in said specifications. In cases where no particular specifications are given for any article to be used under the contract relevant specifications of the Indian Standard Institution shall apply.



#### **GC-10 PERFORMANCE GUARANTEE: (SECURITY DEPOSIT)**

The total Security Deposit is 4% (Four) percent of contract value and shall be as under:

**The successful tenderer shall have to pay as initial security deposit at 2% (two) percent of the tendered amount. Security Deposit (2%) shall be in cash or in the form of Demand Draft/ Bank Guarantee / Fixed deposit of nationalized bank or scheduled banks like -IDBI, HDFC, ICICI and AXIS banks issue in favour of "SURAT SMART CITY DEVELOPMENT LTD." payable at Surat payable at Surat. The duration of F.D.R shall be the Scheduled time required to complete the work plus twelve months of defect liability period.**

The remaining amount of the Security Deposit i.e. 2% of tendered amount shall be recovered from the running bills 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. The amount recovered from the running bills shall not be allowed to be transferred in the form of bank guarantee

The remaining 50% (2% of Tendered Amount) of the amount so deducted from R.A.Bills will be allowed for conversion in the form of interest bearing fixed deposit receipt, issued in favour of **"SURAT SMART CITY DEVELOPMENT LTD." payable at Surat** by a Nationalized Bank located at Surat only. The initial security deposit 2% submitted will be refunded after payment of final bill and remaining 2% of security deposit deducted from the running bill will be refunded only after the expiry of defect liability period and after payment of final bill, and after rectifying the defects found if any, within defect liability period as intimated by S.M.C

If the security deposit is not paid within 15 days from the date of work order then the 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, the contract already accepted shall be considered as cancelled and his Earnest money deposit shall be forfeited.

**If S.D is submitted in the form of FDR, than in that case stamp paper for entering in to the agreement shall be of value equal to 4.25 % of SD amount.**

#### **GC-11 INSPECTION OF WORK:**

- 1) The Engineer-in-charge will have full power and authority to inspect the work at any time wherever in progress either on the site or at Contractor's any other manufactures workshop or factories wherever situated and the Contractor shall afford for Engineer-in-Charge every facility and assistance to carry out such inspection.

Contractor or his authorized representatives shall at all time during the usual working hours and all other times so notified, remain present to receive orders and instructions. Orders given to Contractor's representative shall be considered to have the same force as if they had been given to the Contractor himself. Contractor shall give not less than 7 days notice in writing to the Engineer-in-charge before covering up or otherwise placing beyond reach of inspection and measuring any work in order that the same may be inspected and measured. In the event of breach of the above the same shall be recovered at Contractor's expenses for carrying out such inspection or measurement.



- 2) No material shall be dispatched from contract store on site of work before obtaining approval in writing of the Engineer-in-charge. Contractor shall provide at all time during the progress of work and maintenance period proper means of access with ladders, gangways etc. and the necessary attendance to move and adopt as directed for inspection or measurement of work by Engineer-in-charge.

**GC-12 DEFECT LIABILITY:**

- (1) Contractor shall guarantee the work for a period of 12 months from the date of issue of completion certificate. Any damage or defect that may arise or that may remain undiscovered at the time of completion certificate connected in any way with the equipment or materials supplied by him or in the workmanship be rectified or replaced by Contractor at his own expenses as desired by Engineer-in-charge or in default may cause the same to be made good by other agency and deduct expenses for which the certificate Engineer-in-charge shall be final, from any sums that may then or any time thereafter become due to the Contractor of sale thereof or of a sufficient portion thereof.
- (2) From the commencement to completion of work Contractor shall take full responsibility for the cause of the work including all temporary works and in case any damage, loss or injury shall happen to work or any part thereof or to any temporary works from any cause whatsoever, the Contractor shall at his cost repair and make good the same so that at completion, work shall be in good order and confirm in every respect with the requirements of contract and as per the instructions of the Engineer-in-charge.  
If at any time before the work is taken over, the Engineer-in-charge shall –
  - (a) Decide that any work done or materials used by the Contractor are defective or not in accordance with contract or that work of any portion there of is defective or do not fulfill the requirements of contract (all such materials being hereinafter called defects in this clauses (b) ), as soon as reasonably practicable give to the Contractor notice in writing of the said defect specifying particulars of the defects alleged to exist or to have occurred, then Contractor shall at his own expenses and with all speed make good the defects so specified.
  - (b) In case Contractor fails to do so, owner may take at the cost of the Contractor, such steps as may be in all circumstances are reasonable to make good such defects. The expenditure so incurred by the SURAT MUNICIPAL CORPORATION will be recovered from the amount due to Contractor. The decision of Engineer-in-charge with regards to the amount to be recovered from Contractor will be final and binding on the Contractor.

**GC-13 POWER OF ENGINEER-IN-CHARGE TO GIVE FURTHER INSTRUCTION:**

The Engineer-in-charge shall have the power and authority from time to time and at all times to give further instructions and directions as may appear to him necessary or proper for the guidance of Contractor and the works and efficient execution of the works according to the terms of the specifications and the Contractor shall receive, execute, obey and be bound by the same, according to the true intent and meaning thereof, as fully effectually as thought the same had accompanied or had been mentioned or referred to in specifications. No work which radically changes the original nature of the contract shall be ordered by the Engineer-in-charge and in the event of any deviation being ordered, which in the opinion of the Contractor changes the original nature of the contract, the Contractor shall nevertheless carry it out and any disagreement as to the nature of work and the rate to be paid thereof shall be resolved. The time of completion of



works, in the event of any deviations, resulting in additional cost over the contract sum being ordered then be extended or reduced reasonable by the Engineer-in-charge. The Engineer-in-charge's decision in the case shall be final and binding.

**GC-14 PROGRAMME:**

The time allowed for execution of works shall be essence of the contract. The contract period shall commence from date of Notice of intimation to proceed. The tenderer at the time of submitting his tender shall indicate the construction schedule; the month-wise program required for the execution of the works and shall confirm the same within fourteen (14) days of the acceptance of his Tender. The Contractor shall provide to the Engineer-in-charge a detailed program of time schedule for execution of the works in accordance with specifications and the completion date. The entire program to be finalized by the Contractor has to confirm to the execution period mentioned along with the Bill of Quantities in the Tender Documents. The Engineer upon scrutiny of such submitted program by Contractor, shall examine suitability of it to the requirement of contract and suggest modifications, if found necessary.

**GC-15 SUBLETTING OF WORKS:**

No part of the contract nor any share or interest thereon shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any firm or corporation whatsoever except as provided for in the succeeding sub-clause without the consent in writing of the owner.

**GC-16 SUB-CONTRACTORS FOR TEMPORARY WORKS ETC.**

The owner may give written consent to sub Contractors for execution of any part of the work at the site being entered upon by the Contractors provided each individual sub Contractor is submitted to the Engineer-in-charge before being entered in to and approved by him. List of sub Contractors is to be supplied. Notwithstanding any subletting with such approval as aforesaid and notwithstanding the Engineer-in-charge shall have receive copies of any sub Contractors, the Contractors shall be and shall remain solely responsible for the quality and proper expeditions and execution of the works and the performance of all the conditions of contract in all respect as if such submitting or sub contracting had not taken place and as if such work had done directly by the Contractor.

**GC-17 TIME FOR COMPLETION:**

- 1) The work covered under this contract shall be commenced from the date Contractor is served with a notice to proceed with the work and shall be completed before the date as mentioned in the time schedule of work. The time is the essence of the contract and unless the same is extended as mentioned in clause No. GC-18 (extension of time). The Contractor will be penalized for the delay.
- 2) The general time schedule for construction is given in the tender document. Contractor shall prepare a detailed weekly or monthly construction program in consultation with Engineer-in-charge soon after the agreement and the work shall be strictly executed accordingly. The time for construction given includes, the time required for testing, rectification if any, retesting and completion in all respects to the entire satisfaction of the Engineer-in-charge.



**GC-18 EXTENSION OF TIME:**

If the contractor shall desire an extension of the time for conviction 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 the Engineer-in-charge within 30 days from the date on which he was hindered as aforesaid or on which the cause for asking for extension occurred. The Engineer-in-charge if in his opinion considers that there are reasonable grounds for granting an extension may refer to the owner for considering grant of such extension being necessary or proper. The decision of the owner in this matter shall however be final.

**GC-19 CONTRACT AGREEMENT:**

The successful Tenderer shall when called upon to do so, enter into and execute the contract Agreement within (15) fifteen days of the Notice of Award. It should be incumbent on the Contractor to pay the stamp duty and the legal charges for the completion of the contract agreement as per legal requirements.

**GC-20 PENALTY FOR DELAY:**

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 SURAT MUNICIPAL CORPORATION The amount of penalty for delay 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 contact and forfeiture of all security for performance.

**BAR CHART :**

The successful tenderer shall have to submit the progress bar-chart within fifteen days after the contract, and the contractor should work as per the approved bar-chart, failing the contractor shall have to pay the compensation for delay at the rate of 0.2% per day.

**GC-21 FORFEITURE OF SECURITY DEPOSIT:**

Whenever any claims arise against the Contractor for the payment of a sum of money out of or under the contract, the owner shall be entitled to recover such sum by appropriating in part or whole, the security deposit of the Contractor. In case the security deposit is insufficient the balance recoverable shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor. The Contractor shall pay to the owner on demand any balance remaining due.

**GC-22 ACTION OF FORFEITURE OF SECURITY DEPOSIT:**

In any case in which under any clause or clauses of the contract the Contractor shall have forfeited the whole of his security deposit or have committed a breach of any of the terms contained in this contract, the owner shall have power to adopt any of the following courses as he may deem best suited to his interest.

- (A) To rescind the contract (of which rescission notice to the Contractor under the hand of the owner shall be conclusive evidence) in which case, the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the owner.



- (B) To employ labor and to supply materials to carry out the balance work debiting Contractor with the cost of labor employed and the cost of materials supplied for which a certificate of the Engineer-in-charge shall be final and conclusive against the Contractor and 10% costs on above to cover all departmental charges and crediting him with the value of work done at the same rates as if it has been carried out by the Contractor under the terms of his contract. The certificate of Engineer-in-charge as to the value of the work done shall be final and conclusive against the Contractor.
- (C) To measure up the work of the Contractor and to take such part hereof as shall be unexecuted out of his hand give it to another Contractor to complete. In this case the excess expenditure incurred than what whole have been paid by the original Contractor, if the said work had been executed by him shall be paid to the original Contractor, if the said work had been executed by him shall be earnest and paid by the original Contractor and shall be deducted from any money due to him by the owner under the contract or otherwise and or the excess expenditure the certificate of the Engineer-in-charge shall be final and conclusive.

In the event of any of the above course being adopted by the owner, the Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or produced any materials or entered into any agreement so or made by advance on account of or with a view to the execution of the work of the performance of the contract. In such case the Contractor shall not be entitled to recover or be paid by sum for any work actually performed under this contract unless the Engineer-in-charge will certify in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid the value so certified. In the event of the owner putting in force powers as stated in a,b,c above vested in him under the preceding clause, he may if he so desires, take possession of all or any tools and plant, materials and stores in or upon the work or the site thereof belonging to the Contractor, or procured by him and intended to be used for the execution of the work or any part thereof paying or allowing for the same in account at the contract rates to be certified by the Engineer-in-charge whose certificate thereof shall be final otherwise the Engineer-in-charge may give notice in writing to the Contractor or his representative requiring him to remove such tools, plant, materials or stores from the premises within the time specified in the notice and if the Contractor fails to comply with any such notice, the Engineer-in-charge may remove them at the Contractor's expense or sell them by auction or private sale on account of the date, time or place of the sale the certificate of Engineer-in-charge as to the expenses of any such removal and the amount of the proceeds and the expenses of any such sale shall be final and conclusive against the Contractor.

**GC-23 NO COMPENSATION FOR ALTERNATION OR RESTRICTION OF WORK:**

If at any time from the commencement of work, the owner shall for any reasons whatsoever not require the whole or part thereof specified in the tender to be carried out, the Engineer-in-charge shall give notice in writing 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 execution of work in full but which he did not derive in consequence of the full amount of the work not having been carried neither shall he have claim for compensation by reason if any alternations having been made in original specifications, drawings, designs and instruction which shall involve any curtailment of the work as originally contemplated.



When the Contractor is a partnership firm, the prior approval in writing of The SURAT MUNICIPAL CORPORATION shall be obtained before any change is made in the constitution of the firm, where the Contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall, likewise be obtained before sub Contractor enters into any agreement with other parties where under the reconstituted firm would have the right to carry out the work hereby undertaken by the Contractor. In either case if prior approval as aforesaid is not obtained the contract shall be deemed to have been allotted in contravention of subletting clause hereof and the same action may be taken and the same consequence shall ensure as provided in the sub-letting clause.

**GC-24 IN EVENT OF DEATH OF CONTRACTOR:**

Without prejudice to any of the right or remedies under the contract, if the Contractor dies, the owner shall have the option of terminating the contract without compensation to the Contractor.

**GC-25 MEMBER OF THE OWNER NOT INDIVIDUALLY LIABLE:**

No official or employee of the owner shall in any way be personally bound or liable for the acts or obligations of the owner under the contract or answerable for any default or omission in the observance, or performance of the acts, matters or things which are herein contained.

**GC-26 OWNER NOT BOUND BY PERSONAL REPRESENTATIONS:**

The Contractor shall not be entitled to any increase on the schedule of rates or any other rights or claims whatsoever by reason of representation, explanation or statement or alleged representation, promise or guarantees given or alleged to have been given to him by any person.

**GC-27 CONTRACTOR'S & OWNER'S SITE OFFICES:**

The Contractor shall provide and maintain an office at the site for the accommodation of his agent and staff and such office shall be opened at all reasonable hours to receive instructions, notice or other communications.

The Contractor shall have an office adjacent to the site of work at a place as may be approved by the Engineer-in-charge where all directions and notices of any kind whatsoever, which the client or Engineer-in-charge or his representative may desire to give to the contractor in connection with the contract, may be left and the same when left or sent by post to such office or delivered to the contractor's authorized agent or representative, shall be deemed to be sufficiently served upon the Contractor.

**GC-28 CONTRACTOR'S SUBORDINATE STAFF AND THEIR CONDUCT:**

- 1) The Contractor on award of the work shall name and depute a qualified Engineer, having experience of carrying out work of similar nature, to whom equipments, materials, if any, shall be issued and instructions for work given. The Contractor shall also provide to the satisfaction of Engineer-in-charge sufficient and qualified staff to superintend the execution of the work, competent sub agents, foremen and leading hands including those specially qualified by previous expeditions to supervise the type of works comprised in the contract in such manner as will ensure work of the best quality and expeditions





working. If in the opinion of the Engineer-in-charge additional properly qualified supervision staff is considered necessary it shall be employed by the Contractor without additional charge on account thereof. The Contractor shall ensure to the satisfaction of the Engineer-in-charge that sub Contractor, if any shall provide competent and efficient supervision over the work entrusted to them.

- 2) If and whenever any of the Contractor's or sub Contractor agents, sub-agents, assistance foreman or other employees shall in the opinion of Engineer-in-charge, guilty of any misconduct or be incompetent or insufficiently qualified or intelligent in the performance of their duties or that in opinion of the owner or Engineer-in-charge, it is undesirable for administrative or any other reason for person or persons to be employed in the works, the Contractor, if so directed by the Engineer-in-charge, shall at once remove person or persons from employment thereon. Any person or persons so removed shall not again be reemployed in connection with the works without the written permission of the Engineer-in-charge. Any person so removed from the works shall be immediately replaced at the expenses of the Contractor by a qualified and competent substitute. Should the Contractor be required to repatriate any person removed from the works he shall do so and shall bear all costs in connection therewith.
- 3) The Contractor shall be responsible for the proper behavior of all the staff, workmen and others shall exercise proper control over them and in particular and without prejudice to the same. Generally, the Contractor shall be bound to prohibit and prevent any employee from trespassing or acting in any way detrimental or prejudicial to the interest of the community of the properties or occupiers of land and properties in the neighborhood and in the event of such employees so trespassing, the Contractor shall be responsible therefore and relieve the owner of all consequent claims, actions for damages or injury or any other grounds whatsoever. The decision of the Engineer-in-charge upon any matter arising under this clause shall be final.
- 4) If and required by the Owner the Contractor's personnel entering upon the owner's premises shall be properly identified by badges of a type acceptable to The SURAT MUNICIPAL CORPORATION which must be worn at all times on owner's premises.

#### **GC-29 TERMINATION OF SUB CONTRACTOR BY OWNER:**

If any sub-Contractor engaged upon the works at the site executes any work which in the opinion of Engineer-in-charge is not in accordance with the contract documents, The SURAT MUNICIPAL CORPORATION may give written notice to the Contractor to terminate such sub contract and the Contractor upon the receipt of such notice shall terminate such sub-contract and the later shall forthwith leave the works failing which the owner shall have the right to remove such sub Contractors from the site.

No action taken by the owner under the above clause shall relieve the Contractor of his liabilities under the contract or give rise to any right to compensation, extension of time or otherwise.

#### **GC-30 POWER OF ENTRY:**

If the Contractor shall not commence the work in the manner previously described in the contract documents or if he shall, at any time, in the opinion of Engineer-in-charge,



- (a) Fail to carry out works in conformity with the documents or
- (b) Fail to carry out the works in accordance with the time schedule or
- (c) Substantially suspend work or the works for a period of fourteen days without authority from Engineer-in-charge.
- (d) Fail to carry out and execute the work to the satisfaction of the Engineer-in-charge or
- (e) Fail to supply sufficient or suitable construction plant, temporary works, labour, materials, or things or
- (f) Commit breach of any other provisions of the contract on his part to be performed or observed or persist in any of the above mentioned breach of the contract for fourteen days after notice in writing shall have been given to the Contractor by the Engineer-in-charge requiring such breach to be remedied or
- (g) Abandon the work or
- (h) During the continuance of the contract becomes bankrupt, makes any arrangement or compromise with his creditors, or permits any execution to be levied or go into liquidation whether compulsory or voluntary then in any such case :

The owner shall have the power to enter upon the works and take possession thereof and of the materials, temporary works, constructional plant and stock therein and to revoke the Contractor's license to use the same and to complete the works by his agents, other Contractor or workman or to relate the same upon any terms and to such other person, firm or corporation as the owner in his absolute discretion may think proper to employ and for the purpose aforesaid to use or authorities the use of any materials, temporary works constructional plant and stock as aforesaid without making payment or allowance to the Contractor for the said materials other than such as may be certified in written by the Engineer-in-charge to be reasonable and without making any payment or allowance to the Contractor for the use of said temporary works, constructional plant and stock or being liable for any loss or damage thereto. If the owner shall by reason of his taking possession of the works or of the work being got completed by other Contractor incur excess certified the Engineer-in-charge shall be deducted from any money, which may be due for the work done by the Contractor under the contract and not paid for. Any deficiency shall forthwith be made good and paid to the owner by the Contractor and the owner shall have power to sell in such manner and for such price as he may think fit all or any of the construction plant materials etc. constructed by or belonging to and recoup and retain the said deficiency or any part thereof out of the proceeds of the sale.



### **GC-31 CONTRACTOR'S RESPONSIBILITY WITH THE OTHER CONTRACTOR AND AGENCIES**

Without repugnance to any other condition, it shall be the responsibility of the Contractor executing the work of civil construction to work in close cooperation and coordinate the work with other Contractors or their authorized representatives and the Contractor will put a joint scheme with the concurrence of other Contractor showing the arrangements for carrying his portion of the work to the Engineer-in-charge and get the approval. The Engineer-in-charge before approving the joint scheme will call the parties concerned and modify the scheme if required. No claim will be entertained on account of the above. The Contractor shall conform in all respects with the provisions of any statutory regulations, ordinances or by laws of any local or locally constituted authorities or public bodies which may be applicable from time to time to works or any temporary works. The Contractor shall keep the owner indemnified against all penalties and liabilities of every kind arising out of non-adherence to such statutes, ordinance, laws, rules, regulations, etc.

### **GC-32 OTHER AGENCIES AT SITE:**

The Contractor shall have to execute the work in such place and condition where other agencies will also be engaged for other works, such as site grading, filling and leveling, electrical and mechanical engineering works, etc. No claim shall be entertained for works being executed in the above circumstances.

### **GC-33 NOTICES:**

Any notice under this contract may be served on the Contractor or his duly authorized representative at the job site or may be served by registered post direct to the official address of the Contractor. Proof of issue of any such notice could be conclusive of the Contractor having been duly informed about all contents therein.

### **GC-34 RIGHT OF VARIOUS INTERESTS:**

The owner reserves the right to distribute the work amongst more than one Contractor. Contractor shall co-operate and aforesaid reasonable opportunity to other Contractors for access to the works, for the carriage and storage of materials and execution of their works.

Wherever the work is being done by any department of the owner or by other Contractor employed by the owner is contingent upon work covered by this contract, the respective rights of the various interests shall be determined by Engineer-in-charge to secure the completion of various portion of the work in general harmony.

### **GC-35 TERMS OF PAYMENT:**

The payment of Bills shall be made progressively according to the rules and practice followed by the Municipal Corporation. The progressive payment unless otherwise provided in the contract agreement or subsequently agreed to by the parties shall be made generally monthly on submission of all bills by the Contractor in prescribed form in an amount according to the value of the work performed less the aggregate of previous progressive payments and as required by clause GC-36 (Retention money) herein. All such progressive payment shall be regarded as payment by way of advance against final payment.



Payment for the work done by the contractor will be based on the measurement at various stages of the work in accordance with the condition at Clause GC-75 (measurement of work in progress)

#### **GC-36 RETENTION MONEY:**

Pursuant to Clause GC-35 (Terms of Payment) on all money due to the contractor for work done, Municipal Corporation will hold as retention money of **Five percent (5%) of the value of work done**. The retention money will not normally be due for payment until the completion of the entire work and till such period the work has been finally accepted by the Municipal Corporation and completion certificate issued by the Municipal Corporation in pursuant to Clause No. GC-81 (Completion Certificate). The Retention money such deducted from R.A. bill shall be released with the final bill only. However, after the assurance of completion certificate, Municipal Commissioner may at its own discretion and having considered the Contractor's performance and diligence during the contract time, allow the retention money to converted into a Bond as stipulated in the Clause GC-10 (Performance Bond {Security Deposit}).

#### **GC-37 PAYMENT DUE FROM THE CONTRACTOR:**

All costs, damages or expenses, for which under the contract the Contractor is liable to the Municipal Corporation deducted by the Municipal Corporation from any money due or becoming due to the Contractor under the contract or from any other contract with the Municipal Corporation, or may be recovered by action of law or otherwise from the Contractor.

#### **GC-38 CONTINGENT FEE:**

- 1) The Contractor warrants that he has not employed any person to solicit or secure the contract upon any agreement for a commission, percentage, brokerage or contingent fee. Breach of this warranty shall give the Municipal Commissioner the right to cancel the contract or to take any other measure, as the Municipal Commissioner may deem fit. The warranty does not apply to commission payable by the Contractor to establish commercial or selling agent for the purpose of securing business.
- 2) No officer or employee of the Municipal Corporation be admitted to any share or part of his contract or to any benefit that may rise there from.

#### **GC-39 BREACH OF CONTRACT BY CONTRACTOR:**

If the Contractor fails to perform the work under the contract with due diligence or shall refuse or neglect to comply with instructions given to him by the Engineer-in-charge in accordance with the contract or shall contravene the provisions of the contract, the SURAT MUNICIPAL CORPORATION may give notice in writing to the Contractor to make good such failure, neglect or contravention. Should the Contractor fail to comply with such written notice within twenty eight (28) days of receipt, if the Municipal Commissioner shall think fit, it shall be lawful for the Municipal Corporation without prejudice to any other rights may have under the contract to terminate the contract for all or part of the works, and to make any other arrangements. It shall deem necessary to complete the work outstanding under the contract at time of termination. In this event Article GC-15 (subletting of work) and GC-16 (Sub Contracts for Temporary works etc) hereof shall be invoked and the performance Bond shall immediately become due and payable to the Municipal Commissioner the value of the work done on the date of termination and not paid for shall stand forfeited to the Municipal Corporation and the Municipal Corporation shall have



free use of any works which the Contractor may have at the site at the time of termination of the contract.

**GC-40 DEFAULT OF CONTRACTOR:**

- 1) The Municipal Corporation may upon written notice of default to the Contractor terminate the contract in circumstances detailed hereunder:
  - a) If in the judgment of the Municipal Corporation the Contractor fails to make completion of works within the time specified in the completion schedule or within the period for which extension has been granted by the Municipal Corporation/ Engineer to the Contractor.
  - b) If in the judgment of the Municipal Corporation the Contractor fails to comply with any of the provision of this contract.
- 2) In the event the Municipal Commissioner terminates the contract in whole or in part as provided in Article GC-47 (Termination of Contract) the Municipal Corporation reserves the right to purchase up on such terms and in such manner as it may deem appropriate plant similar to that terminated and the Contractor will be liable to the Municipal Corporation for any additional costs for such similar and / or for liquidated damaged for delay until such reasonable time as may be required for the final completion of works.
- 3) If this contract is terminated as provided in this paragraph GC-30 (Power of Entry) the Municipal Corporation in addition to any other rights provided in this clause, may require the Contractor to transfer title and deliver to the Municipal Corporation under following case or any of the cases in the manual and as directed by the Municipal Corporation.
  - a) Any partially completed information and contract rights as the Contractor has specifically produced or acquired for the performance of the contract so terminated.
- 4) In the event the Municipal Corporation does not terminate the contract as provided in the paragraph GC-47 (Termination of Contract) the Contractor shall continue performance of the contract, in which case he shall be liable to the Municipal Corporation for liquidated damages for delay until the works are accepted.

**GC-41 BANKRUPTCY:**

If the Contractor shall become bankrupt or insolvent or have a receiving order made against him or compound with the creditors or being the Municipal Corporation commence to be wound up not being a members voluntary winding up for the purpose of amalgamation of reconstruction, or carry on its business under a receiver for the benefit of his creditors or any of them the owner shall be at liberty to either (a) terminate the contract forthwith by giving notice in writing to the Contractor or to the receiver, or liquidator or to any person or organization in whom the contract may become vested and to act in the manner provided in Article GC-40 (Default of Contractor) as though the last mentioned notice had been the notice referred to in such Article of (b) to give such receiver liquidator or other person in work the contract may become vested the option of carrying out the contract subject to his providing a satisfaction guarantee for the due and faithfully performance of the contract subject to his providing a satisfactory guarantee for the due and faithful performance of the contract up to an amount to be agreed. In the event that the Municipal Corporation terminates the contract in accordance with this article, the performance bond shall immediately become due and payable on demand to Municipal Corporation.



#### **GC-42 OWNERSHIP:**

Works supplied pursuant to the Contract shall become the property of the Municipal Corporation from whichever is the earlier of the following times namely.

- a) When the works are completed pursuant to the contract
- b) When the Contractor has been paid any to which he may become entitled in respect thereof pursuant to clause GC-35 (Terms of Payment)

#### **GC-43 DECLARATION AGAINST WAIVER:**

The condonation by the Municipal Corporation of any breach or breaches by the stipulations and conditions contained in the contract, shall in no way prejudice or effect to the constructed as a waiver of the Municipal Corporation rights powers and remedies under the contract in respect of any breach or breaches.

#### **GC-44 LAWS GOVERNING THE CONTRACT:**

The contract shall be constituted according to and subject to the laws of India and the State of Gujarat and under the jurisdiction of the courts of Gujarat at Surat.

#### **GC-45 OVERPAYMENT AND UNDERPAYMENT:**

Whenever any claim for the payment of a sum of the Municipal Corporation arises out of or under this contract against the Contractor the same may be deducted by the Municipal Corporation from any sum then due or which at any time thereafter may become due to the Contractor under this contract and failing that under any other contract with the Municipal Corporation or from any sum due to the Contractor with the Municipal Corporation (which may be available with Municipal Corporation) or from his retention money, or he shall pay the claim on demand. The Municipal Corporation reserves the right to carry out post payment audit and technical examination of the final bill including all supporting vouchers, abstracts, etc.

The Municipal Corporation further reserves the right to enforce recovery of any over payment when detected notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an Arbitrator appointed under Article GC-47 of this contract and notwithstanding the fact that the amount of the final bill figure in the award.

If as a result of such audit and technical examination any over payment is discovered in respect of any work done by the Contractor or alleged to have been done by him under the contract it shall be recovered by the Municipal Corporation from the Contractor by way of all the means prescribed above or if any under payment is discovered by the Municipal Corporation, any amount due to the Contractor under this contract or under payment may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the Contractor from the Municipal Corporation on any other contract account whatsoever.

#### **GC-46 SETTLEMENT OF DISPUTES:**

Except or otherwise specifically provided in the contract, all disputes concerning question of fact arising under the contract shall be decided by the Engineer-in-charge, subjected to a written



appeal by the Contractor to the Engineer and these decisions shall be final and binding on the parties hereto. Any disputes or difference including those considered as such by only one of the parties arising out of or in connection with this contract shall be to the extent possible settled amicably between the parties. If amicable settlement cannot be reached then all dispute issues shall be settled as provided in (a).

a) **DISPUTES OR DIFFERENCE TO BE REFERRED TO:**

If at any time, any question, disputes or differences of any kind whatsoever shall arises between the Engineer-in-charge and the Contractor upon or in relation to or in connection with this contract, either party may forthwith give to the other, notice in writing of the existence of such question, dispute of difference as to any decision, opinion, instruction, direction certificate or evaluation of the Engineer.

The question or difference shall be settled by the Municipal Commissioner, who shall state his decision in writing and give notice of same to the Engineer and to the Contractor such decision shall be final and binding upon both parties to the contract and work on contract if not already breached or abandoned shall proceed normally unless and until the same shall be revised (or upheld) due to any judicial proceeding.

Should the Municipal Commissioner fail to give a decision within three (3) calendar months after issuance of notice of a question, dispute or difference or if the Contractor is dissatisfied with any such decision of the Municipal Commissioner, then the matter may be referred to Standing Committee. Then also, if the said question of difference or dispute remains unsolved / unsettled and if the contractor is dissatisfied with any such decision of the Standing Committee, then the matter may be referred to the court of law subject to SURAT JURISDICTION.

**GC-47 TERMINATION OF THE CONTRACT:**

- 1) If the Contractor finds it impracticable to continue operation owing to Force Majeure reasons or for any reason beyond his and / or the Municipal Commissioner find site impossible to continue operation then prompt notification in writing shall be given by the party affected to the other.
- 2) If the delay or difficulties so caused can not be expected to cease or become unavoidable or if operations cannot be resumed with six (6) months the party shall have the right to terminate the contract upon ten (10) days written notice to the other. In the event of such termination of the contract, payment to the Contractor will be made as follows –
  - a) The Contractor shall be paid for all works approved by the Engineer and for any other legitimate expenses due to him.
  - b) If the Municipal Commissioner terminates the contract owing to Force Majeure or due to any cause beyond its control, the Contractor shall additionally be paid for any work done during the said six (6) months period including any financial commitment made for the proper performance of the contract and which are not reasonable defrayed by payment under (a) above.
  - c) The Municipal Commissioner also release all bonds and guarantees at its disposal except is case where the total amount of payments made to the Contractor exceeds the final amount due to him in which case the Contractor shall refund



the excess amount within sixty (60) days after termination and the Municipal Commissioner thereafter shall release all bonds and guarantees. Should the Contractor fail to refund the amount received in excess within the said period such amount shall be deducted from the bonds or guarantees provided.

- 3) On the termination of the contract for any cause the Contractor shall see the orderly suspension and termination of operations, with due consideration to the interests of the Municipal Corporation with respect to completion, safeguarding or storing of materials procured for the performance of the contract and the salvage and resale thereof.

#### **GC-48 CHANGES IN CONSTITUTION:**

Where the Contractor is a partnership firm, the prior approval in writing of the Municipal Commissioner shall be obtained if any change is made in the constitution of the firm, where the Contractor is an individual or an undivided family business concern such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement where under the partnership firm would have the right to carry out the works hereby undertaken by the Contractor. If prior approval as aforesaid is not obtained the contract shall be deemed to have been assigned in contravention of Article thereof.

#### **GC-49 SUB CONTRACTUAL RELATIONS:**

All work performed for the contract by sub Contractor shall be pursuant to an appropriate agreement between the Contractor and sub Contractor, which shall contain provisions to:

- a) Protect and preserve the rights of the Municipal Corporation and the Engineer with respect to the work to be performed under the sub contract so that the sub Contractor thereof will not prejudice such rights.
- b) Require that such work be performed in accordance with requirements of the contract documents.
- c) Require under such contract of which the Contractor is a party, the submission to the Contractor of application for payment and claims for additional costs, extension of time, damages for delay or otherwise with respect to the sub contracted portions of the work in sufficient time, that the Contractor may apply for payment and comply in accordance with the contract documents for like claim by the Contractor upon the Municipal Corporation.
- d) Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance except such rights as they may have to the proceeds so such insurance held by the Municipal Corporation as trustee and
- e) Obligate each sub Contractor specifically to consent to the provisions of this Article.

#### **GC-50 LIEN OR CLAIM:**

If at any time, there should be evidence of any lien or claim for which owner might have become liable and which is chargeable to the Contractor, the owner shall have the right to retain out of





any payment then due or thereafter to become due an amount sufficient to completely indemnify the owner against such lien or claim or if such lien or claim be valid the owner may become due and payable to the Contractor shall refund or pay to the owner all money that the latter may be compelled to pay in discharging such lien or claim including all cost and reasonable expenses.

**GC-51 EXECUTION OF WORK:**

The whole work shall be carried out in strict conformity with the provisions of the contract documents, detailed drawings, specifications and the instructions of the Engineer-in-charge from time to time. The Contractor shall ensure that the whole work is executed in the most substantial proper and best workmanship using materials of best quality in strict accordance with the specifications to the entire satisfaction of the Engineer-in-charge.

**GC-52 WORK IN MONSOON:**

When the work continues in monsoon, the Contractor shall maintain minimum labour force required, for the work and plan and execute the construction and erection work according to the prescribed schedule. No extra rate will be considered for such work in monsoon. During monsoon and entire constructing period the Contractor shall keep the site free from water at his own cost.

**GC-53 WORK CLOSED ON SUNDAYS AND HOLIDAYS AND BETWEEN SUNSET AND SUNRISE.**

No work shall be carried out on Sundays and Corporation Holidays and no work shall be carried out between sunset and sunrise. Except with the special permission of Engineer-in-charge in writing previously obtained and withholding such permissions. There shall be no ground of complaint on the part of Contractor or cause for compensation to them. Working period shall be maximum eight (8) hours per days.

**GC-54 DRAWING TO BE SUPPLIED BY THE OWNER:**

The drawings attached with the tender document shall be for general guidance of the Contractor to enable him to visualize the type of work contemplated and scope of work involved. Detailed working drawings according to which the work is to be done shall be furnished from time to time as the work progresses. The Contractor shall study the drawings thoroughly in connection with other connected details and discrepancy if any bring to the notice of the Engineer-in-charge before actually carrying out the work.

**GC-55 DRAWING TO BE SUPPLIED TO THE CONTRACTOR:**

Where drawings, dates, are to be furnished by the Contractor they shall be as enumerated in special condition of contract and shall be furnished within the specified time. Where approval of drawings has been specified it shall be the Contractor's responsibility to have these drawings got approved before any work is taken up with regard to the same. Any changes becoming necessary in these drawings during the execution of the work shall have to be carried out by the Contractor at no extra cost. All final drawings shall bear the certification stamp as indicated below duly signed by both the Contractor and Engineer-in-charge.

"Certified true for \_\_\_\_\_ Project

Agreement No. \_\_\_\_\_

Signed:



Contractor)

(Engineer-in-charge)

Drawings will be approved with three (3) weeks of the receipt of the same by the Engineer-in-charge.

#### **GC-56 SETTING OUT WORK:**

The Contractor shall set out the work on the site handed by the Engineer-in-charge and shall be responsible for the correctness of the same. The work shall be carried out to the entire satisfaction of Engineer-in-charge. The approval thereof or partaking by Engineer-in-charge in setting out work shall not relieve Contractor of any of his responsibilities.

The Contractor shall provide at his own cost all necessary level posts, pegs, bamboos, flags, ranging rods, strings, theodolite etc. and other materials and skilled/unskilled labourers required for proper setting out of the work. The Contractor shall provide fix and be responsible for the maintenance of all stakes, temples, level marks profiles and similar other things and shall take necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence for such removal or disturbance. The Contractor shall also be responsible for the maintenance of all existing Survey Marks, Boundary Marks, Distance Marks and Centre line marks either existing or fixed by the Contractor. The center, longitudinal or face lines and cross lines shall be marked by small masonry pillars. Each pillar shall have distance mark at the center for setting up Theodolite. The work shall not be started unless the setting out is checked by Engineer-in-charge in writing but such approval shall not relieve the Contractor of his responsibilities. The Contractor shall provide all materials, labour and other facilities necessary for checking at his own cost.

The Contractor shall protect pillars bearing geodetic marks on site. On completion of the work the Contractor shall submit the geodetic documents according to which the work has been carried out.

#### **GC-57 RESPONSIBILITIES OF CONTRACTOR FOR CORRECTNESS OF WORK:**

The Contractor shall be entirely and exclusively responsible for the correctness of every part of the work and shall rectify completely the errors thereon at his own cost when so instructed by Engineer-in-charge.

- 1) Materials to be supplied by Contractor: Contractor shall procure and provide all the materials required for the execution of work all tools, tackle, construction plant and equipment except the materials to be supplied by the Owner detailed in the contract documents and for the transport thereof. Owner shall made recommendations to the respective authorities if desired by the Contractor but assumes no responsibility of any nature. Owner shall insist for procurement of materials with ISI marks supplied by reputed firms on the Director General (Supply and Disposal) list.
- 2) If however the Engineer-in-charge feels that work is likely to be delayed due to Contractors inability to procure the materials, the Engineer-in-charge shall have the right to procure materials from the market and the Contractor will accept these materials at the rates decided by Engineer-in-charge.



#### **GC-58 MATERIALS TO BE SUPPLIED BY THE OWNER:**

- 1) If the contract provides certain materials or stores to be supplied by The SURAT MUNICIPAL CORPORATION such materials and stores shall be transported by the Contractor at his cost from The SURAT MUNICIPAL CORPORATION's stores or Railway Station. The sum due from Contractor for the value of materials supplied by the owner will be recovered from the R.A. Bill on the basis of actual consumption of materials in the work covered and for which R.A. Bill has been prepared. After completion of work, Contractor has to account for the full quantity of materials supplied to him.
- 2) The value of store materials supplied by The SURAT MUNICIPAL CORPORATION to the Contractor shall be charged at rates shown in the contract document and in case any other material not listed in the schedule of materials is supplied by The SURAT MUNICIPAL CORPORATION, the same shall be charged at cost price including carting and other expenses incurred in procuring the same. All materials so supplied shall remain the property of the owner and shall not be removed from the site on any account. Any material remaining un-used at the time of completion of work or termination of contract shall be returned to The SURAT MUNICIPAL CORPORATION's store or any other place as directed by the Engineer-in-charge in perfectly good condition at Contractor's cost. When materials are issued / supplied free of cost for use in work and surplus and unaccounted balances thereof are not returned to the Municipal Corporation, recovery in respect of such balance will be affected at double the applicable issue rate of the materials or the market rate whichever is higher.

#### **GC-59 CONDITIONS OF ISSUE OF MATERIALS BY THE SURAT MUNICIPAL CORPORATION:**

- a) The materials specified to be issued by The SURAT MUNICIPAL CORPORATION to the Contractor shall be issued by The **SURAT MUNICIPAL CORPORATION's store/Any places within City Limit** or at Railway Station and all expenses for its shifting to site shall be borne by the Contractor. The materials will be issued during working hours and as per rules of The SURAT MUNICIPAL CORPORATION from time to time.
- b) Contractor shall bear all expenses for storage and safe custody at site of materials issued to him before use in work.
- c) Materials shall be issued by The Municipal Corporation in Standard / non-standard sizes as obtained from manufacturer.
- d) Contractor shall construct suitable godowns at site for storing the materials to protect the same from damage due to rain, dampness, fires, theft etc.
- e) The Contractor should take the delivery of the materials issued by The SURAT MUNICIPAL CORPORATION after satisfying him that they are in good conditions. Once the materials are issued, it will be the responsibility of the Contractor to keep them in good condition and in safe custody. If the materials get damaged or if they are stolen. It shall be the responsibility of the Contractor to replace them at his cost according to the instructions of the Engineer-in-charge.
- f) For delay in supply or for non supply of materials to be supplied by the SURAT MUNICIPAL CORPORATION, on account of natural calamities, act of enemies, other



difficulties beyond the control of The SURAT MUNICIPAL CORPORATION, The SURAT MUNICIPAL CORPORATION carries no responsibilities. In no case the Contractor shall be entitled to claim any compensation for loss suffered by him on this account.

- g) None of the materials issued to the Contractor, shall be used by the Contractor for manufacturing items, which can be obtained from manufacturer. The materials issued by the owner shall be used for the work only and no other purpose.
- h) Contractor shall be required to execute indemnify bond the prescribed form of the same custody and account of materials issued by the owner.
- i) Contractor shall furnish sufficiently in advance a statement of his requirements of quantities of materials to be supplied by The SURAT MUNICIPAL CORPORATION and the time when the same will be required for the work, so as to enable Engineer-in-charge to make arrangements to procure and supply the materials.
- j) A daily account of materials issued by the owner shall be maintained by the Contractor showing receipt, consumption and balance in hand in the form laid down by Engineer-in-charge with all connected paper and shall be always available for inspection in the site office.
- k) Contractor shall see that only the required quantities of materials are got issued and no more. The Contractor shall be responsible to return the surplus material at The SURAT MUNICIPAL CORPORATION's store at his own cost.

**GC-60 MATERIALS PROCURED WITH ASSISTANCE OF THE OWNER:**

Notwithstanding anything contained to the contrary in any of the clauses of this contract, where any materials for the execution of the contract are procured with the assistance of The SURAT MUNICIPAL CORPORATION either by issue from The SURAT MUNICIPAL CORPORATION stock or purchase made under orders or permits or licenses issued by the Government, the Contractor shall hold the same materials as trustees for owner and use such materials economically and solely for the purpose of contract and if required by Engineer-in-charge, all surplus or unserviceable materials that may be left with him after the completion of the contract at its termination for any reason whatsoever on his being paid or credited such prices as Engineer-in-charge shall determine having due regard to the conditions of the materials. The price allowed to Contractor shall not exceed the amount charged to him excluding the storage charges if any. The decision of Engineer-in-charge shall be final and conclusive in such matters. In the event of the breach of the aforesaid condition, the Contractor shall in terms of licenses of permits and /or for criminal breach of trust be liable to compensate, the SURAT MUNICIPAL CORPORATION at double rate or any higher rates. In the event of these materials at that time having higher rate or not being available in the market then any other rate has to be determined by the Engineer-in-charge and his decision shall be final and conclusive.



**GC-61 MATERIALS OBTAINED FROM DISMENTALING:**

If the Contractor, in the course of execution of work is called upon to dismantle any part for reasons other than on account of bad or imperfect work, the materials obtained from dismantling will be the property of The Municipal Corporation and will be disposed of as per instruction of Engineer-in-charge in the best interest to The SURAT MUNICIPAL CORPORATION

**GC-62 ARTICLE OF VALUE OR TREASURE FOUND DURING CONSTRUCTION**

All gold, silver and other minerals of any description and all precious stones, coins, treasures relics antiquities and other similar things which shall be found in under or upon site shall be the property of the owner and the Contractor shall properly preserve the same to the satisfaction of Engineer-in-charge and shall hand over the same to the owner.

**GC-63 DISCREPANCIES BETWEEN INSTRUCTIONS:**

If there is any discrepancy between the various stipulations of the contract documents of instructions to the Contractor or his authorized representative or if any doubt arises as in the meaning of such stipulation or instructions, the Contractor shall immediately refer in writing to the Engineer-in-charge whose decision shall be final and conclusive and no claim for losses caused by such discrepancy shall in any event be admissible.

In case there is any discrepancy in measurements showing drawings and specifications the same shown in drawing shall be considered as final and will be binding upon the Contractor.

**GC-64 SCHEDULE OF QUANTITIES AND EXTRA ITEMS:**

**(a) Schedule of Quantities:**

Variations in the quantities of work in the bill of quantities shall not vitiate the contract. The quantities shown in the tender are approximate and no claim shall be entertained for quantities of work executed being less or more than those entered in the tender. The Contractor shall be bound to carry out the additional work up to 30% (thirty percent) of tender amount, in accordance to any instruction, which may be given to him in writing signed by the Engineer-in-charge, after obtaining prior approval/sanction from the competent authority of the SURAT MUNICIPAL CORPORATION at the sanctioned tender rate.

**(b) Extra Items:**

Extra item of work shall not vitiate the contract. The Contractor shall be bound to execute extra items of work as directed by the Engineer-in-charge. The rate for extra item shall be derived from the **S.O.R. (R & B Division, Surat) of year 2015-16 or GWSSB SOR 2014-15** and quoted premium of the tender. If the rate of the extra item is not available in S.O.R. then it will be derived on prevailing market rates. However, the decision of the Engineer-in-charge shall be final and binding to the Contractor.



#### **GC-65 ACTION WHEN NO SPECIFICATION IS ISSUED:**

In case of any class of work for which no specification is supplied by The SURAT MUNICIPAL CORPORATION in the tender documents, such work shall be carried out in accordance with I.S.S. which, if do not cover the same; the work should be carried out as per standard Engineering practice as directed and approved by Engineer-in-charge.

#### **GC-66 ABNORMAL RATES:**

Contractor is expected to quote rate for each item after careful analysis of cost involved for the performance of the completed item considering all specifications and conditions of contract. This will avoid loss of profit or gain in case of curtailment or change of specification for any item in case it is noticed that the rates quoted by a tenderer for any item is usually high or unusually low, it will be sufficient cause for rejection of tender unless, the SURAT MUNICIPAL CORPORATION is convinced about the reasonableness of the rates on scrutiny of the analysis for such rates to be furnished by the tenderer on demand.

#### **GC-67 ASSISTANCE TO ENGINEER-IN-CHARGE:**

Contractor shall make available to Engineer-in-charge free of cost all necessary instruments and assistance in checking of any work made by the Contractor for taking measurement of work.

#### **GC-68 TEST OF QUALITY OF WORK:**

- 1) All workmanship shall be of the best kind described in the contract document and in accordance with the instructions of Engineer-in-charge and shall be subjected from time to time to such test at Contractor's cost as the Engineer-in-charge may directed at the place of manufacture or fabrication or on site or at any such place. Contractor shall provide assistance, instrument, labour and materials as are normally required for examining measuring and testing any work, workmanship as may be selected and required by Engineer-in-charge.
- 2) All tests will be necessary in connection with the execution of work as decided by Engineer-in-charge. They shall be carried out at an approved laboratory at Contractor's cost.
- 3) The Contractor shall furnish to Engineer-in-charge for approval when requested or if required by the specification adequate samples of all materials and finished goods to be used in work and sufficiently in advance to permit test and examination thereof. All materials furnished and finished goods applied in work shall be exactly as per the approved samples.
- 4) All the testing charges shall be borne by the Contractor.

#### **GC-69 ACTION AND COMPENSATION IN CASE OF BAD WORKMANSHIP:**

If it shall appear to the Engineer-in-charge that any work has been executed with materials of inferior description, or quality or are unsound or imperfect or of unskilled workmanship or otherwise not in accordance with the contract, the Engineer-in-charge or his authorized representative shall demand in writing by specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for forthwith rectification or removal and reconstruction of the complained work, materials or articles specified, and in the event of failure to do so within a period to be specified by Engineer-in-charge. In his aforesaid demand, Contractor shall be liable to pay compensation at the rate of



one (1) percent of the tendered cost of work for every ten (10) days limited to a maximum of ten (10%) percent of the value of work while his failure to do so continues and in the case of any such failure the Engineer-in-charge may on expiry of the notice period rectify and remove and re-execute the work or remove and replace with other at the risk and cost of the Contractor. The decision of the Engineer-in-charge as to any question arising under this clause shall be final and conclusive.

**GC-70 SUSPENSION OF WORK:**

Contractor shall if ordered in writing by Engineer-in-charge or his representative temporarily suspended the work or any part thereof for such time (not exceeding two months) as ordered and shall not after receiving such written order proceed with the work until he shall have received a written order to proceed therewith. The Contractor shall not be entitled to claim compensation for any loss or damage sustained by him by reason of temporary suspension of work as aforesaid. An extension of time for completion of work will be granted to the Contractor corresponding to the delay caused by such suspension of work if applied for the same provided the suspension was not consequent upon any default or failure on the part of the Contractor.

**GC-71 OWNER MAY DO PART OF THE WORK:**

When the Contractor fails to comply with any instructions given in accordance with the provisions of this contract, the SURAT MUNICIPAL CORPORATION has the right to carry out such parts of work as The SURAT MUNICIPAL CORPORATION may designate whether by purchasing materials and engaging labour or by the agency of another Contractor. In such cases The SURAT MUNICIPAL CORPORATION shall deduct from the amount which otherwise might become due to Contractor, the cost of such work and materials with Ten (10%) percent added to cover all departmental charges and should the total amount thereof exceed the amount due to Contractor, Contractor shall pay the difference to The SURAT MUNICIPAL CORPORATION.

**GC-72 POSSESSION PRIOR TO COMPLETION:**

The Engineer-in-charge shall have the right to take possession of or to use any completed or partly completed work or part of work, such possession or use shall not be deemed to be an acceptance of any work completed in accordance with the Contractor. If such prior possession or use by Engineer-in-charge delays the progress of work, equitable adjustment in the time of completion will be made and the contract shall be deemed to be modified accordingly.

**GC-73 COMPLETION CERTIFICATE:**

As soon as the work has been completed in accordance with contract (except in minor respect that do not affect their use for the purpose of which they are intended and except for maintenance thereof) as per general conditions of contract and has passed the tests on completion, the Engineer-in-charge shall issue certificate (hereinafter called completion certificate) in which he shall certify the date on which work has been completed and has passed the said tests and The SURAT MUNICIPAL CORPORATION shall be deemed to have taken over work on the date so certified. If work has been divided in various groups in contract, the SURAT MUNICIPAL CORPORATION shall be entitled to take over any group or groups before the other or others and there upon the Engineer-in-charge will issue a completion certificate which will, however, be for such group or groups so taken over only. In order that Contractor could obtain a completion certificate he shall make good, with all speed any defect arising from the defective materials supplied by Contractor or workmanship or any or omission of contract that may have



been discovered or developed after the work or group of works has been taken over. The period allowed for carrying out such work will be normally, one month. If any defect be not remedied within a reasonable time, the SURAT MUNICIPAL CORPORATION may proceed to do work at Contractor's risk and expenses and deduct from the final bill such amount as may be decided by the SURAT MUNICIPAL CORPORATION If by reason of any default on the part of the Contractor a completion certificate has not been issued in respect of every portion of work within one month after the date fixed by Contractor for completion of work, the SURAT MUNICIPAL CORPORATION shall be at liberty to use work or any portion thereof in respect of which a completion certificate has been issued provided that work or the portion thereof so used as aforesaid shall be aforesaid reasonable opportunity for completion of this work for the issue of completion of this work for the issue of completion certificate.

**GC-74 SCHEDULE OF RATES:**

- 1) The price / rates quoted by the Contractor shall remain firm till the issue of final certificate no price adjustment shall be given Schedule of rates shall be deemed to include and cover all costs expenses and liabilities of every description and all risks of every kind to be taken in executing, completing and handing over work to owner by Contractor. Contractor shall be deemed to have known the nature, scope, magnitude and the extent of work and materials required through contract documents which may not fully and precisely furnish them. He shall make such provision in the schedule of rates as he may consider necessary to cover the cost of such items of work and materials as may be reasonable and necessary to complete work. The opinion of Engineer-in-charge as to the item of work shall be final and binding on Contractor although the same may be not shown on or describe specifically in contract documents.
- 2) The Schedule of rates shall be deemed to include and cover the cost of all constructional plant, temporary work, pumps materials, labour and all other materials in connection with each item in schedule of rates and the execution of work or any portion thereof furnished complete in every respect and maintained as shown or described in the contract document or as may be ordered in writing during the continuance of the contract.
- 3) The Schedule of rates shall be deemed to include and cover the cost of all royalties and free for the articles and processes, protected by letters patent or otherwise incorporated in or used in connection with work, also all royalties, and other payments in connection with materials of whatsoever kind of work and shall include an indemnity to owner which Contractor hereby gives against all action, proceedings, claims, damages, costs and expenses arising from the incorporation in use of work of any such articles, processes OR MATERIALS. Octroi of other Municipal or local board charges if levied on materials, equipment of machineries to be brought to site for use on work shall be borne by the Contractor.
- 4) No exemption or reduction of custom duties, excise duties, sales tax or any other taxes or charges of the central or State Government any local body whatsoever will be granted to obtain. All of such expenses shall be deemed to have been included in and covered by schedule of rates. Contractor will also obtain and pay for all permits or other privileges necessary to complete work.
- 5) The schedule of rates shall be deemed to include and cover risk on account of delay or interference with Contractor's conduct of work, which may occur from any cause





including orders of The SURAT MUNICIPAL CORPORATION in the exercise of his power and no account of extension of time granted due to various reasons.

- 6) For work under unit rate basis no alteration will be allowed in the schedule of rates by reason of work or any part of them being field altered, extended diminished or omitted.

**GC-75 PROCEDURE FOR MEASUREMENT OF WORK IN PROGRESS:**

- 1) All measurements shall be in metric system. All the work in progress will be jointly measured by the representative of Engineer-in-charge and Contractor's authorized agent. Such measurements will be got recorded in the measurement book by the Engineer or his authorized representative and signed by Contractor or his authorized agent in token of acceptance. If the Contractor or his authorized agent fails to be present whenever required by the Engineer-in-charge for taking measurements for any reasons whatsoever, the measurement will be taken by the Engineer-in-charge or his authorized representative notwithstanding the absence of Contractor and these measurements will be deemed to be correct and binding on Contractor.
- 2) Contractor will submit a bill in approved Performa in duplicate to the Engineer-in-charge of the work giving abstract and detailed measurements of various items executed during a month as mutually agreed. The Engineer-in-charge shall verify the bill and the claim as far as admissible adjusted if possible within 10 days of presentation of the bills.
- 3) In case of Tenders for completed items of work, Contractor may be allowed "Secured Advance" on the Security of materials brought to site for execution of the constructed items of work the extent of 75% of the value of materials of imperishable nature and an agreement be drawn up with Contractor under which the owner secures a lien on these materials and is safe guarded against losses due to any reasons whatsoever. Recoveries of advance paid would not be postponed till the whole work is completed but shall be adjusted from his work done or the materials used. The necessary deductions being made when the items of work in which they are used are billed for. When the mode of measurement is not covered by contract for any item of work it shall be as per latest I.S. codes.

**GC-76 RUNNING ACCOUNT PAYMENT TO BE RECOVERED AS ADVANCES:**

All running account payment shall be regarded as payments by way of advance against the final payment only and not as payment for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or to be considered as an admission of the due performance of contract or any part thereof.

**GC-77 NOTICE FOR CLAIM FOR ADDITIONAL PAYMENT:**

If the Contractor considers that he is entitled to extra payment or compensation or any claim whatsoever in respect of work, he shall forthwith give notice in writing to the Engineer-in-charge about his extra payment and/or compensation. Such notice shall be given to the Engineer-in-charge within Ten (10) days from the happening of any event upon which Contractor basis such claims and such notice shall contain full particulars of the nature of such claim with full details and amount claimed. Failure on the part of the Contractor to put forward any claim with full details and amount claimed, failure on the part of the Contractor to put forward any claim with the necessary particulars as above within the time above specified shall be an absolute waiver



thereof. No commission shall be paid by The SURAT MUNICIPAL CORPORATION of any rights in respect thereof.

**GC-78 PAYMENT OF CONTRACTOR'S BILL:**

- 1) The price to be paid by The SURAT MUNICIPAL CORPORATION to Contractor for the work to be done and for the performance of all the obligations under taken by the Contractor under contract shall be based on the contract price and payment to be made accordingly for the work actually executed and approved by the Engineer-in-charge.
- 2) No payment shall be made for work costing less than Rs. 5,000/- till the work is completed and a certificate of completion given. But in case of work estimated to cost more than Rs. 5000/-, Contractor on submitting the bill thereof will be entitled to receive a monthly payment, proportionate to the part thereof approved and passed by Engineer-in-charge whose certificate of such approval and passing of the sum so payable shall be final and conclusive against Contractor. This payment will be made after making necessary deductions as stipulated elsewhere in the contract documents for materials, security deposit, etc. The payment may be released to the Contractor within thirty (30) days of submission of the bill in case of running bill and with in two (2) months in case of final bill. unless any query raised by corporation to the Contractors bill contractor shall present the bill duly pre receipted on proper revenue stamp. In no case, any claim from contractor related to interest regarding delay of paying running bill or final bill shall be entertained by corporation.

Payment due to Contractor shall be made by the crossed Accounts payee cheque in Indian Currency forwarding the same to the registered office of the Contractor. Owner shall not be responsible if the cheque is mislaid or misappropriated by unauthorized person.

**GC-79 FINAL BILL:**

The final bill may be submitted by Contractor within (2) months of the date of physical completion of work, otherwise the Engineer-in-charge's certificate of measurement and of total amount payable for work shall be finalized binding on all parties.

**GC-80 RECEIPT FOR PAYMENT:**

Receipt for payment made on account of work when executed by a firm must be signed by a person holding power of attorney in this respect on behalf of Contractor except when described in the tender as a limited company in which case the receipt must be signed in the name of the company by one of its principal officers or by some other person having authority to give effectual receipt of the company.

**GC-81 COMPLETION CERTIFICATE:**

- 1) When the Contractor fulfils his obligation as per terms of contract, he shall be eligible to apply for completion certificate. Contractor may apply for separate completion certificate in respect of each such portion of work by submitting the completion documents along with such application for completion certificate.
- 2) Within 2 (two) months of completion of work in all respects, Contractor shall be furnished with a certificate by the Engineer-in-charge of such completion but no certificate shall be given nor shall work be deemed to have been executed until all (1) scaffolding, surplus materials and rubbish is cleared off from site completely (2) until



work shall have been measured by the Engineer-in-charge whose measurement shall be binding and conclusive and (3) until all the temporary works, labour and staff colonies etc. constructed are removed and the work site cleaned to the satisfaction of the Engineer-in-charge. If Contractors shall fail to comply with the requirements as aforesaid or before date fixed for the completion of work, the Engineer-in-charge may at the expenses of Contractor remove such scaffolding, surplus materials and rubbish and dispose of the same as he thinks fit.

- 3) The following documents will form the completion documents:
  - i) Technical documents according to which work was carried out.
  - ii) Construction drawings showing therein the modifications and corrections made during the course of execution signed by Engineer-in-charge
  - iii) Completion certificate for Embedded or Covered up work.
  - iv) Certificate of final levels as set out for various works.
  - v) Material appropriation statement for the materials issued by owner for work and list of surplus materials returned to The SURAT MUNICIPAL CORPORATION, a store duly supported by necessary documents.
- 4) Upon expiry of the period of defects, liability and subject to Engineer-in-charge being satisfied that work has been duly maintained by Contractor during the defects liability period as fixed originally or as External subsequently and the Contractor has in all respects made up by subsidence and performed all his obligations under contract, the Engineer-in-charge shall (without prejudice to the rights of owner in any way) give final certificate to that effect. The Contractor shall not be considered to have fulfilled the whole of his obligation until final certificate shall have been given by the Engineer-in-charge notwithstanding previous entry upon and taking possession, working or using of the same or any part thereof by owner.
- 5) Final Certificate only Evidence of Completion

Except the final certificate no other certificate or payments against a certificate or a general account shall be taken to be an admission by owner of the due performance of contract or any part thereof or of occupancy validity of any claim by the Contractor.

#### **GC-82 TAXES, DUTIES ETC:**

- 1) Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes, including sales taxes/VAT, duties etc. now or herein after imposed, increased or modified from time to time in respect of work and materials and all contributions and taxes for unemployment compensation, insurance and old age pension or annuities now or herein after imposed by Central or State Government authorities with respect to or cover the wages, salaries or other compensation paid to the persons employed by Contractor. The Contractor shall produce sales tax / VAT clearance certificate from the competent authority before payment of final bill. If the Contractor is not liable to sales tax assessment, a certificate to the effect from the competent authority shall be produced without which final payment to the Contractor shall not be made. No "P", "C" or "D" form shall be supplied by the Municipal Corporation and the Contractor shall be required to pay full sales tax / VAT as applicable.



- 2) Contractor shall be responsible for compliance with all obligations and restrictions imposed by the labour law or any other law, affecting employer employee relationship.
- 3) Contractor further agrees to comply and to secure the compliance of all sub Contractors with applicable Central, State, Municipal and local law and regulations and requirements. Contractor also agrees to defend, indemnify and hold harmless the owner from any liability or penalty which may be imposed by Central, State or local authorities by reasons on any violation by Contractor or sub Contractor or such laws, regulation of requirement and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons of work provided for by this contract by third parties or by Central or State Government Authority or any administration sub division thereof. Any tax whether it may be named as work contract tax or sales tax or VAT the same shall be born by contractor himself, SURAT MUNICIPAL CORPORATION shall not reimburse the amount of tax so paid by contractor recovered from bills at the later stage.
- 4) If any service tax levied by the Government during the course of execution of this contract, shall be borne separately by SURAT MUNICIPAL CORPORATION, provided the original receipt/proof for the amounts actually remitted by the successful bidder to the competent authority be submitted within 30 (Thirty) days from the date of payment. Then after, SURAT MUNICIPAL CORPORATION shall not be held responsible for any such dues/payments, not paid by the Contractor. In short, the contractor shall be solely responsible for the payment of the service tax, if any, applicable during the course of execution of this contract. SURAT MUNICIPAL CORPORATION will not entertain any claim regarding service tax later on.
- 5) Applicable sale tax/income tax with surcharge & cess, works contract tax as per prevailing rules from time to time, will be deducted from all the payments made to the contractor as a TDS.

**All taxes/Cess (other than service tax) duties and levies of Government shall be borne by the contractor in any case.**

**Construction Cess 1% (As per prevailing rules time to time) will be deducted for total work done amount of bill will be deducted from all the payments made to the contractor.**

#### **GC-83 INSURANCE:**

The contractor shall take “all contract risk insurance policy” for the maximum amount of either estimated or sanctioned tender amount of the subjected project, whichever is higher and up to the defect liability period, “Workmen Compensation Policy” for all workers and labourers of contractor and client working at site and “Third Party”.

“Insurance policy” to fully cover all third party type risk. The insurance policy so taken by the contractor for such purposes shall be in the joint name of the contractor and the client and the policy shall be deposited with the client.



#### **GC-84 DAMAGE TO PROPERTY:**

- 1) Contractor shall be responsible for making good to the satisfaction of owner any loss of and any damage to all structures and properties belonging to owner or being executed or procured by owner or of other Agencies within the premises of work of owner if such loss or damage is due to fault and / or the negligence or will full act or omission of Contractor, his employees, agent representatives or sub Contractors.
- 2) Contractors shall indemnify and keep owner harmless of all claims for damage to properties other than The SURAT MUNICIPAL CORPORATION's property arising under or by reasons of this agreement if such claims result from the fault and / or negligence or willful act of omission of contract his employees agents representatives of sub Contractors.

#### **GC-85 LABOUR LAWS AND REGULATIONS:**

- 1) The Contractor shall be responsible for the strict compliance of and shall ensure strict compliance by his sub Contractor employees and agents of all labours and others laws, rules or regulations having the force of law affecting the relationship of employer and employee between the Contractor / sub Contractor and their respective employees.
- 2) No labour below the age of eighteen (18) year is employed on work.
- 3) Contractor shall pay to the labours engaged on work according to the law.
  - a) The Contractor and sub Contractors of the Contractor shall obtain proper authority designated in this behalf under any applicable law, rules or regulations (including but not restricted to the factories act and contract labour Abolition and Regulation Act 1970) in so far as applicable any and all such licences, consents, Registration and / or other authorization as shall from time to time be or become necessary for relating to the execution of work or any part or portion thereof or the storage or supply of any materials or otherwise in connection with the performance of the contract and shall at all times observance by the sub Contractors employees and agents of all terms and conditions of the said licenses conserts regulations and other authorization and laws, rules and regulations applicable thereto.
  - b) The Contractor shall have to keep the record of the labourers employed for the concerned work. The Contractor should provide attendance card, identification card pay etc. to the labours employed. Further, the amount of ESI and Provident Fund should be deducted from the salary of the labourers employed and such amount should invariably be deposited to the concerned Government Departments. In addition, the amount of social security amount should invariably be deposited directly to the concerned Government Departments. In the same context, the details regarding such amount deposited to the concern Govt. Deptt. and labourers employed shall be furnished to the office of Hydraulic Department of SMC every month. In case of failure, such amount shall be deducted / recovered from the running bill directly in accordance with the details given by Contractor regarding labourers employed and as per the prevailing rules of Government. In absence of detail, an adhoc suitable amount of the total amount of work done shall be recovered directly from the running bills. On submission of evidence of recovery of



such amount, the amount recovered / deducted shall be released in the next bill after due sanction of Competent Authority of SURAT MUNICIPAL CORPORATION

**GC-86 CONTRACTOR TO INDEMNIFY OWNER:**

- 1) The Contractor shall indemnify and keep indemnified the owner and every member, officer and employee of owner from and against all actions, claims, demands and liabilities whatsoever and in respect of the breach of any of the above clauses / and or against any claim action or demand by any workman / employee of the Contractor or any sub Contractor under any law, rule or regulations having the force of law, including but not limited to claims against the owner under the workman compensation act 1923. The employees provident funds act 1952 and / or the contract labour (abolition and Regulations) Act, 1970.
- 2) Payment of claims and damages:  
  
If owner has to pay any money in respect of such claims or demands as aforesaid, the amount to be paid and the cost incurred by the owner shall be charged to and paid by Contractor without any dispute notwithstanding the same may have been paid without the consent or authority of the Contractor.
- 3) In every case in which by virtue of any provision applicable in the workman's compensation Act 1923 or any other Act, be obliged to pay compensation to workman employed by Contractor the amount of compensation so paid, and without prejudice to the rights of The SURAT MUNICIPAL CORPORATION under sec (12) sub section (2) of the said Act The SURAT MUNICIPAL CORPORATION shall be at liberty to recover sub amount from any surplus due to the Contractor or the security deposit. The SURAT MUNICIPAL CORPORATION will not be bound to context any claim made under section (12) sub section (2) of the said act except or written request of Contractor and upon the contesting of such claim.
- 4) The Contractor shall protect adjoining sites against structural and other damages that could be caused by the execution of these works and made good at his cost any such damage so caused.

**GC-87 IMPLEMENTATION OF APPRENTICE ACT 1964:**

Contractor shall comply with the provisions of the Apprentice Act 1964 and the orders issued there under from time to time. If he fails to do so, it will be a breach of contract. Contractor shall also be liable for any particular liability arising on account of any violation of the provisions of the Act by him.

**GC-88 HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS:**

Contractor shall comply with all the rules and regulations of the local sanitary authorities or as framed by owner from time to time for the protection of health and sanitary arrangements of all labour directly or indirectly employed on the work of this contract.



## **GC-89 SAFETY CODE:**

### **GENERAL:**

Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with owners safety rules and set fourth herein.

#### **1.0 FIRST AID AND INDUSTRIAL INJURIES**

1.1 Contractor shall maintain first aid facilities for its employees and those of his sub Contractor.

1.2 Contractor shall make outside arrangements for ambulance service and for the treatment of industrial injuries. Name of those providing these services shall furnished to Engineer-in-charge prior to start of construction and their telephone numbers shall be prominently posted in Contractor's field office.

1.3 All injuries shall be reported promptly to Engineer-in-charge and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to owner.

#### **2.0 GENERAL RULES:**

Carrying striking matches' lighters inside the project area and smoking within the job is strictly prohibited. Violators of smoking rules shall be discharged immediately. Within the operation area, no hot work shall be permitted without valid gas safety, fire permits. The Contractor shall also be held liable and responsible for all lapses of his Sub Contractors / employees in this regards.

#### **3.0 SCAFFOLDING:**

3.1 Suitable scaffolding shall be provided for workmen for all works that can not safely be done from the ground or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable foothold and handholds shall be provided on the ladder and the same shall be given inclination not steeper than 1 to 4 (horizontal and 4 vertical).

3.2 Scaffolding or staging more than 3.6 M (12) above the ground or floor swing or suspended from any overhead support to erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise fixed at least 1.0 M (3) high above the floor or platform of scaffolding or staging and extending along the entire length of the outside ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be fastened as to prevent it from swaying from the building or structure.

#### **4.0 MAINTENANCE OF SAFETY DEVICES:**

All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in some conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate facilities should be provided at or near place or work.



**5.0 DISPLAY OR SAFETY INSTRUCTIONS:**

The safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at the work spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

**6.0 ENFORCEMENT OF SAFETY REGULATIONS:**

To ensure effective enforcement of the rules and regulations relating safety precautions the arrangements made by the Contractor shall be open to inspection by the welfare officer, Engineer-in-charge of safety Engineer of the owner or their representatives.

**7.0 NO EXEMPTION:**

7.1 Notwithstanding the above clauses, there is nothing to exempt the Contractor from the operations of any other Act or rules in force in the Republic of India.

7.2 In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. safety code framed from time to time.

**GC.90 ACCIDENTS:**

It shall be the Contractor's responsibility to protect against accidents on the work. He shall indemnify the Municipal Corporation against any claim for damage or for injury to persons or property resulting from and in the course of work and also under provision of the workman's compensation act . On the occurrence of an accident arising out of the works which results in death or which is so serious as to be likely to result in death, the Contractor shall within twenty four hours of such accident, report in writing to the Engineer-in-charge, the facts stating clearly and in sufficient details the circumstances of such accident and the subsequent action. All other accidents on the works involving injuries to person or damage to property other than that of the Contractors shall be promptly reported to the Engineer-in-charge stating clearly and in sufficient details and facts and circumstances of the accidents and the action taken. In all cases the Contractor shall indemnify the Municipal Corporation against all loss of damage resulting directly or indirectly from the Contractors failure to report in the manner aforesaid. These includes penalties or fine as a consequence of failure to give notice under the workman's compensation Act or failure to conform to the provisions of the said Act in regard to such accidents.

In the event of an accident in respect of which compensation may become payable under the workmen's compensation Act VIII of 1923 including all modification thereof whether such compensation may become payable by the Contractor or by the Municipal Corporation as Principal employer, the Engineer-in-charge may retain money due and payable to the Contractor such sum or sums or money as may in the opinion of the Engineer-in-Charge be sufficient to meet such liability. On receipt of award from the labour commission in regard to quantum of compensation, the difference in amount will be adjusted.

**GC-91 WATER CHARGES:**

If possible, S.M.C. will provide water for construction and for the labourers, staff deployed at site by the Contractor. In such case if pipe network facility of Surat Municipal Corporation is available to nearby site area; the contractor shall have to apply for getting water connection through the license plumber to the concerned zone, in prescribed format and as per prevailing rules and regulations of the Surat Municipal Corporation. Contractor shall have to pay all the connection charges as may be asked by the concerned zone. The necessary periodic water charge bills shall





have to be paid by the contractor as and when issued by the Surat Municipal Corporation and the copy of the paid bill shall be submitted from time to time to this office. Any dues, regarding water charges shall be recovered from the running bills/Final bill etc before making final payment for the aforesaid work. The connection has to be disconnected from the site after completion of the work, under the intimation to this office.

Contractor/contractors are allowed to use the SMC water through tankers from any of the nearby water distribution centre of the Surat Municipal Corporation at the prevailing rules and rates and depositing the necessary amounts.

Contractor may make his / their own arrangement of water for execution/ drinking purpose. In such case, the contractor shall have to apply with written application/request to the Engineer-in-charge within 30 days from the date of issue of work order for aforesaid work and / or from date of starting the work at site. However, the water shall have to be tested fit for construction / drinking purpose and shall meet with the tender specifications / I.S. requirements, prior to using for the execution. **And as contractor makes his own arrangements for water required for construction and labour camp etc. by drilling own bore / own arrangement, no water charges will be recovered from the Contractor. If the contractor fails to do so, water charge shall be recovered at the rate of 3.0% of (Three percent) execution cost of the Item of Schedule-'B'. (i.e. items in which cement will be consumed)**

#### **GC-92 TESTING AND INSPECTION CHARGES:**

The Contractor shall have to bear all the charges for testing and inspection purposes. Here, it is clarified that, all the charges towards "Testing & Inspection" of all the items given in the tender & to be used for the proposed work shall be borne by the contractor. Further, charges for traveling expenses (to & fro) and accommodation for maximum two representatives from Surat Municipal Corporation shall be borne by the contractor. No expenses shall be borne by the contractor for testing & inspection by Third Party Inspection and project management consultant.

#### **GC-93 SECURED ADVANCES:**

No Secured advances shall be paid in any case.

#### **GC-94 BASIC RATE:**

Cement and Reinforcement Steel (CRS / TMT) shall be procured by the Contractor at his own cost. The basic/star rate for the above material is as below:

**CEMENT: Rs. 4,800/- per M.T.) (i.e 240=00 per bag)**

**Reinforcement Steel (TMT): Rs. 37,000/- per M.T.**

#### **GC-95 ARBITRATION CLAUSE IS DELETED:**

Arbitration clause shall be treated as deleted wherever specified in this tender document.

#### **GC-96 (A) PRICE VARIATION CLAUSE:**

**This clause shall be treated as deleted wherever specified in this tender document.**



**GC-96(B) STAR RATE & DIFFERENCE FOR REINFORCEMENT STEEL & CEMENT:**

**This clause shall be treated as deleted wherever specified in this tender document.**

**GC-97 EVALUATION OF SUBMITTED QUALIFICATION OFFER BASED ON SUBMISSIONS MADE BY THE TENDERER.**

The tenderer shall be fully responsible for correctness of submissions made whether same has been examined and approved by employer or not. In the event of misrepresentation or suppression of the matter/ fact by the tenderer, the action will be taken on the wrong tenderer as per procedure/ provision outlined in the tender document. Price bid will be opened of those tenderers, whose post qualification bids meet requirements of the qualifying criteria as laid down in tender.

**GC-98 SPECIAL RISK**

If during the contract, there shall be outbreak of war (whether war is declared or not), major epidemic, earthquake, or similar occurrence in any part of the world beyond the control of either party to the contract which whether financially or otherwise materially affects the execution of the contract, the contractor shall unless and until, the contract is terminated under the provisions of this article, use his best endeavors to complete the execution of the contract, provided always that the Corporation shall be entitled at any time after the onset of such special risks, to terminate the contract by giving written notice to the contractor and upon such notice being given this contract shall terminate but without prejudice to the rights of either party in respect of any antecedent breach thereof. If any of the works, or materials to be deli subjected to damage or distribution by reasons for the special risks, the contractor shall be entitled to payment for such damage or destroyed materials and to any costs involved in making good damages or destroyed materials as may be required by the Municipal Corporation.

The contractor shall not be liable for payment of compensation for delay or for failure to perform the contract for reasons of Force Majeure such as acts of public enemy, acts of Government fires, floods, cyclone, epidemics, quarantine restrictions, lockouts, strikes, freight embargoes and provided that the contractor shall within Ten (10) days from the beginning of such delay notify the Engineer-in-charge in writing the cause of delay. The Municipal Commissioner shall verify the facts and grant such extension as the facts justify.

**GC-99 EMPLOYEE PROVIDENT FUND:-**

- [1] The Contractor is required to have his own employer's code number under EPF Act, 1952 and is required to comply the applicable provisions of said statute regularly and totally.
- [2] Further the contractor 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 Surat Municipal Corporation, along with copies of Pay Roll and Muster Roll. If the same are not produced, the bills will not be released



**GC-100 SPECIAL CLAUSES REGARDING REFUND / RECOVERY OF EXCESS/ADDITIONAL SECURITY DEPOSIT;**

Refund / Recovery of security deposit

- (1) In case the total amount of work done is less than 5% of the contract value, prorata S.D. to that extent shall be refunded to the contractor while releasing the payment of final bill. In short the S.D. to be retained by the corporation after payment of final bill shall be equal to 2% of the amount of final bill as per prevailing norms or as per the norms decided from time to time.
- (2) The additional Security Deposit shall be recovered from the running bills when the total amount of work done by contractor upto the running bills under consideration is more than 5% of the contract value. However, such S.D. shall be recovered in round figure of Rs. 1000/- i.e. the amount of work done when exceed 5% of the contract value, it shall be rounded off to the nearest multiple of Rs. 1000/-. Such additional Security Deposit (Total 4% of the additional amount) shall be recovered for the work amounting to Rs. 5 lacks or more.

**GC-101 RECOVERY OF CHARGES FROM ORIGINAL CONTRACTOR FOR RE-ADVERTISING**

If the contractor fails to complete the work and the Additional City Engineer on behalf of the corporation take action in accordance to 2(a) or (b) or (c) of the contract, in such cases, the remaining work has to be carried out by advertising the tender for the remaining work and the whole administrative process right from inviting the tenders to finalizing the tender etc. will have to be carried out by SMC. For this repetition a fixed amount of Rs. 1000/- shall be recovered from the original contractor towards the cost of re-advertisement and other administrative charges incurred by the department in finalizing the contract for the remaining work. In case however a separate advertisement is issued for a single work, actual cost of advertisement shall be recovered.

**GC-102 LABOUR CESS / CONSTRUCTION CESS.**

**The Bidders shall have to be noted that, labour cess shall be deducted from the running bill as per the Government rules and regulations. Accordingly, the intending bidder shall quote their competitive rates. More over it is also to be noted that, labour cess is already considered in the estimated rate of the tender.**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**SURAT MUNICIPAL CORPORATION**

**HYDRAULIC DEPARTMENT**

**SPECIAL NOTE**

- 1) The work shall be carried out strictly according to the Specifications given in Bombay Public Works Department Hand Book Vol.1 and IT (The latest edition) whenever applicable as directed by Hydraulic Engineer.
- 2) The work shall have to be started by the contractor at as many places as ordered by the Hydraulic Engineer.
- 3) Cement required for construction purpose for this work shall be supplied by the contractor at his own cost.
- 4) The fire wood, white zink, sand, bricks, reinforcement steel, metal, gravel, manhole frame cover, rubber packing, nuts, bolts etc. required for the work shall be provided by the contractor at his own cost.
- 5) The contractor shall have to keep chowkidar and red lights (of a proper size) during night on phen trenches during the progress of the work and untile the trench or pit is completely refilled. Proper barricading shall be provided by the contractor to avoid accident during day and night time. Red flags road closing board etc. and such other precautionary measures shall have to taken by the contractor. If the contractor fails carry out the above precautionary measures, Hydraulic Engineer shall engage, even without giving a notice to the contractor wherever the situation demands quick action for the chowkidar, places, necessary red lights and manage to guard the trenches all the expenditures so incurred shall be recovered from the contractor form his bill or deposit. The contractor will have no right to dispute the action taken by the Hydraulic Engineer.
- 6) The contractor shall always have to inform the Electricity Co.,Telephone and Telegraph office and Gujarat Gas Office and other under lying services, agencies before starting the excavation work.
- 7) During excavation or carrying out of any item of the work, any electric pole, electric cable, telephone cables, telegraph cable, gas line, drain connection pipeline, water service pipeline, sewer main, water mains, etc. is/are damaged by the contractor shall be liable to pay the full expenditure required and to repair the same or charges for the same (as the case may be) decided by the electric company, Gas Company, Government Authority or the Mahanagar Seva Sadan which ever may be.
- 8) It shall be the responsibility of the contractor to guard the cables etc. mentioned above wherever they exposed in an open trench and any damage done to then from what so ever reasons shall be made good at the risk cost of the contractor.
- 9) The trench excavated for the work shall be properly barricaded. Proper signals and caution, red flags, ared lamps etc. shall be displayed on both end of the trench and at every crossing and at suitable distance wherever found necessary. Similarly to avoid any accident the red lamps of proper size shall be displayed so as to make visible the danger or main road to distance at night.



If accident occurs for want of sufficient precautionary measures the entire responsibility be of the contractor only.

Contractor shall have to provide wooden planks etc., reasonable distance on the trench, for the purpose of crossing the trench for the public. The materials also shall be kept site in such away so that they may not cause any inconvenience to the traffic and passer by.

- 10) In case for want of necessary materials or the holding of any public function, marriage ceremonies, procession etc., If the order is issued to the contractor to fill up the trench to stop the progress of the work or to delay the begging of excavation of the work at any stage in any locality or localities he shall have to comply with such orders shall given no compensation for such delay and or stoppage of work.
- 11) Wherever it is mentioned in the above conditions that a certain expenditure will be recoverable, the recovery will governed in the way as specified in the agreement or in the general condition.
- 12) The work shall be carried out in workman like manner, and best skilled worker should be employed. If any defect in the work is found out the contractor shall have to rectify within the time fixed by Hydraulic Engineer. If the fails to rectify the defect Hydraulic Engineer after giving due notice shall rectify the defect at the risk and cost of the contractor.
- 13) All the work shall be done strictly according to the instruction of Hydraulic Engineer.
- 14) After the pipeline is laid and before refilling the trench in the materials used in the line shall be checked and noted in the presence of Hydraulic Engineer or his Assistant and the contractor or his authorised representatives. After refilling the trenches surplus excavated earth should be carted and the road surface should be scraped and cleaned by the Contractor at his own cost, as directed by the Engineer-in-charge.
- 15) No compensation shall be paid if the work is stoped due to defective work or as per the instruction from Engineer-in-charge due to any reasons.
- 16) After the line out is given for a particular pipeline the work shall have to be completed by the contractor with least possible delay, and within the period fixed by the Hydraulic Engineer.
- 17) The contractor shall have to use his own tools, plants and machinery required for these works.
- 18) The rates given in the schedule shall hold good for all works done under this contractor without reference to quantities or location of work..
- 19) The contractors are particularly directly to observe from the specification what is to be included in the items and rates for the several portion of the work frame out all their rates for items accordingly.
- 20) All the rates must be carefully entered by the tenderer and no variations of alternation there in will be allowed by commissioner on any account after the tenders are opened.
- 21) The time-limit of the contract for the said work shall includes the period of monsoon.
- 22) The date of starting of the work is considered to be the date specified in the final work order.



- 23) The civil works when completed before the time limit excepting the connections to be made, the balance of the period of time limit will again be given to the contractor, when other department in the meantime finish/ complete their works like connection etc. It may be noted here that when the other department completes their job, the contractor concerned will resume again immediately to finish the work in balance period of the time limit only.
- 24) Liaising with the any Government / Semi-Government / Private Parties like Farmer / Residential etc. shall be in the scope of Contractor for the purpose of laying out the pipe line.
- 25) No advance payment of mobilization advance or payment against procurement shall be made /entertained.
- 26) S.M.C. shall not be responsible for any wastage of material. All wastage shall be accounted on the part of the contractor. No payment for such wastage shall be maid.
- 27) Surat Mahanagar Seva Sadan will not give any amount of interest in case of delayed payment of running bill, final bill or any arise by the contractor.
- 28) If any clause of Arbitration is there in tender document, the same is deleted here with.
- 29) **For laying pipeline parallel to Road and crossing the pipeline across the Railway / NHAI or State High Way Road / Canal permission from the concerned authority i.e. Railway, Highway, Irrigation etc. liesaning shall be in the scope of bidder at his own cost .**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

Contractor's Signature:-

Address :-

Date :-

Place:-



## **6.0 SPECIAL CONDITIONS OF CONTRACT:**

The following conditions treated as part of the tender documents.

### **1. GENERAL :-**

Clause given under these special conditions shall be read in conjunction with conditions of the contract and in case of any conflict the provisions of special conditions will override the provisions of general conditions of contract. The tendered shall acquaint himself with the access to site, availability of local facilities such as transport, materials, labour and shall price his tender accordingly.

### **2. PREPARATION OF SITE:**

The existing trees of any girth and height in the area of site shall be cut by the Contractor, including removing the roots, leveling the area and stacking the cut trees away from site of work and demolition of existing structure and pipeline as directed.

### **3. ROAD INFRASTRUCTURE:**

The bidder shall acquaint himself with the access to site. The successful tenderer shall have make road and other infrastructure facility for the easy access to the site at his own cost.

### **4. SAFETY:**

All the safety and entry 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.

### **5. TIME SCHEDULE:**

The work shall be executed strictly as per the time schedule / bar chart submitted along with price bid offer. The entire job / project has to be completed with a period of **21 (Twenty One) months Excl. Monsoon** from the date of placement of order. The time includes the time limit 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 important for the citizen of Surat City, and hence weightage will be given on strict compliance of work as per the sanctioning schedule of work.

### **6. PENALTY FOR DELAY:**

If the Contractor fails to complete the whole project by the stipulated completion date, he shall also pay liquidated damage at one fifth of one percent i.e. 0.2% of tender amount per day of delay in completion and handing over the work to the Municipal Corporation. The amount of liquidated damages shall however be subjected to maximum of ten (10) percent of the tender amount. Delays in excess of one hundred days will be a cause for termination of contract and forfeiture of all per performance security.



## 7. SCOPE OF SUPPLY OF MATERIAL

(a) All materials, consumables, testing appliances, tools, tackles and spares etc. necessary for the successful execution completion, till handing over to SMC shall be procured and provided by the tenderer. No materials will be supplied by the owner except mention in Schedule A.

(b) **Water:**

Contractor shall have to make his own arrangement for water required for construction, testing and for his labour / employees too or as per GC-91.

(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. The S.M.C. will issue only recommendation letter to the Contractor if required. No compensation shall be paid for delay in getting power supply.

(d) **Cement :**

Cement required for the construction, erection works shall be procured by the Contractor.

The cement to be used shall be grade 43/53 and out of following brands only.

1. Ultratech.
2. Ambuja.

(e) **Steel :**

All TMT (Fe-500) shall be procured by the contractor.

The reinforcement steel bars shall be only following makes :

1. SAIL.
2. TATA
3. Rastriya Ispat (RINL) VIZAG.
4. Electrotherm (I) Ltd.
5. JSW Steel Ltd.

**Contractor will have to produce Bill / T.C. in the name of said Project / Contactor from respected Steel Company, time to time and as asked by the Engineer-in-charge.**

Structure steel required for construction, erection and other allied job, shall be procured by the Contractor at his own cost.





8. **LABOUR AND SUPERVISORY CAMPS**

No land will be provided by the SMC to the Contractor for constructing his labour and supervisory camps and other service facility. Contractor shall make his own arrangements outside the site boundary.

9. **CONSTRUCTION EQUIPMENTS:**

The Contractor shall make his own arrangements to procure all constructional plant equipments on 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 sit are not to be removed from there without the written authority 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.

10. **CO-OPERATION WITH OTHER CONTRACTORS:**

The Contractor shall execute his work in phased manner as directed by the Engineer from time to time so as not to obstruct or retard the work being executed simultaneously by other agencies.

11. **SAFETY:**

The Contractor shall be responsible for provision of safety arrangement and protective clothing for all operators on the site whether or not engaged in actual operation of supervision. The Contractor shall also be responsible for safety arrangements of all equipment used for construction and shall employ trained workmen conversant 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 certificate 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 in completion with the Contractor he 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 provided 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.

12. The Contractor shall have to take photographs during various stages of construction activity for each of the work at no extra cost. The photograph shall be of size 4" x 6" on mat paper. The number of photographs shall not be less than 160.

13. No mobilization advance will be paid.

14. Extra item of work shall not vitiate the contract. The Contractor shall be bound to execute extra items of work as directed by the Engineer-in-charge. The rate for extra item shall be derived from the **S.O.R. (R & B Division, Surat) of Year 2015-16 or GWSSB SOR 2014-15** and quoted premium of the tender. If the rate of the extra item is not available in S.O.R. than it will be derived on



prevailing market rates. However, the decision of the Engineer-in-charge shall be final and binding to the Contractor.

15. It is further to clarify that, the security deposit deducted from each running bill will be released after the completion of defect liability period. The security deposit remitted by the Contractor will be released after the payment of the final bill.
16. No compensation of any item shall be paid in case any of the item is omitted i.e. not executed at all.
17. It is to clarify once again that, the serviceable materials obtained during dismantling / clearing of the site shall have to be carted by the Contractor at the places shown by the Engineer-in-charge any where within city limit.
18. 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 prevailing from time to time.
19. Surat Municipal Corporation shall not provide "C" for tax purpose.

**20. LEAKAGES FOUND IN PIPELINE:-**

After each section of the pipeline has been completed it shall be tested for water tightness. The ends shall be suitably closed with a valve, cap or plug or a blank flange. The pipe line shall then be filled with water, pressure shall then be supplied with a hand force pump upto 7 Kg/ square centimeter (above 100 lbs/ square inch) or 15 percent, above the highest working pressure in the line whichever is more. When the pipe is laid on an appreciable gradient, the test shall be carried out at the upper end of the section. Any leaking joints shall be made good and the test repeated until a perfectly leak proof pipe line obtained. If any defect/ leakages, regarding connection of the pipe or joints or fixing of sluice valves, Air valves, Scour valves, Fire Hydrants or any other specials etc. or any other defects/ leakages connecting the line or any joints is traced out leaking, during the progress of work and during period of Twelve months after the commissioning of that particular works or Eighteen months after satisfactory completion of work which ever is letter, the same shall have to be repaired by the contractor at his own cost and risk. On failing to do so, Municipal Corporation shall proceed to rectify the defects after giving 24 hours notice by instruction to the contractor and charged shall be recovered for those leakages which repaired by Surat Municipal Corporation as under:

Size of Leakage joint	Amount Rs.
100	3,000.00
150	3,300.00
200	3,700.00
250	4,500.00
300	5,200.00
400	6,500.00
450	7,500.00
500	8,000.00
600	10,000.00
750	12,000.00
813 M.S. welding joint	6,500.00
914 M.S. welding joint	6,750.00



1016 M.S. welding joint	7,500.00
1219 M.S. welding joint	9,600.00
1524 M.S. welding joint	12,000.00

Further any defect found in the material of pipe, specials, valves etc. in the laid line shall be made good by replacing the same as directed by the Engineer-in-charge. No extra payment shall be given by the SMC for this work. On failing to rectify the damage portion within three days from the instruction to contractor, SMC will rectify the same as its own discretion and all the expenses incurred against rectification will be recovered from the contractor

21. **“The Contractor shall depute technical person/personnel having adequate experience of same kind of work to whom contractor may rely upon him / them as it the sole responsibility of the contractor regarding the quality and safety executed work. Details about these personnel shall be submitted along with the tender in the format prescribed by The Surat Municipal Corporation in this tender.”**
22. Supervision of the work shall be done by The Surat Municipal Corporation. It may / may not appoint a person or a firm/consultant as a PMC (Project Management Consultant) and or TPI (Third Party Inspection) for day to day close supervision at above work site. Contractor shall have to provide every assistance to them and shall have to obey and implement the instruction received from the person or a person of a firm/consultant, appointed by Surat Municipal Corporation. Contractor shall not have any objections in this context.
23. The Contractor shall prepare and submit report of daily activities in a Performa, which shall be approved by Engineer-in-charge before start of work. The daily report shall specifically include details like items executed with respective quantities, materials received on site, materials consumed, etc. In general the Performa and details to be provided in daily report shall contain all necessary information as required by the Engineer-in-charge. During execution of work the Performa shall be modified, if desired by the Engineer-in-charge to accommodate relevant necessary details about daily activities.
24. If cement is required to be used in quantity of less than 50 kg. (i.e. less than one full bag e.g. 25 kg), the same shall be weighed and packed in advance and then only it shall be used in concrete work.
25. The Contractor shall construct and provide totally watertight godown building for storage of cement. The sidewalls of godown shall have minimum 230 mm thick brick masonry walls plastered on both faces. The roof can be either of leak proof reinforced concrete slab or adequately sloped watertight galvanized / asbestos sheets. Windows / doors shall be normally kept tightly shut to prevent moisture / rain water from entering into the godown. Height of plinth shall be at least 600 mm above natural ground level and such that it permits convenient loading / unloading operations from truck. The floor of the godown shall be at least 150 mm thick densely compacted concrete slab on rubble soling with proper line, level and slope.

Wooden planks or sleepers covered with plastic sheets shall be kept on the floor and the cement bags stored on top of it. Bags shall not be stored more than 10 bags high. Bags shall be stored at least 300 mm away from the walls. Exhaust fans shall be installed on blank walls to improve ventilations. Necessary lighting and heating arrangement shall be installed on walls at suitable locations. Stacking of bags shall be such that it can be easily counted and permits movement of personnel for the purpose. The godown shall have lock with two sets of keys. One set of keys



shall always remain with the Engineer-in-charge, without whose permission addition, removal or any change in stack of bags stored shall not be allowed.

26. "The contractor shall have to keep the record of the labourers employed for the concerned work. The contractor should provide attendance card, identification card, pay slip etc to the labourers employed. Further, the amount of E.S.I. and Provident Fund should be deducted from the salary of the labourers employed and such amount should invariably be deposited to the concerned Government Departments. In addition, the amount of social security under E.P.F. and M.P. act 1952 shall be recovered every month and such amount should invariably be deposited directly to the concern Government Departments. In the same context, the details regarding such amount deposited to the concern Govt. Dept. and labourers employed shall be furnished to the office of Hydraulic Department of S.M.C. every month. In case of failure, such amount shall be deducted / recovered from the running bill directly in accordance with the details given by contractor regarding labourers employed and as per the prevailing rules of Government. In absence of detail, an ad-hoc suitable amount of the total amount of work done shall be recovered directly from the running bills. On submission of evidence of recovery of such amount, the amount recovered /deducted shall be released in the next bill after due sanction of Competent Authority of S.M.C."

27. "Steel frame work (H-frame) is preferred for scaffolding of pumphouse top slab. No extra claim will be entertained to contractor for such scaffolding.

**28. WASTAGE OF CEMENT & REINFORCEMENT.**

The weight of reinforcement shall be computed on the basis of the length of the steel used in the work multiplied by the standard unit weight of TMT Fe-500 bar as mentioned in IS code No.1786. Based on standard theoretical total consumption, penalty shall be levied as below against variation for actual consumption.

**CEMENT:**

- (a) No penalty, if actual total consumption matches with standard theoretical total consumption.  
(b) If actual consumption is less than up to 5% than standard theoretical consumption. Penalty of Rs. 4,800/- per M.T. for variation up to minus 5% will be recovered.  
Rs. 9,600/- per M.T. for variation up to beyond minus 5% actual total consumption against standard theoretical total consumption

**REINFORCEMENT STEEL:**

- (a) No penalty if actual total consumption matches with standard theoretical total consumption.  
(b) Rs. 37,000/- per M.T. for TMT for variation upto – (Minus) 7.5% in actual total consumption against standard theoretical total consumption.  
(c) Rs. 74,000/- per M.T. for TMT for variation beyond – (Minus) 7.5% in actual total consumption against standard theoretical total consumption.

29. Concreting should be done with automatic digital way batch mixing machine having capacity of 8 C.M./Hr. with necessary required accessories and equipments.

30. If any service tax levied by the Government during the course of execution of this contract shall be borne separately by S.M.C, provided the original receipt / proof for the amounts actually



remitted by the successful bidder to the competent authority be submitted with in 30 (Thirty) days from the date of payment. Thereafter, S.M.C shall not be held responsible for any such dues/payments, not paid by the contractor. In short, the contractor shall be sole responsible for the payment of the service tax, if any, applicable during the course of execution of this contract. S.M.C will not entertain any claim regarding service tax later on.

31. Any tests mentioned in the tender or else suggested by any consultant/consultants i.e. (PMC) Project Management Consultant and or (TPI) Third Party Inspection shall be conducted, managed by the contractor along with the representative of the Surat Municipal Corporation, at his/their own cost. Moreover, contractor's duly authorised representative shall remain present with them at the time/place of sampling and testing.
32. Interest of any kind what so ever shall never be paid/ entertained in any case including delayed payment of Running bill or final bill or any such or all dues with Surat Municipal Corporation.
33. The approved brands/makes mentioned in the tender for the Cement and Reinforcement steel has been unchanged. However, in case of non availability of Cement / Reinforcement steel from the approved manufacturers, any brand used either in the world bank promoted projects or purchased by the Central Stores of the Surat Municipal Corporation may be allowed to be used, after written application by the contractor & consequent prior approval from the Engineer-in Charge.
34. Mix design for the required grade of concrete and of selected brand/make of cement shall have to be pre-approved from the consultant/Engineer in charge, prior to execution.
35. If the document (either original / Digitally Signed) attached with this tender are found false or misleading then the EMD will be forfeited, more over such bidders are liable for debarred or even black listed from this corporation.
36. The contractor should have to prepare all the drawings / designs for all the temporary structures / staging / scaffolding / shuttering etc. Such details may have to be prepared by any renowned/reputed consultant as may be decided by the contractor.
37. The Contractor shall have to prepare and display the board (on site or at required interval when the work is not in define area) showing details, specifications of work and Name, Address, Phone no. & Fax no. of concern Executive Engineer at his own expenses. If the contractor fails to do same or till he doesn't inform the concern Executive Engineer with photographs of Boards, 0.25% to 1.00% of Tender Amount will be retained with Surat Municipal Corporation.
38. 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.
39. 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 Surat Municipal Corporation, along with copies of Pay Roll and Muster Roll. If the same are not produced, the bills will not be released.
40. The Contractor shall have to start all the work simultaneously.



41. Location of proposed work given in this tender may be changed by Surat Municipal Corporation in East & South East Zone of SMC. In any such case, due to change of location of proposed work in this tender, no extra claim/compensation what so ever with respect to sanctioned tender will allowed on the part of Contractor. However, time limit as per tender will be considered from the date of handing over possession of land of Contractor.
42. The Contractor shall have to dispose off Construction & Demolition waste at SMC suggested place / site as per norms of SMC. Otherwise SMC will dispose the waste & charges decided by SMC will be recovered from contractor.
43. **Hydro Test for the MS water main shall be in scope of contractor at his own cost & risk. Water will be supplied by S.M.C. for hydro-test.**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



## 7.0 QUALITY ASSURANCE PLAN

The Contractor shall strictly follow the Quality Assurance Plan, in order to ensure good quality of materials and works. All tests, etc. which are mentioned in the Quality Assurance Plan, shall be in addition to manufacturer's test certificates.

For all field tests, the Contractor will set up a field laboratory on site. It shall have all equipments necessary to carry out requisite field tests in confirmation to relevant IS codes of practice. The Contractor shall get approved the setup of field laboratory, persons responsible for field testing, equipments to be used for field testing, reporting format for field tests, etc. with the Engineer-in-charge within 15 days from the date of work order. All field tests shall be performed on site in presence of the Engineer-in-charge. Reports for the field tests shall be submitted on the same day to the Engineer-in-charge. All reports of the manufacturer's test, field test, laboratory test, etc. shall be property of the SURAT MUNICIPAL CORPORATION

The frequency of sampling shall be as given in the table. The frequency and number of samples to be tested mentioned herein are minimum. The Engineer-in-charge may ask the Contractor for more samples to be tested. If the frequency of sampling and number of samples required to be tested, as specified in technical specifications / relevant IS code of practice is more than those mentioned herein, the guideline mentioned in technical specifications / relevant IS codes of practice shall be followed. The method of sampling, size of sample, method of testing and all testing equipments shall conform to relevant IS codes of practice. The identification of various IS codes for confirmation of test method are mentioned only for general guideline to the Contractor. This does not restrict application of other relevant / applicable IS codes for the test under reference. All expenses for field tests, required setup on site, equipments for field – testing, reporting formats, laboratory tests, etc. shall be borne by the Contractor. Execution of any item of works shall start only after submission of required manufacturer's test certificates, field test reports and laboratory test reports for relevant materials / item of work, provided they are in confirmation with detailed technical specifications of the tender and requirements of relevant / applicable IS codes of practice. In no case delay in execution due to non-availability of test report shall become cause for any claim or extra payment to the Contractor.

Sr. No	Material/Item of Work	Tests to be performed	Type of Test	Frequency of Tests
1	Water	Physical and chemical tests (Confirming to IS:3025-1964)	Laboratory	<ul style="list-style-type: none"> <li>At the beginning of work</li> <li>Whenever source changes</li> <li>As provided in relevant IS.</li> </ul>
2	Cement	Fineness Soundness Consistency Initial and final setting time Compressive strength (Confirming to IS:4031-1968)	Laboratory Laboratory Laboratory Laboratory	<ul style="list-style-type: none"> <li>After minimum 2000 bags.</li> </ul>



Sr. No	Material/Item of Work	Tests to be performed	Type of Test	Frequency of Tests
3	Coarse Aggregates	Particle size, shape, gradation, flakiness index, elongation index Deleterious materials and organic impurities Specific Gravity, voids, absorption, surface moisture content Mechanical properties Soundness Alkali Aggregate reactivity Abrasion (Confirming to IS:2386 and 383)	Field/Lab  Field/Lab.  Field/Lab.  Laboratory Laboratory Laboratory Laboratory	<ul style="list-style-type: none"> <li>At the beginning of work</li> <li>Whenever source changes</li> <li>At least once in 90 days</li> </ul>
4	Fine aggregate	Particle size, shape and gradation Deleterious materials and organic impurities Specific Gravity, voids, absorption and bulking (Confirming to IS:2386 and 383)	Field/Lab.  Field/Lab.  Field/Lab.	<ul style="list-style-type: none"> <li>At the beginning of work</li> <li>Whenever source changes</li> <li>At least once in 90 days</li> </ul>
5	Reinforcement steel	Ultimate tensile stress, yield stress, weight and size, bend and re-bend test, elongation test Manufacturer's test certificate	Laboratory	<ul style="list-style-type: none"> <li>At the beginning of work</li> <li>For every 25 MT of each category of steel</li> </ul>
6	Stone	Toughness (IS:5218-1969) Impact Value (IS:5640-1970) Strength (IS:1121-1974) Durability (IS:1126-1974) Abrasion Resistance (IS:1706-1972) Weathering (IS:1125-1974) Water absorption S.G. porosity (IS:1124-1974) Weight and size	Laboratory Laboratory Laboratory Laboratory  Laboratory Laboratory  Field/Lab.	<ul style="list-style-type: none"> <li>At the beginning of work</li> <li>Whenever source changes</li> <li>At least once in 90 days</li> </ul>





Sr. No	Material/Item of Work	Tests to be performed	Type of Test	Frequency of Tests	
				Quantity of concrete in CM	No. of samples
7	Concrete	Compressive strength (Conforming to IS:516-1959)	Field/Lab.		
				<ul style="list-style-type: none"> <li>• up to 50</li> <li>• 51 and above</li> </ul>	<ul style="list-style-type: none"> <li>• 2 sets*</li> <li>• 3 sets plus one additional set for each additional 50 CM or part thereof.</li> </ul> <p>*(set means 3 nos. of cubes)</p>
		Workability using slump test or compacting factor test or Vee-Bee test	Field/Laboratory	<p>Note :</p> <ol style="list-style-type: none"> <li>1 At least one sample shall be taken from each shift.</li> <li>2 Three test specimens shall be made for each sample for testing at 7 and 28 days and 1 stand by for confirmatory test if required</li> <li>3 At least twice in a day</li> </ol>	
8	Any other material or item of work.	As per tender specification / relevant IS Codes / as directed by Engineer-in-charge.			

All laboratory tests shall be conducted at the laboratory, which is approved earlier by the Engineer-in-charge and the test reports shall be submitted to the Engineer-in-charge.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:

NAME AND ADDRESS:

DATE:



## 8.0 APPROVED LIST OF VENDORS

**Cement** : Ambuja, Ultra tech, conforming to IS: 12269 of 53 grade (OPC only)

**Steel** : Reinforcement Steel: TMT Fe 415/ Fe500  
TATA, SAIL, RINL (VIZAG),  
Electrotherm (I) Ltd. & JSW Steel Ltd. (Conditional).

**Butterfly valve:** Indian Valve Co., Nasik  
Kirlosker Brothers Ltd., Mumbai  
Fouress Engineering (I) Ltd., Bangalore  
INDIAN VALVE INTERNATIONAL, KOLKATA

**Air Valve** : IVC, Fouress, Kirloskar,IVI, UPADHYA, AVISHKAR, SHIVA, BALAJI, JUPITER, DALUI,  
KESIN, SACHDEVA

**Sluice Valve** : **AS UNDER**

<u>Sr.No.</u>	<u>Name of Manufacturer</u>	<u>Brand Name/Make</u>
1	KIRLOSKAR BROTHERS LTD., MUMBAI	KIRLOSKAR
2	INDIAN VALVE CO., NASIK	IVC
3	FOURESS ENGINEERING (I) LTD., BANGLORE	FOURESS
4	INDIAN VALVE INTERNATIONAL, KOLKATA	IVI

**Note:** Above Equipments / items / Products are indicative. The Product / Make shall have to pre-approve from the Engineer-in-charge prior to Execution / Procurement. The decision of the Engineer-in-charge shall be final and binding to the contractor.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**SURAT MUNICIPAL CORPORATION**  
**HYDRAULIC DEPARTMENT**  
**SURAT SMRAT CITY DEVELOPMENT LIMITED (SSCDL)**

**TENDER NOTICE NO.(ON LINE)**

**GM(Water-Energy)/SSCDL/HYD/ABD(1-B)/01/2016-17**

.....

**NAME OF WORK:-** Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.

<b><u>VOLUME: II</u></b> <b>GENERAL TECHNICAL SPECIFICATIONS</b> <b>&amp;</b> <b>ITEMWISE TECHNICAL SPECIFICATIONS</b>
---

<b>LAST DATE OF ONLINE SUBMISSION OF TENDER:</b> <b>(i.e NECESSARY DOCUMENTS, CERTIFICATES, ETC.)</b>	<b>Dt. 23.02.2017</b> up to 18:00 hrs. (On line)
--	---

<b>LAST DATE OF SUBMISSION OF TENDER FEE &amp; E.M.D IN</b> <b>HARD COPY</b>	<b>: On or Before Dt. 04.03.2017</b> up to 17:00 hrs.
---	--

***(BY SPEED POST / RPAD THROUGH POSTAL AUTHORITY ONLY)***

**To be Submitted to**  
**The Chief Accountant,**  
Accounts Department,  
**SURAT MUNICIPAL CORPORATION**  
Muglisara, Surat-390 003.



**INDEX**

<b>SR. NO.</b>	<b>PARTICULARS</b>	<b>PAGE NO.</b>
<b>9</b>	<b>TECHNICAL SPECIFICATIONS</b>	<b>3</b>
9.1	Preabmble	3
9.2	General Specifications of Materials	7
9.3	Item wise Detailed Technical Specifications for Civil Works	15
<b>10</b>	<b>GENERAL PERFORMANCE DATA</b>	<b>186</b>
10.1	Declaration by the Tenderer	187
10.2	Tenderer's/Contractor's/Certificate/Undertaking	188
10.3	Details of Proprietor / Partners of the Firm	189
10.4	Details of Technical Personnel who shall be immediately Deputed for this Work	190
10.5	Tenderers proposed Completion Schedule in the form of BAR / PERT / CPM Chart or any other method as approved by SMC	191
10.6	Request for Refund of EMD	192
10.7	Advanced Stamp Receipt	193
10.8	Memorandum	194
<b>11</b>	<b>DRAWINGS</b>	<b>195</b>
11.1	Alignment of pipeline	
11.2	Sarthana- Simada Khadi Crossing	
11.3	GAD of Pipe Pushing at Ahmedabad-Mumbai Railway Line	

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

DATE :



## 9.0 TECHNICAL SPECIFICATIONS

### 9.1 PREAMBLE

1. In the specification “as directed” / “approved” shall be taken to mean, “as directed / approved by the Engineer-in-charge”.
2. Wherever a reference to any Indian Standard appears in the specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.
3. In “Mode of Measurement” in the specification wherever a dispute arises in the absence of specific mention of a particular point or aspect, the provisions on these particular point or aspects in the relevant Indian Standards shall be referred to.
4. All measurements and computations, unless otherwise specified, shall be carried out nearest to the following limits.

(i)	Length, width and depth (height)	..	0.01Mt.
(ii)	Areas	..	0.01Sq.mt
(iii)	Cubic Contents	..	0.01Cu.mt.

In recording dimensions of work the sequence of length, width and height (depth) or thickness shall be followed.

5. The distance, which constitutes lead, shall be determined along the shortest practical route and not necessarily the route actually taken. The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specified, it shall mean “all leads”.
7. Definite particulars covered in the items of work, though not mentioned or elucidated in its specifications shall be deemed to be included therein.
8. Any material specified in detailed specification of items shall be of quality and property as mentioned in the respective general specifications of materials mentioned in this tender.
9. Approval of the samples of various materials given by the Engineer-in-charge shall not absolve the Contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The Contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
10. The contract rate of the item of work shall be for the work completed in all respects.
11. No collection of materials shall be made before it is got approved from the Engineer-in-charge.

Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.



12. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
13. No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage on overloading of the various components of the structure.
14. All work shall be carried out in a workmanlike manner as per the best techniques for the particular item.
15. All tools, templates, machineries and equipments for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall be kept in sufficient numbers and in good working condition on the site of work.
16. The mode, procedure and manner of, execution shall be such that it does not cause damage or over-loading of the various components of the structure during execution and after completion of the structure.
17. Special modes of construction not adopted in general Engineering practice, if proposed to be adopted by the Contractor, shall be considered only if the Contractor provides satisfactory evidence that such special mode of construction is safe, sound and helps in strength and quality. Acceptance of the same by the Engineer-in-charge shall not, however, absolve the Contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of the work.
18. All installations pertaining to water supply and fixtures thereof as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the Contractor.
19. The Contractor shall be responsible for observing the rules and regulations imposed under the "Minor Minerals Act" and such other laws and rules prescribed by Government from time to time.
20. All necessary safety measures and precautions (including those laid down in the various relevant Indian Standards) shall be taken as also of the work itself.
21. The testing charges of all materials shall be borne by the Contractor.
22. Approval to any of the executed items for the work does not in any way relieve the Contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications.
23. All works shall be carried out strictly as per detailed technical specification provided in the tender. If not specified, the work shall be executed according to relevant applicable IS codes and standard engineering practice. In such case decision of the Engineer-in-charge shall be final and binding to the Contractor and in no case the Contractor will claim any extra for the same.



24. If Tenderer feels that detailed technical specifications for item mentioned in Schedule “B” are not provided with the tender, he will raise such points before quoting rates and submitting the tender. No claim on the basis of such argument shall be entertained during the course of work.
25. All measurements shall be considered as mentioned in the drawings / schedule / detailed specifications.
26. The Schedule of Quantities and Rates are to be read for the purpose of pricing in conjunction with instructions of tenderers, technical specifications, drawings and General conditions for contract for Civil works.
27. The price quoted in the summary of costs, sheets of schedule of quantities and rates shall be of all inclusive value for the work described including all costs and expenses which may be required in for the execution of the work described together with all general risks, liabilities and obligations set for ther or implied in the document on whoich the tender is based.
28. The quantities furnished are approximate. In the even of actual quantities varying form those furnished herein below or items detailed or added. the percentage (plus/minus) quoted for the entire work shall remain, firm and no extra claims in this respect will be entertained. The payment shall be made based on the actual quantities in the complete work.
29. All works shall be carried out strictly as per detailed specification whther actually specified or not If not specified, as per directions of owner/Engineer-in-charge.
30. Percentage (plus/minus) quoted by tenderer shall be firm even if the contract is split.
31. Percentage (plus/minus) and the total amount entertained in the summary of cost. sheet of schedule of quantities and Rates shall be written in ink and shall be entered both in figures and words.
32. Detailed specifications of items of work are described under section Detailed technical Specification for each item of schedule of quantities and Rates. The section gives guidelines to the reference of relevent clauses of specifications and mode of measurement, Tenderer shall read this in conjunction with other technical specifications and quote accordingly.
33. The measurements shall be as described in the detailed Technical specification of items of work, all measurements being not in accordance with the drawings with no allowance for waste.
34. If Tenderers need any clarifications, they should obtain the same in writing from Owner/ Engineer-in-charge. No notice will be taken of any verbal discussion in such matters.
35. For the work to be carried out at river bed level, contractor has to make his won arrangement for dewatering/ diverting river water or sub soil water by making katcha earthen dam, applying dewatering ump or any other mean convient as per site condition.
36. If Tenderers need any clarifications, they should obtain the same in writing from Owner / Engineer-in-charge.



Mm	Millimetres
Cm	Centimetres
Mt.	Metres
Km.	Kilometres
Sq.mt.	Square Metres
Cu.mt.	Cubic Metres
R.Mt.	Running Metres
No.	Numbers
C.I.	Cast Iron
R.C.C.	Reinforced Cement Concrete
Wt.	Weight
Kg.	Kilogram
M.T.	Metric Tonne
M.D.	Metre Depth
M.S.	Mild Steel
I.S.	Indian Standard

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:





## **9.2 GENERAL SPECIFICATIONS OF MATERIALS**

### **M-1 Water**

- 1.1 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 alkalis, 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.
- 1.2 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.
- 1.3 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.
- 1.4 Hard and bitter water shall not be used for curing.
- 1.5 Potable water shall generally be found suitable for curing mortar or concrete.

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

- 2.1 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.
- 2.2 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 colour. Lime in form of porous lumps of dirty white colour, indicates quick lime, and solid lumps indicate 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.
- 2.3 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.
- 2.4 Field-testing shall be done according to I.S. 162-1974 to show the acceptability of materials.

### **M-3 CEMENT**

- 3.1 Cement shall be ordinary Portland cement as per I.S. 269-1989 or Portland slag cement as per I.S. 455 –1989.



**M-4 WHITE CEMENT:**

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

**M-5 SAND:**

5.1 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, alkali, salts, organic matter, 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.

5.2 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 – 50

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

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:**

6.1 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 not deleterious reaction with cement.

6.2 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%

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



- 6.4 The necessary tests for grid shall be carried out as per the requirements of I.S. 2386 (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:**

- 7.1 LIME: Shall conform to specification M-2. WATER: water shall conform to specification M-1. SAND: Sand shall conform to specification M-5.
- 7.2 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 sand shall be measured by volume.
- 7.3 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.
- 7.4 STORAGE: Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.
- 7.5 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:**

- 8.1 Water shall conform to specification M-1. Cement shall conform to specification M-3. Sand shall conform to M-5.
- 8.2 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 cu.m. The mortar may be hand mixed or machine mixed as directed.
- 8.3 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.
- 8.4 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 FOR NOMINAL MIX:**



- 9.1 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.
- 9.2 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 6 mm. less than the cover whichever is smaller.

TABLE

I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size		Sieve	I.S. Sieve Designation	Percentage passing for single sized aggregates of Normal size		
	40 mm	20 mm			40 mm	20 mm	16 mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10.00 mm	0-5	0-20	0-30
40 mm	85-100	100	-	4.75 mm	-	0-50	0-50
20 mm	0-20	85-100	100	2.36 mm	-	-	-
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.

- 9.3 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 arrangement shall be stored separately and handled in such a manner as to prevent the intermixing 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:**

- 10.1 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.
- 10.2 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.
- 10.3 The necessary tests indicated in I.S. 383-1970 and I.S. 456-2000 shall have to be carried out to ensure the acceptability of the material.
- 10.4 If aggregate is covered with dust it shall be washed with water to make it clean.



**M-11 BRICK BATS AGGREGATE:**

11.1 Brick bat aggregates 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 brickbats shall be of 40 mm to 50 mm size unless otherwise specified in the item. The under burnt or over burnt brick shall not be allowed.

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

**M-12 BRICKS:**

12.1 The bricks shall be hand or machine moulded 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 colour. The bricks shall be moulded with a frog of 100 mm x 40 mm and 10 mm to 20 mm deep on one of its flat sides. The bricks shall not break when dropped on the ground from a height of 600 mm.

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

12.3 The size of conventional bricks shall be as under:

225 x 110 x 75 mm .

12.4 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

12.5 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 flyash building bricks shall conform to IS-13757, IS-5454, IS-12894, IS-3495, IS-3812. The frog of 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 standards size shall used on one work. The following tolerances shall permitted in the conventional size adopted in a particular work:

Length : ±3 mm

Width : ±2 mm

Height : ±2 mm

The physical characteristic of bricks shall be as follows –

The minimum compressive strength of Burnt Clay Flyash building bricks shall not be less than 70 kg/sq. cm. And the test shall be conform to IS-3495 (Part-I)

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

**M-13 STONE:**

13.1 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 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 of the strength of the stone shall be 200 Kg./Sq.cm. unless otherwise specified.

- 13.2 The samples of the stone to be used shall be got approved before the work is started.
- 13.3 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 40mm. 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:**

- 14.1 Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-I) – 1982 and shall be of tested quality. It shall also comply with the relevant part of I.S. 456-2000.
- 14.2 All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.
- 14.3 For the purpose of payment, the bar shall be measured correct upto 10 mm length and weight payable worked out as per the rate specified below:
- |           |              |       |       |              |
|-----------|--------------|-------|-------|--------------|
| i)6 mm    | 0.22 Kg/Rmt. | viii) | 20 mm | 2.47 Kg/Rmt. |
| ii)8 mm   | 0.38 Kg/Rmt  | ix)   | 22mm  | 2.98 Kg/Rmt. |
| iii)10mm  | 0.62 Kg/Rmt. | x)    | 25 mm | 3.85 Kg/Rmt. |
| iv)12 mm  | 0.89 Kg/Rmt. | xi)   | 28 mm | 4.83 Kg/Rmt. |
| v)14 mm   | 1.21 Kg/Rmt. | xii)  | 32 mm | 6.31 Kg/Rmt. |
| vi)16 mm  | 1.58 Kg/Rmt. | xiii) | 36 mm | 7.31 Kg/Rmt  |
| vii)18 mm | 2.00 Kg/Rmt. | xiv)  | 40 mm | 9.86 Kg/Rmt  |

**M-15 T.M.T. BARS:**

- 15.1 T.M.T.steel deformed bars shall be either cold twisted or hot rolled and shall conform to I.S. 1786-1985. or I.S.1139-1966 respectively.
- 15.2 Other provision and requirements shall conform to specification No. M-14 for Mild Steel bars.

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

- 16.1 The high tensile wires for use in prestressed concrete shall conform to I.S. 2090-1962.
- 16.2 The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength, minimum strength shall be taken as per para. 6-1 or the I.S. 1785-1962. Testing shall be done as per I.S. requirements.
- 16.3 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.
- 16.4 The high tensile wire shall be obtained from manufacturers 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:**



- 17.1 The mild steel wire shall be of 1.63 mm or 1.22 mm (16 or 18 gauge) diameter and shall conform to I.S. 280 –1972).
- 17.2 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:**

- a. 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.
- b. 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:**

- 1.1 The shuttering shall be either of wooden planking of 30 mm 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-braced 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.
- 1.2 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 leakages of cement grout.
- 1.3 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 formwork shall be got inspected by and approved from Engineer-in-charge, before the reinforcement bars are placed in position.
- 1.4 The props shall consists of bullies having 100 mm minimum diameter measured at mid length and 80 mm at the 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.
- 1.5 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.
- 1.6 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 swan 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.
- 1.7 As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.



- 1.8 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 shuttering 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.
- 1.9 The shuttering for beams and slabs shall have camber of 4 mm 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 Paints:**

##### **20.1 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 of specified shade or tint is not available white ready mixed paint with approved strainer 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 need with the following general requirements –

- i) Paint shall not show excessive setting in a freshly opened full can and shall easily be re-dispersed with paddle to a smooth homogeneous state. The paint shall show no curling, levering, 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 unevenness and other imperfections.

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

##### **20.2 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-21 CAST IRON PIPES AND FITTINGS:**

21.1 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.

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

21.3 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.

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





---

Sr. No	Nominal Dia	Overall Thickness	Weight of Pipe Excluding Ears		
			1.5M.long	1.8M long	2M. long
1					

---

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 upto 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.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



#### 9.4 ITEMWISE DETAILED TECHNICAL SPECIFICATIONS (IDTS)

##### DTS No. 2

**Providing, manufacturing, and supplying at site the M.S. specials as required at site and suitable for field welding at site. The size and dimensions shall be confirming to IS:7322, with providing and applying on outer coating of corrosion and chloride resistant treatment and inner coating of food grade quality epoxy paint as approved by Engineer in charge. The item includes cost of providing M.S.plate, fabrication and conveyance etc. complete as directed by the Engineer-in-charge..**

**Note:-**

- (1) All the dimensions of the specials as well as flange shall be conforming to IS:7322.
- (2) Quantities of the specials stated in Schedule-'B' of the tender are very approximate and orders will be placed as required according to exigency/requirement during progress of work. Thus, the quantity may vary as per the requirement and contractor shall have to carry out the work at the quoted rates only.
- (3) Pipes having 8 mm/10mm wall thickness are of the 1000 mm to 200 mm dia. inner diameter. Specials except the flanges shall be made of 8 mm/10mm thick M.S.Plate & M.S.Plate thickness of flanges shall be as specified in IS:7322. Required M.S. Plates shall be provided by the Contractor. Inner coating of the M.S.Special shall be done by applying non toxic anticorrosive epoxy paint conforming to RDSO Specification.

Ends of the specials shall be made bevelled (where not flanged) properly which shall be suitable for field welding alongwith the adjacent pipe.

Outercoating/ inner coating shall be as per DTS of this tender.

The M.S. Plate required for manufacturing of the specials shall be provided by the contractor. The M.S. Plates shall conform to IS:2062 with its latest amendments. The contractor shall provide all the required test certificate at free of cost for each and every lot of the plates. The thickness of M.S. Plates shall be within the permissible limits of IS:1852 with its latest amendments. Any kind of wastage of M.S. Plates shall be on account of the contractor only.

Pipes/specials not conforming to the specifications and not serviceable in the opinion of the Engineer-in-charge, shall have to be removed from the site by the Contractor at his own cost.

In case of difference of opinion between the contractor and the Engineer-in-charge, the decision of the Commissioner shall be considered final and binding to the contractor.

The welding shall be done by using the submerged Arc welding process using approved electrodes as instructed by the Engineer-in-charge.

Manufacturing of the specials shall be done at the own premises/factory of the Contractor at Surat only. Surat Municipal Corporation will not allot any space for the same. Alternatively, contractor may manufacture the specials at site in such a manner that it does not obstruct the vehicular traffic or pedestrains on road.



### Electrodes and Welding:

Electrodes to be used welding work shall conform to IS:814 & 815 and welding shall conform to IS 816:822 & 823. The electrodes must be of make "ESAB-INDIA", "Advani", and "D&H" only.

The steel core shall be formed by shaping and welding together steel plates of specified thickness. But welding shall be adopted for all longitudinal and circumferential welds. All welds shall be made down hand by the automatic shielded submerged arc welding process. Welding shall be done so that there shall be thorough fusion and complete penetration. Prior to welding the plates shall be fitted closely and during welding they shall be held firmly. The metal arc welding shall be done as per I.S.816/1969 code of practice for use of metal ARC welding for general construction in mild steel and I.S. 823-1964 code of procedure for manual metal arc welding of mild steel.

### **NOTE:-**

For Item No.10 "Providing ,Manufacturing ,supplying and laying at site the M.S. specials in the following sizes suitable for field welding at site having 12 mm thick plate. The size and dimensions shall be confirming to IS :7322 as directed by Engineer-in-charge. The item includes cost of M.S. plate, fabrication and conveyance etc. comp". It is further to clarify as below.

The contractor shall have to procure the plates for manufacturing the specials from the M.S. Plates steel shall be of Grade A designated Fe415 W A confirming to IS:2062-1992 or its latest amendment.

1. Sail (Steel authority of India Ltd.)
2. Essar Steel
3. Ispat
4. Tata Iron & Steel Co.
5. Electrotherm

Contractor shall have to produce the copy of purchase Bill / Invoices, Challan, Test certificates etc. of the plate. The plate so purchase shall have to be pre-approved from Engineer-in-Charge prior to manufacturing the specials. In short, the specials shall have to be manufactured from the approved plates and the finished product shall be as per the IS:7322. The rates of the special is inclusive of all materials, cost of fabrication, cuttings, rolling, bending, welding, wastage and all labour for Providing & laying the specials in proper position at site. No negative tolerance will be allowed for the thickness of the plate.

### Mode of measurement :-

The payment shall be made on kg basis which includes all the materials, M.S. Plates, outer coating, conveying upto the site, tools, tackles, machineries, labours for carrying out the work for cutting, bending, welding all the taxes, duties, octroi, hydraulic and material tests etc. complete as directed by the Engineer-in-charge.

### **DTS No. 3**

**Providing and supplying ISI mark CI BF of the following class and diameter including all taxes, insurance, transportation, freight charges, inspection charges, loading, unloading,**



conveyance to departmental stores, stacking etc. comp.

- (a) 700 mm dia B/F Valve PN-1.0
- (b) 800 mm dia B/F Valve PN-1.0
- (c) 1000 mm dia B/F Valve PN-1.0
- (d) 1200 mm dia B/F Valve PN-1.0

**1.0 Butterfly Valves as per IS 13095 with PN 1.0 - Gear operated**

**SCOPE** – Fabricated valve will not be considered.

This standard cover double flanged and wafer type of metal seated, resilient seated cast iron, ductile iron, and carbon steel and lined butterfly valves for general purpose. Valves covered under this standard are manually, pneumatically, hydraulically or electrically operated.

It covers valves of nominal pressure designations up to and including 4 Mpa. and class 300 with ends flanged in accordance with appropriate table of I.S 6418 : 1971 'Cast iron and malleable cast iron flanges for general engineering purpose' or wafer type valves with bodies designed to be accommodate between pipe work flanges in accordance with appropriate table of IS 6418 : 1971 or IS 6392 : 1971 'steel pipe flanges' in nominal size DN 40 to DN 2000. It also covers valves up to class 300 and flanges as per the pressure/temperature ratings given in IS 13159 ( Part 1) : 1991 'steel pipe flanges and flanged fittings : part I dimensions' and IS 6418 : 1971 'cast iron and malleable cast iron flanges for general engineering purposes'.

**2.0 REFERENCE**

The Indian standards are necessary adjuncts to this standard.

**3.0 TERMINOLOGY AND DEFINITIONS**

Terminology and definition covered in IS 4854 (Part3) : 1974 are generally applicable.

**4.0 VALVE END CONNECTIONS**

**Double flanged valves**

A valve having flanged ends for connection to pipe flanges by individual bolting.

**5.0 SERVICE APPLICATIONS**

Valves shall be suitable for one or more of the following applications.

- (a) Tight shut off - A valve having no visible leakage on the disc in closed position under test conditions.



- (b) Regulating - A valve intended for regulating purpose and which may have a clearance between the disc and the body in close position.
- (c) Low leakage - A valve which has specified maximum leakage rate on the disc in the closed position.

### **Vacuum Condition**

Where valve are to be used under vacuum conditions, purchaser shall mention specifically and the detailed design provision shall be mutually agreed between the purchaser and the manufacturer.

## **6.0 NOMINAL SIZES**

The range of nominal valve size (DN) in mm shall be as follows:

40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900, 1000, 1200, 1400, 1600, 1800 and 2000

## **7.0 NOMINAL PRESSURES**

Valve shall be designated by nominal pressure (PN) defined as the maximum permissible working pressure (Mpa) at 20<sup>0</sup> C temperature as follows:  
PN 0.25, PN0.6, PN1.0, PN 1.6, PN 1.25 and PN4.0

The class designation for valves specified by nominal pipe size shall be class 125, class 150 and class 300.

## **8.0 PRESSURE / TEMPERATURE RATINGS**

Maximum permissible gauge working pressure and operating temperatures shall be in accordance with IS 6418 : 1971 and IS 13159 ( Part I ) : 1991 except that restriction on temperature may be placed by the manufacturer on valves in accordance with this standard by reason of valve type, trim materials or other factors. However, all valves shall be suitable for continuous use at their PN designation within the temperature range of -10<sup>0</sup> c to 65<sup>0</sup> c.

## **9.0 BODY ENDS**

### **Double Flanged Body Ends**

The dimensions of flanged body ends and drillings shall be in accordance with the requirement given in Annex B. Flanges as per any other specific requirements of the purchaser may also be given as agreed to between the manufacturer and the purchaser or as per I.S. 13159 ( part I ) : 1991.



Flanges shall be at right angles to the axis of the bore and concentric with the bore. Flanges shall be drilled unless otherwise specified and bolt holes shall be off centers. Tapped by the design of the valve

### Wafer Body Ends

Body ends shall be capable of being fitted between the pipe flanges complying with the requirements of annex B flange drilling.

The joint faces shall be at right angles to the axis of the bore and concentric with the bore.

Holes may be provided, where required by the design, for the passage of the bolts securing the flanges and the valve. Where through bolting is not practicable due to the presence of valve shaft, bearing housing, tapped holes may be provided for individual bolting of each flange.

## 10.0 FACE TO FACE DIMENSIONS

Face to face dimensions of double flanged and wafer types of valve shall be as per Table 1.

Face to face dimensions given in Table 1 are exclusive of the sealing gaskets at both ends.

The manufacturer shall ensure that adequate space will be available between valve flanges for bolting when flanged valve with short body face to face to face or wafer long face to face are manufactured.

Tolerance on face to face dimension in Table 1 shall be as follow

Face to face dimension of Unlined valve		Tolerance
MM		MM
Over	Up to and Including	
0	250	<u>±2</u>
250	500	<u>±3</u>
500	800	<u>±4</u>
800	1000	<u>±5</u>
1000	2400	<u>±6</u>



### 11.0 BODIES

Bodies end ports shall be circular and the numerical valves of the diameter shall be as close as possible to the valve of DN.

### 12.0 DISC AND SHAFT

The disc and shaft shall be designed to withstand the maximum pressure differential across the valve in either direction of flow. The shaft may be of one piece design or in two pieces separately attached to the disc. Any means of attachment between the shaft and the disc shall be such as to preclude components becoming loose in service.

### 13.0 SEATING AND LININGS

Non-integral seating, and lining where used, and their means of attachment shall be such as to preclude their becoming loose in service.

### 14.0 BEARINGS

14.1 The bearings shall be suitable for the maximum loads imposed by the shaft during testing and in service.

14.2 For valves DN 350 and above, a bearing shall be provided to take the axial thrust, spring retaining clips (circlips) shall not be used as thrust bearing.

14.3 Suitable sealing shall be provided for the shaft where it passes outside the pressure containing enclosure.

### 15.0 MATERIAL OF CONSTRUCTION

This standard is based on materials specified in I.S.S. Unless otherwise agreed, the materials shall be of a grade equivalent to those given in I.S.S. or superior. Other material may be used as per agreement between the manufacturer and the purchaser. The material of construction shall be as per table given below

Sr. No.	Part Component	Pressure Rating (1 Bar + 1 atmosphere)
1.	Body	D.I. / S.G. IRON IS 1865 GR 500/7
2.	Disc	D.I. / S.G. IRON IS 1865 GR 500/7
3.	Shaft (DE/NDE)	SS AISI 410
4.	Seal	EPDM Rubber having Properties equal or superior to the following. 1) Tensile strength Min. 130 Kg/cm <sup>2</sup> 2) Elongation at break: Min 375%



		3) Tear resistance : Min.35 Kg/cm <sup>2</sup> Compression set at 100°C for 72 hours: Max. 20%.
5.	Seat ring / Retaining Ring	SS AISI 316
6.	Bearing	Steel backed PTFE
7.	Internal Hardware	SS AISI 316
8.	External Hardware	C S to IS 1367
9.	Hand wheel	M.S. round, Chrome Plated
10.	Cast Steel parts to be protected with coating suitable for tropics.	Clause 16 of B.S. 1218
11.	Drilling of valves flange	Drilling of the flange shall be as per Table of BS 4504 / IS 1538 and thickness of the flange as per the pressure rating of the valves.

The material of construction of Gear Box for valves shall be as per table given below

Sr. No.	Description	Materials
1.	Gear Case & Cover	Cast Steel ASTM A 216 Gr. WCB or S.G Iron to IS 1865 Gr. 400/15
2.	Sector Gear	D.I. / S.G.I. IS 1865 Gr. 600/3
3.	Worm / Shaft, spur Gear /pinion /shaft	BS 970 EN 19 / EN 24
4.	Fastners / Dowels	SS 316 / SS 304
5.	O – Rings	Nitrile Rubber with Shore hardness of 65 ± 5
6.	Bearing for shaft	Ball / Roller bearing.

## 16.0 OPERATION

### 16.1 Manual Operation

All valves shall be capable of operated at a differential pressure across the disc as marked on the valve. Lever, worms gear / travelling nut type or any other suitable type of operator can be used.

#### 16.1.1 Direction

Unless otherwise, specified manually operated valves shall be closed by turning hand wheel or lever in a clockwise direction when facing the hand wheel or lever. The design





of lever when fitted shall be such that the lever may only be assembled to the valve so that it is parallel to the direction of flow when the valve is open.

- 16.1.2 All gear travelling nut operators shall be provided with suitable stops to prevent movement of the shaft beyond the limit corresponding to the fully closed position of the disc.
- 16.1.3 All gear travelling nut operators shall be packed with grease for life time operation. Gear / travelling nut operators shall be totally enclosed and weather proof for general application. For special applications such as marine, submerged service etc. the purchaser may specify special en-closer.
- 16.1.4 All gear / travelling nut operators shall be self locking type. All lever operated valve shall be capable of being locked at least three intermediate position.
- 16.2 The operating hand-wheels shall be marked 'CLOSE' or 'SHUT' to indicate the direction of closer.
- 16.3 The operator shall be provided with arrangement to indicate the disc position.

## **17.0 TESTING**

All valves shall hydrostatically tested by the manufacturer before dispatch. The pressure shall be obtained without any significant hydraulic shock. Testing shall be carried on before application of paint or other similar treatment unless otherwise agreed between the purchaser and the manufacturer. There shall be no air entrapped within the part of the valves subjected to test pressure.

### **17.1 Performance Testing**

Each valve shall be shop operated from fully closed to fully open position and reverse, under no pressure and no flow condition to demonstrate that the complete assembly is workable.

### **17.2 Body Test**

Completely assembled valve shall be tested as follows:

'The body ends shall be blanked so that the valve is subjected to the full pressure in all directions include by the test pressure wafer valves may be tested in any suitable manner agreed between the purchaser and the manufacturer. The valve disc shall be in slightly open position and pressure equivalent to 1.5 times the maximum permissible working pressure shall be applied with water. The duration of this test shall be as in Table 3 below in Para 17.3.



### 17.3 Seat Test

The seating surface of the valve shall be cleaned unless a surface treatment forms an integral part of the design or the use of a temporary surface treatment has been agreed between the manufacturer and the purchaser to avoid the possibility of damage under the condition of the test.

NOMINAL DIA MM	MINIMUM TEST DURATION IN MINUTES	
	BODY TEST	SEAT TEST WHEN APPLICABLE
Up to and including 50	0.25	0.25
65 to 150	1.00	1.00
200 to 300	2.00	2.00
350 to 1000	5.00	2.00
1200 to 2000	5.00	3.00

17.3.1 Each valve shall be shop tested for leaks in close position. The test shall be conducted with the body flanges in a horizontal position. Pressure shall be applied to the upstream end of the valve, the downstream being open to atmosphere. The duration of test shall be as per Table above. There shall be no indication of leakage past the valve disc during test and valves shall be drop tight. Seat test shall be carried out in both the direction of valve if agreed between the manufacturer and the purchaser. The seat pressure applied on upstream side shall be equivalent to 1.1 times the maximum permissible working pressure at 20<sup>0</sup> c and shall be applied with water.

17.3.2 For regulating type valves seat test shall not be applicable.

### 17.4 Disc Strength Test

The test shall be conducted with the body flanges in horizontal position. The test pressure shall be 1.5 times the maximum permissible pressure at 20 0 C With disc in closed position, hydro test pressure shall be applied to the lower face of the disc for duration as per table-3. There shall be no damage to the valve disc nor shall any part of valve or disc be permanently deformed by the test. The purpose of this test is to provide evidence of the adequacy and structural integrity of disc and body. Any leakage past the seat shall not be the criteria for rejection of the valve (Sampling test sample as per IS 2500). For regulating type valves, disc strength shall not be applicable.

17.5 Maximum permissible leakage shall be as given in Table in para 18.0.

### 18.0 TEST CERTIFICATES

When specified by the purchaser, the manufacturer shall issue a test certificate confirming that the valves have been tested in accordance with this standard and stating the actual pressures and medium used in the test.



VALVE TYPE	LEAKAGE RATE
Tight shut-of	No visible leakage for duration of test
Low leakage	0.1 mm <sup>2</sup> /s X DN (sec 5)
Regulating	Not specified. Outside the scope of this standard.

## 19.0 INSPECTION

The purchaser or his authorized representative shall have access to the manufacturer's works at all reasonable times to inspect assembled valve at factory. The bidder has to make necessary arrangements for testing facilities of the valves as per the relevant IS at factory.

## 20.0 WITNESSING OF TESTS

When the purchaser desires to witness the tests, this shall be specifically agreed in advance.

## 21.0 MARKING

Marking shall be cast integral on the body or on a plate securely attached to the body. The markings shall be in accordance with I.S. 9866: 1981.

## 22.0 PREPARTION FOR DISPATCH

- (a) Valve shall be complete in all respect when dispatched. Each valve shall be drained, cleaned, prepared and suitable protected with 2 coats of red oxide on unmachined surfaces and rust preventive coats on machined and flanged surfaces for dispatch in such a way as to minimize the possibility of damage and deterioration during transit and storage. Painting other than specified on the finished valve shall be as per the agreement between the manufacturer and the purchaser.
- (b) Disc shall be unseated when dispatched, but care shall be taken to ensure that there is no risk of damage to the disc.
- (c) When specified, the body ends shall be suitably sealed to exclude foreign matter during transit and storage.
- (d) Components shipped unattached shall be adequately protected and identified to permit correct field assembly.



### 23.0 APPROVED MAKE FOR BUTTERFLY VALVES

1. Kirloskar Brothers Limited
2. Fouress Engineering Limited
3. R & D Multiples
4. Indian Valve Company

### 24.0 MODE OF PAYMENT

The payment will be made on No. basis.

### DTS No. 4

**Providing and supplying ISI mark CI BF (Electrically operated) valve conforming to BS:5155-1984 & IS:13095-1991 of the following class and diameter including all taxes, insurance, transportation, freight charges, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. com D/F Butterfly valves, of following class and diameters**

- (a) 700 mm dia
- (b) 800 mm dia
- (c) 1000 mm dia
- (d) Any size

**The specification of valve is as per DTS No. 3 (Manually Operated Valve) above and for electrical operated valve the specification of Actuator shall be as given below :**

#### ACTUATOR:

The sluice valve 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.

- 1 A.C. electric motor S2 duty.
- 2 Reduction gear unit
- 3 Torque switch mechanism complete with set of torque switches
- 4 Hand wheel for manual operation.
- 5 Hand-auto change over lever with suitable locking arrangement.
- 6 Local control switch/push buttons
- 7 415/230 V AC control transformer
- 8 Valve position indicator
- 9 Integral forward reverse starter
- 10 All power & Controlling cable of require size & length of cable for operating the actuator. Locally as well as remotely.**
- 11 Remote Control Panel.
- 12 Max. time for valve opening/closing with actuator is 3 Minute.



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.

Motors shall be 3 phase. Squirrel cage induction motor as per IS 325 with insulation class "F", winding to be impregnated to render them non-hygroscopic/oil resistant. Motor shall be rated **S2** duty. It shall be protected by bi metallic relay or electronic relay. Reset should be manual.

Reverse forward starter shall comprise electrically and mechanically interlocked reversing contactors, suitably rated, HRC type fuses.

Local control shall comprise push button for operations of CLOSE AND OPEN (START 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.

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> cables. Suitable cable entry shall be provided. Enclosure shall be IP 67.

Reduction gear unit shall be of totally enclosed oil bath/grease lubricated type. Gear box shall be providing with the first charge of oil lubricants and appropriate filling and drain connection. This is not applicable if it is grease lubricated.

Gearing shall be adequate to open and close the valve under full maximum operating pressure differential at a speed sufficient to cover the extent of travel.

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 % torque than maximum valve torque.

The valve operating equipment shall have hammer blow device to loosen stuck valve or retrieve jammed valve position.

The torque switch in the closing direction shall interrupt the control circuit if mechanical overload occurs during closing cycle or when the valve is fully closed. The torque switch in the opening direction shall interrupt the control circuit if mechanical overload occurs during opening cycle or when the valve is fully open.

The mechanism should facilitate adjustment of the torque at which the switches are required to operate.

Non Adjustable limit switches shall stop the motor and give indication when the wedge has attained the fully open or closed position.



The adjustable limit switches shall function to activate relays/switches provided for system interlock, at the desired valve position in both the opening and closing directions.

#### MODE OF PAYMENT

The payment will be made on No. basis.

#### DTS No. 5

**Providing, supplying DI DF Resilient seated glandless Sluice / Scour valves conforming to IS 14846-2000 with Gear Box of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.**

**(a) 600 mm dia Sluice Valve PN-1.0**

#### DI RESILIENT (SOFT) SEATED GLANDLESS SLUICE VALVES

##### SPECIFICATION:-

- (1) All Ductile Iron resilient seated sluice valves shall be manufactured strictly in accordance with and conforming to Indian Standard specification IS:14846-2000/ BS:5163/ EN:1074-1&2 Or its latest amendments and detailed specification of S.M.C.
- (2) The valves intended to be used in water supply systems up to 70°C in vertical/horizontal position. All the sluice valves shall be Double flanged of non-rising spindle type and shall be of PN1.0 type.
- (3) The Material of Construction for different components, parts of sluice valves shall conform to requirements given in table below:

Sr.	Components	Material	Ref. to IS No.	Grade or Designation
1	Body and Bonnet	Ductile iron/ SG Iron	GGG-50/40 or 1865	500/7 or 400/15
2	Stem	Stainless steel	AISI 420	
3	Stem sealing	NBR wiper ring		NBR O-rings
4	Wedge	Ductile iron/ SG Iron	GGG-50/40 or 1865	500/7 or 400/15, core fully encapsulated with EPDM rubber with integral wedge nut
5	Bonnet bolts	Stainless steel	AISI 420	Sealed with hot melt
6	Bonnet gasket	EPDM rubber	WRAS or DVGW approved	EUW-70
7	Wedge Nut	Aluminum Bronze		



8	Coating	Electro statically applied epoxy powder coating	DIN 30677-2 or GSK guide lines	Internally and externally RAL Blue colour
---	---------	---	--------------------------------	---

**Manufacturing:-**

- a) Dimensions of each part of the valve shall conform to IS:14846-2000/ BS:5163 / EN:1074-1&2 or Manufacturer's standard.
- b) The valve shall be glandless and pocket less for smooth flow of water.
- c) The valve shall be easy in operation having negligible head loss and it shall be maintenance free.
- d) Resilient wedge with double sealing points provides absolute water tightness.
- e) Ductile Iron wedge core is fully vulcanized with EPDM rubber on all sides.
- f) The valve shall be open anticlockwise.
- g) The flange of the valve shall conform to IS:1538-1993/ BS EN:1092-2 table-9 or its latest amendments.
- h) Hand wheel:-All valve shall be provided with hand wheels as per required size. The direction of closing shall be indicated on the top of the hand wheel.
- i) The supplier shall submit a detailed G.A. drawing which is to be approved by the S.M.C. after awarding the work. The valves shall be manufactured and supplied according to this approved drawing.

**Testing:-**

The DI Sluice Valve shall be tested according to IS:14846-2000/ as per approved drawings in presence of representatives of SMC or / and S.M.C. appointed TPI consultant. Representative of SMC or / and S.M.C. appointed Third Party Inspection Consultant [TPI] may visit/inspect the worksite at any stage of manufacturing for inspection/testing and may reject any material which does not conform to the specified requirement. The supplier shall give at least 15 days notice period for the inspection/testing of the material. All the charges towards testing/ inspection including traveling charges of S.M.C. representatives shall be borne by the manufacturer. T.P.I. Charges shall be borne by S.M.C.

- (7) All valves shall be provided with enclosed greased packed spur gear box (for 400 mm dia. and above size). The valves shall be vertically operated by removable key from top accordingly the design of the shaft and Gear box shall be done. The gear box essentially be of worm and worm wheel design, self locking type with or without additional Spur gear arrangement to ensure that the effort on hand wheel is limited to 180 N pull and Push. The gear box shall be invariably of Master gear/Auma/Limitorque/ Ameya/ Transpower/BEL-Bombay Engg. Ltd./Safex/New-Tech/Perfect Engg. only with operating torque as per AWWAC-504rating.



**MARKING:-**

The following information shall be cast/punched/painted on each valve body in raised letters.

- (a) The manufacturer's name or trade mark.
- (b) ISI mark if any.
- (c) The nominal pressure of valve.
- (d) The size and serial number of valve.
- (e) Year of manufacturing.
- (f) Heat number of cast.
- (h) S.M.C./ SSCDL or any other mark.

**Packing:**

All valves shall be supplied with the wedge closed. Valve of small diameter may be packed in wooden case parts liable to injury in transit shall be wrapped with wood-wool or similar material as a protection.

**The valve shall be of the following make only.**

- (1) Fouress Engg. (Ind.) Ltd., Bangalore "FOURESS"
- (2) Indian Valve International, Kolkata - "IVI"
- (3) Kirloskar Bros. Ltd., Mumbai - "KIRLOSKAR"
- (4) Indian Valve Pvt. Ltd., Nasik - "IVC" And As Per Approved Vendor List

**Mode of Measurement and payment:**

The rate shall be paid in Nos. basis.

**DTS No. 6**

**Providing and supplying DI temper proof Air valves conforming to IS 14845 with SS 304 float gun metal nozzle of approved make and quality of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. comp.**

**Temper proof air valve with isolation sluice valve PN 1.0**

- (a) 200 mm dia
- (b) 150 mm dia
- (c) 100 mm dia

**Tamper proof double acting Kinetic Air Valves**

Tamper proof double acting Kinetic Air Valves are to be supplied which shall be designed as per AWWA C512-92 standards.





## 1.0 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.

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 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 design to prevent premature closure prior to all air having been discharge from the line. The orifice shall be positively sealed in the close position but flot ( Ball) shall only be rised by the liquid and not by mixer of air and liquid. The sealing shall be design 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 thr 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 orifice.

The valve body, the orifice cover, cowl of the air valves shall be made of cast iron of grade 2 of IS:210.

Where tenderer considers necessary a suitable drain plug shall be provided.

## **2.0 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.

## **3.0 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.)

## **4.0 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 158-1969 (OR latest edition) shall be applied.

## **5.0 TAMPER PROOF AIR RELEASE VALVES**

The bidder has to supply tamper proof Air Release Valves.

The valves shall be

- (i) 100% tamper proof
- (ii) Zero water leakage



- (iii) Unaffected by strong air flow
- (iv) Maintenance free

The tamper proof air release valve shall have following:

- (i) Double orifice & double float.
- (ii) Stainless steel large & small float.
- (iii) Stainless steel guiding stem for large float shall give 100% perfect closing.
- (iv) Aerodynamic bucket design for maximum airflow & which should restrict entry of foreign material.
- (v) Integral vent welded to inverted cap made of MS should restrict tampering of Air Release Valve large orifice.
- (vi) Small orifice automatic valve vertically assembled should discharge small quantity of dissolved air / air pockets automatically.
- (vii) Design shall be as per AWWA C512-92 standards.
- (viii) Air Release Tamper Proof Valves shall be tested as per IS 14845 – 2000.

#### 6.0 MATERIAL OF CONSTRUCTION OF KINETIC AIR VALVES

Sr. No.	Kinetic Air Valves	Material Description PN 10, PN 16 / PN 25
1	Body	Ductile Iron DIN 1693-GG40/ Spheroidal Graphite Iron IS 1865 Gr 400/15
2	Float (Large)	Stainless Steel : ISI – 304 / 316 / 316L
3	Nozzle	Gun Metal : IS 318 LB2 / GM + Neoprene Rubber
4	Gasket	Rubber : Neoprene
5	Cover	Carbon Steel : Plate
6	Fasteners	Carbon Steel : IS 1363

#### 7.0 TESTING

The air valves shall be tested as per IS 14845 – 2000. 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.

#### 8.0 APPROVED MAKE FOR KINETIC AIR VALVE – TAMPER PROOF

1. Indian Valve Company
2. Kirloskar Brothers Limited
3. Fouress Engineering Limited
4. R & D Multiples

#### 9.0 MODE OF PAYMENT

The payment will be made on No. basis.



## DTS No. 7

**Excavation for pipeline trenches including all safety provision (barricading, fencing etc.) using site rails with shoring, strutting and stacking the excavated stuff upto 90.00 mt. Cleaning the site etc. complete for lift and strata s specified. The excavation shall be carried out in stable slope for which no extra payment will be made. Rate is inclusive of backfilling the trenches with available excavated earth (excluding rock) in layer including ramming, watering, consolidating the same etc. complete as directed by the Engineer-in-charge..**

- (a) In all sorts of soil, soft murrum, hard murrum, soft rock, etc.  
- 0 to 1.5 mt. Depth  
- 1.5 mt. to 3.0 mt. Depth

The trench for laying the pipes shall be excavated true to lines, levels and grades as shown on the drawings or directed by the Engineer with the help of boning rods.

The depth shall be such that the pipe shall have a clear cover of at least 1.2 m. The trench shall be excavated through all strata met with. When it is necessary and ordered by the Engineer in writing, the sides shall be shored or sloped, otherwise they shall be as vertical as possible. The rates shall include shoring and provision of slopes.

Various materials excavated shall be separated and stacked beyond one meter or more from the edge as may be necessary in the opinion of the Engineer to avoid provision of slopes.

The bed shall be even and to the correct grade and line in all cases.

The trench shall be barricaded and warning board fixed, Red lights shall be hung at night time at sufficiently close intervals to indicate the danger and a chowkidar employed to see that the lights are properly burning. The contractor shall be solely responsible for any accidents, due to any default in barricading, sign posting or red lights and shall bear the consequences.

At all road crossing, the trench shall be excavated only for half the width of the road and pipe laid. The other half shall be excavated only after backfilling over the laid pipe and making it suitable for the traffic. At all road crossings, the pipes shall be sufficiently laid below the crust of the road.

All pipes, gas gline, cables service lines etc. met with during the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost. For making end connection or branch connection it shall be the responsibility of the contractor to excavate the trench in such manner so as to enable the fitter to make the connections conveniently. At crossing of cross drains, sewer mains, old water main, drain connection, electric cable etc. it shall be to such a depth as to enable the fitter to take the pipe from, below above or through the cross drain or the cable etc as the case may be and as directed by the Hydraulic Engineer. No extra payment shall be made in above cases of excavation. In case contractor has laid the pipeline in the trench excavated less than above specified depth, contractor may be asked to lay the line after making proper depth as



directed by the Hydraulic Engineer or his Authorised representative on site. The extra labour involved in such cases will have to borne by the contractor. If contractor, fails to carry out such direction, Hydraulic Engineer may give the reduced rates for portion of pipe line laid in the trench as he thinks fit or relay the line at the risk and cost of contractor as deemed fit, no measurement will be taken for joints pits as the same included in the item of lead jointing.

The contractor shall have to keep chowkidar and red lights (of a proper size) during night on open trenches during the progress of the work and until the trench or pit is completely refilled.Red flags road closing board etc. and such other precautionary measures shall have to taken by the contractor.If the contractor fails carry out the above precautionary measures, Hydraulic Engineer shall engage, even without giving a notice to the contractor wherever the situation demands quick action for the chowkidar, places, necessary red lights and manage to guard the trenches all the expenditures so incurred shall be recovered from the contractor form his bill or deposit.The contractor will have no right to dispute the action taken by the Hydraulic Engineer.

Excavated earth shall be used for refilling of trenches however, surplus excavated stuff will be the property of Contractor and Contractor may disposed off or stock the same at their own risk and cost.NO PAYMENT FOR THE CARTING OF SURPLUS EXCAVATED STUFF WILL BE MADE.

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 in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats, mortar dropping and filled with earth in layers not exceeding 20 cms. Layers shall be adequately, watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the butt ends of crowbars where rammer cannot be used.

After compaction and consolidation, If any short fall of excavated stuff is found, than Contractor has to bring the soil of the required quantity in order to meet short fall at his own cost. Moreover, if any settlement of road after reinstatement or after first monsoon or during watering, contractor shall be fully responsible for the settlement of trenches. Patches / depression / settlement shall be repaired with chhara or soil at his own cost. Surplus excavated stuff shall be disposed off in such a way that it does not create any nuisance to the public or SMC's road surface.

#### **Mode of measurement and payment:-**

The depth of excavation shall be counted from the bottom of the base course of metal or asphalt road surface.

Payment shall be made on cubic meter basis.

#### **DTS No. 8**



**Excavation of asphalt pavement of any thickness etc. complete with tacking the material as directed by the Engineer-in-charge (only carpet thickness shall be considered for calculation of quantity)**

Item includes breaking and removing of the road surface upto the bottom of asphalt surface item also include stacking of useful material upto lead of 90 meters.

Mode of measurement and payment:-

Payment shall be made on cubic meter basis.



#### **DTS No. 9**

**Reinstatement of asphalt road / pavement using same material for soling and providing new soling and new metalling, grouting with tack coat etc. complete, as directed.**

This work shall consist of necessary excavation prepared base, spreading metal using excavated useful material, new metal for second layer and grouting it with tack coat.

Necessary specifications of MoRTH & ULB are applied for specific layer.

The item should be measure in Square meter.

The unit rate shall include all the activities to complete above job including all materials, labours, machineries as directed by engineer in charge.

#### **DTS No. 10**

**Providing sand bedding of average 15 CM thickness including ramming, watering, consolidating etc. complete.**

Providing sand bedding under pipe of average 15 CM thickness including watering raming consolidating and dressing etc. complete as and where instructed by Engineer-in-charge

1. The sand to be use for filling shall be free from salts, organic or other foreign matter. All clods of sand shall be broken.
2. As the excavation of trench is done up to required depth and of required width, The sand is filled in trench with average thickness of 15 CM (compacted) in full width of trench before laying pipe. It is watered and rammed to required level so that the average thickness of sand bedding is 15 CM.
3. **Mode of measurement and payment:-**

The payment shall be made for filling sand as per drawings. No deduction shall be made for shrinkage or voids, if consolidated as instructed above.

The rate shall be for a unit of one cubic meter

#### **DTS No. 11**

**Providing and applying with mechanical arrangement with 1:2 proproation cement sand guniting to M.S. Pipe surface under required pressure including removing the loose material as directed by the Engineer-in-charge including scraping the surface with wire brushes and providing degreasing, cleaning if necessary and providing, fixing 3.10 mm wire mesh (hard-d-drawn steel wire) reinforcement 150 C/C both ways including curing, disposing of the rebound material with in a lead of 50 mt. etc. complete. The item includes all required**







After completion, the mortar shall be kept wet by any suitable means such as immersion in water, covering by wet gunny bags or by mechanical sprinklers for a period of not less than 14 days.

The coating shall be carried out at site of work. S.M.C. will not provide any space for coating.

Mode of measurement :

Payments shall be made on per Squaremeter basis. Completed item inclusive of guniting at pipe joints, all materials, tools, tools, equipments, testing, labour etc. complete.

#### **DTS No. 12**

**Providing and making inner cement mortar lining to M.S. pipe with mechanical devices in cement mortar 1:1 proportion including cost of all materials, labour, special sand required, machinery power generation, all equipments and taking necessary access opening and manholes, cuts at suitable intervals as directed by Engineer in charge and rewelding the same after done with doubler plates pipes including necessary excavation, refilling, concrete breaking and remaking if any breaking guniting and remaking the same, repainting wherever required with epoxy paint in 3 coats, all dewatering including emptying the pipe line and refiling the same after done with including carrying out "C" value performance test of pipeline, complete job as per the directions of the Engineer in charge.**

#### **CAST-IN-SITU CEMENT MORTAR INNER LINING.**

I) GENERAL:

1) DESCRIPTION OF WORK INVOLVED IN THIS TENDER:

It is proposed to carry out mortar lining to M.S. pipelines with 12 mm thick cement mortar lining as prescribed in detail hereinafter to prevent corrosion from inside as well as to maintain minimum 'C' Value of 130

2) CONTRACTORS EQUIPMENT

The Contractor should inspect the status of the pipeline work completed. His rate for mortar lining the pipeline shall include carrying out all operation for a pipeline as it is already laid completed.

3) CLIMATIC CONDITION

The conditions under which work is to be carried out are known to vary through out the year. they can be arduous with excess dust, heat, rainfall and humidity.

4) LOCATION AND EXPANSE OF WORK AND ACCESSIBILITY

Surat is readily accessible by Road and Rail. The pipeline to be mortar lined under reference is within city limit. Contractor is expected to inspect the pipeline alignment, site, judge the accessibility from point of view of working facility for transport of men, machine and materials before the tender is filled. For any deficiency in this facility the



Contractor shall have to consider his own solution and accordingly has to base his offer. Nothing extra than the acceptable rates shall be payable on account of the non-accessibility to the pipeline.

#### 5) SCOPE OF WORK

This clause covers scope of material and application of cement mortar lining on the inside surface of the pipe line. The application of mortar lining covers lining of straight pipe sections, long, short radius bends, vertical shafts and all specials etc. The lining shall be carried out through an access by a machine that progress uniformly through the pipe and applies mortar against the pipe surface and mechanically trowels it to obtain smooth lining of uniform thickness having smooth transition at joints. The lining of bends, specials and areas adjacent to valves shall be appropriately dealt with according to the best practice of the trade for the diameter concerned. The Contractor should specify what is the best practice and produce acceptable evidence therefor.

All access openings and feed openings or manhole for feeder hoses shall be rewelded in position after lining them. The line will be restored to the satisfaction of the owner. Item No.1 of Bill of Quantities provides for providing and welding doubler plates over the access openings, feed openings or manholes for feeder hoses.

The scope further includes mobilisation of equipment, making access openings wherever required and curing of the mortar lined pipe including testing. Patching access holes, etc. as described in following pages.

The main items of work will be generally as follows.

- a) Mobilisation of equipment, plant and machinery.
- b) Deciding access openings in the main and providing temporary access upto openings wherever necessary.
- c) Making trenches of suitable depth, width and length for making access openings in case of underground (U.G.) pipe including dewatering and refilling.
- d) Breaking gunited/concreted surface (if any) of U.G. Pipe and cutting the top portion of pipe (Under ground as well as above ground) to provide for access opening.
- e) Provide necessary platform for installation of mixing machinery.
- f) Remove and refix appurtenances, provide additional ventilation openings and plugs, if required. Take suitable measures for adequate ventilation in case of U.G. Pipes.
- g) Maintaining the pipe temperature between 50 degree F and 90 degree F.
- h) Cleaning the pipe surface internally.



- i) Mortar lining the internal surface of the pipe lines.
- j) Curing the mortar lining.
- k) Inspection and testing of mortar lining.
- l) Hand lining with cement mortar for top and bottom portion of pipe removed for access opening. While at outer side it should be coated with 25mm.th.guniting of cement mortat(1:2) with welding of wiremesh as required.
- m) Closing of access openings referred in above and providing and welding doubler plates for the access openings/manholes/ feeder openings. Providing and welding angle stiffners to access openings. Carry out outer coating by cement mortar guniting (c.m.1:2) confirming to IS:1966:1989 and as per the instruction of Engineer-in-Charge. On outer surface of opened portion in case of U.G.Pipeline.

Outercoating work, in case of "PYPEKOT" material, shall be carried out as below.

- (1) All the mill scale, rust, foreign debries or any such material must be removed from the pipe surface by use of wire brush/power brush immediately prior to the application of primer on the surface of the pipe.
- (2) One coat of fibre coal tar and solvent based compatible primer of density 0.92 gm/cumt. and viscosity of 1000 to 2000 CPS at 150 gm/sqmt. shall be applied. The primer shall be allowed to dry until the surface becomes tacky. The primer shall be applied in such a manner that it produces an effective bond between metal and subsequent coating of the 4 mm thick polymeric tape.
- (3) Tape may be wound either circumferentially or spirally with using thermofusion process to completely adhere with primer coated surface maintaining minimum 15 mm overlaps to the two adjacent layers. Cost of overlap is included in the item and no extra payment shall be done for it.
- (4) Either end of the pipe shall be left unocated to enable proper installation/laying as well as field welding work. This area shall be coated insitu after the installation/laying and welding of the pipes in the trench. In case of any damage is occurred to the outer coating of the pipe during handling, laying and installation at any place of the surface, the rectification shall be done by patching up the damaged area by thermofusion at no extra cost. For this patchwork, any extra excavation work, pipe lifting or handling or any related activity shall be carried out at no extra cost. The patchwork shall be done to the satisfaction of the Engineer-in-charge.
- (5) Holiday test as described in IS:10221 shall be conducted at the cost of the Contractor in the presence of an authorised representative of SMC and if any fault/defect is found, it shall be rectified at no extra cost.

In case of Anticorrosive epoxy paint (food grade quality) in layer, Inner/outer coating shall be carried out as below



- 0.1 Prior to application of treatment, the pipe shall be made free from all mill scale, rust, foreign matters or any such materials must be removed from the pipe surface by use of wire brush followed by sand blasting to "Sa 2 1/2 standard immediately prior to the application of priming coating.  
In addition, metal surface should be free from Oil, grease, and other impurities which can impair the adhesion.
- 1.1 Application :
- 1.1.1 Mix the individual components (Component A & Component B) separately homogeneity. Mix one part of component A and one part of component B by weight thoroughly, and apply using conventional brush, roller and spray.
- 1.1.2 Immediately after preparing surface by sand blasting apply one coat of paint. Apply two more coats within the interval of 12 to 48 hours until the surface is completely free from pores.
- 1.2 Following care should be taken while application of this treatment.
- 1.2.1 Due care should be taken to prevent impurities and dampness on the surface in the time between the every application of treatment coat.
- 1.2.2 If longer time is anticipated between topcoat, then the existing coat should be roughened before fresh coating is applied.
- 1.2.3 After application epoxy paint should be protected from moisture (rain, dew, fog) for a period of 6-8 hours.
- 1.3 Consumption :
- For one prior coating and two topcoat coating each each of 80 micron (total 240 micron) the consumption of epoxy paint shall be 750 gm/sm.
- n) Painting near expansion joints internally and external paintings of patch plates.
- o) For curing, depth of 20 to 30 cm. of water be maintained in the flat portion of the pipeline to maintain adequate humidity in the pipe required for curing.
- p) Carrying out performance test for 'C' Value.
- 6) PROGRAMME OF WORK:  
As soon as award of the contract is made, the Contractor shall collect the details of the extent of work of laying of pipeline for completed portion by Owner immediately within 15 days from award of contract and give work plan for mortar lining of;



- 1) the pipeline already laid and tested.

The whole pipeline shall be divided in suitable lengths (sections) and the contractor shall decide access openings for these sections and plan his work. It is expected that every day on an average 200 M. of pipeline shall be mortar lined and steps taken to cure the mortar lining either by sealing by plastic sheets or any other suitable steps. Access openings etc. shall be closed back in portion by welding hand lined cut portion of the pipe line and pipeline shall be partially or as required fully flooded with water to protect the cement mortar lining before the same is commissioned.

- 7) POWER:

The Contractor shall have to make available electrical power for his works (power and lighting) from concerned authorities at his cost and pay energy and other charges, if any, to the concerned authorities. The Surat Municipal Corporation may on request by the Contractor render necessary assistance as is possible but without any financial and contractual obligations.

- 8) TELEPHONE:

The Contractor shall have to make his own arrangement with the Telephone Authorities for installing a telephone at his site office. The Surat Municipal Corporation will render assistance as far as possible. The Contractor shall bear all the charges as levied by the Telephone Deptt. The Contractor has to construct a temporary site office for departmental use of at least 20 Sq.Mt. area with 3 Tables, 6 Chairs, etc. as per requirement and required for site office shall be arranged by the Contractor.

- 9) SITE CLEAN-UP:

During the course of the work, the Contractor shall keep the site of work clean and neat. As the work progresses, the Contractor shall clear away and remove from site construction plant, surplus material, rubbish and temporary works of any kind and leave the whole of the site as in original condition to the satisfaction of the Engineer. Wastes and rubbish shall be disposed off to the satisfaction of the Engineer.

- II) MATERIAL FOR CONSTRUCTION:

- 2.1) STANDARDS:

The materials used for the process shall conform to the following specifications:-

1. AWWA Standard for Cement AWWA C 602-83 Mortar Lining (Latest revision)
2. Indian Standard Specification ISS:11906:1986
3. Indian Standard Specification ISS:269:1989 for cement.



Wherever any reference is made to the above or any other Standard Specifications, it is understood that the latest revision thereof shall take precedence over the above mentioned specifications or any other quoted by the tenderer.

## 2.2) APPROVAL TO THE MATERIALS:-

The terms materials shall mean all materials, goods and articles of every kind whether raw, processed and manufactured which will be used by the Contractor on this work. All materials shall be fresh and of the kinds and qualities prescribed below and shall be of approved quality. Materials shall be transported handled and stored in such a manner as to prevent deterioration, damages or contamination. All materials furnished by the Contractor shall subject to inspection and approval by the Engineer-in-charge. The materials rejected by the Engineer-in-charge shall be immediately removed from the work site entirely at the cost of the contractor.

The Contractor shall furnish all labour and other facilities for handling, testing and inspecting the material to the Engineer-in-charge no extra cost. The Engineer-in-charge may carry out tests on the materials brought by the Contractor before beginning and even during the progress of the work to verify that these conform to specifications. All costs of sampling, packing, transporting and testing shall be borne by the Contractor.

## III) MATERIALS:-

SAND:-As per Specification of material M-3.

WATER:- As per Specification of material M-1.

## 3.4) PLANT AND EQUIPMENT:-

The Contractor shall use plant and equipment which will be efficient, appropriate to secure satisfactory quality of work and maintain the required rate of progress which will ensure the completion of work within stipulated period.

If, at any time, in the opinion of the Engineer-in-charge such plants appear to be inefficient, in inappropriate, insufficient in executing good quality work with required progress, the same shall be replaced, supplemented, as directed by the Engineer-in-charge.

Failure of the Engineer-in-charge to give such orders shall not however, relieve the Contractor of his obligation to secure the required quality of work and rate of progress.

Failure of the Engineer-in-charge to give such orders shall not however, relieve the Contractor of his obligation to secure the required quality of work and rate of progress.



The Contractors equipment for cleaning, applying and trowelling cement mortar in the pipe and for curing the cement mortar lining shall be in good condition so as to permit the workers to follow the procedure and obtain the result as specified.

3.5) ADMIXTURES-

To improve workability, density and strength in the mortar, admixture conforming to the latest edition of IS:9103 may be used at the option of the Contractor, subject to approval of the Engineer-in-charge provided that the ratio of admixture to portland cement does not exceed that used in the qualification tests of ASTM-C-494. No admixtures shall be used that would have a deleterious effect on potable water flowing in the pipe after the lining has been placed.

3.6) WORKMANSHIP

All work shall be performed in a thorough and workman like manner by trained personnel under the supervision of experienced persons skilled in the application of cement mortar lining to pipeline in place.

3.6) ELECTRODES & WELDING:

Electrodes to be used welding work shall conform to IS:814 & 815 and welding shall conform to IS:816:822 and 823. The Electrodes must be of make "ESAB-INDIA", "Advani", "D&H" or "BOBSHELL" only.

IV) GENERAL CEMENT MORTAR LINING DESIGN

4.1) COMPOSITION-

Mortar for the lining shall be composed of cement, sand and water that have been well mixed and are of such consistency as to produce a dense, homogenous lining. Unless otherwise specified by the Owner, the mortar may also include admixtures.

4.2) PROPORTIONS-

The approximate proportions of cement and sand in the mortar for the mortar for the lining shall be 1 part of portland cement to 1 part of sand by volume.

The exact proportions shall be determined by the characteristics of the sand used. Admixtures as per Clause-3.5, if added, shall be used in strict compliance with the Manufacturers recommendations.

The Contractor should specifically state as to the cement proportion to use having regard to his experience (to be stated) and the practice or specifications his principles follow generally and recommend in this particular case.

4.3) WATER CONTENT-

The water content shall be the minimum quantity that produces a workable mixture, with full allowance made for moisture collecting on the interior of the pipe surfaces.



Slump tests should be made periodically on freshly mixed mortar immediately prior to the mortar lining conveyed to the lining machine. The water cement ratio shall not exceed 0.35. The test results of slump test should indicate slump of mortar required consistency or as per directives of the Engineer-in-charge.

4.4) MIXING:

Mortar shall be mixed long enough by machine to obtain maximum plasticity. The mortar shall be used before initial set.

4.5 FIELD TEST:

The following field tests shall be carried out by the Contractor for determining the quality of mortar.

4.5.1) Slump test and compressive strength of mortar:

Slump test should be made once in a day on the freshly mixed mortar immediately prior to the mortar being feed to the lining machine. The test should be made in accordance with IS:1199. After the slump test is carried out, test cubes of size (10 cm x 10 cm) be taken. These cubes shall then be tested for 3 days and 28 days for finding out the crushing strength of mortar. The test shall be carried out twice a week or as Engineer-in-charge may direct.

The minimum compressive strength of mortar for the designed mix by volume shall be 180 kg.sq.cm. after 3 days test.

The minimum compressive strength of mortar for the designed mix by volume after 28 days shall be 315 kg.per sq.cm.

The Contractor shall by trial and error method design the mix of mortar by varying the different grades of sand and proportion, water content with specified limits so as to give minimum compressive strength as stated above.

Sieve analysis shall be carried out twice every week to ensure that the sand conforms to the desired sieve analysis. Contractor shall provide required sieves as well as sieve analysis apparatus for taking tests.

4.6) THICKNESS OF LINING

4.6.1) GENERAL REQUIREMENT

The lining shall be uniform in thickness within the allowable tolerance, except at joint or deformations in the pipeline. Cement mortar lining thickness shall be 12 mm. The tolerance for lining shall be + 2.5 mm for pipe and +5.0 mm for specials with no minus tolerance. The mortar lining work shall be by single application.

4.7). WELDING OF ACCESS OPENING:





The access openings in the laid pipeline in the form of accesses into the pipeline taken out for the work of mortar lining shall be closed by welding the old pieces taken out from the pipeline before mortar lining of the pipe. Before welding, these pieces shall be hand mortar lined using chicken mesh as reinforcement to required thickness and curvature. The edges of the plates shall be cut to level shape and inserted in the opening by keeping a gap of 3 to 4 mm and tacked in sequence conforming to ISS:523 (12.3) or in sequence as per BSS. The renewal field welding shall comply with ISS:816- A double M.S. Plate of 8 mm thickness and at least 0.15 M. extra over the size of opening on each side shall be fixed and welded properly over the access of opening. As regards the welding work, the following points shall be borne in mind by the Contractor.

4.7.1) ELECTRODES:

The Contractor shall use standard electrodes depending on the thickness of plate and the type of joint. The Contractor shall also use standards current and arc voltage required for the machine in use as per the Manufacturer's directions. Welding joint shall be of the butt welded type welded both internally and externally. 2 runs from inside and one run from outside after cleaning the internally welded material by go using with gas flame. Account of wastages in plate shall be given.

All required welding as directed by the Engineer-in-charge shall be borne by the Contractor and the rate of mortar lining shall be inclusive of fixing of old plate providing and fixing access closing plate, all required welding etc.

4.8) EXCAVATION FOR PROVIDING ACCESS OPENING IN UNDER GROUND PIPES:

Excavation shall be carried out to the required depth and width at the locations where opening are to be provided. During excavating care should be taken to see that the pipe protection is not damaged.

All excavation shall suitably and effectively be provided with shoring and strutting wherever necessary to prevent collapse of excavated sides, and also to prevent settlement or damage to structures adjacent to excavations.

Necessary dewatering arrangement shall be made and it should be ensured that the excavated part is kept dry while the work is in progress. Method such as pumping or any other device suitable for local conditions shall be made use for the purpose. Pumping shall be done in such a way as not to cause damage to adjoining property by blows or subsidence etc.

Excavation shall be refilled after closing the access opening as described elsewhere using suitable materials selected from excavation carried out on site, or if such materials are insufficient or unsuitable, then contractor will have to bring material from outside at cost. Soft material free from stones larger than 20 mm size shall be used. Care should be taken to avoid damage to the pipe and any sheating while refilling is in progress. Back filling may consist of coarse material including broken rock from any excavation in rock, free from boulders and clods of earth larger than 150 mm in size provided that the compacted backfill is sufficiently dense to prevent material from the



super imposed layers being washed into the void in such backfill. Backfilling shall be carried out in layers exceeding not more than 150 mm, each layer shall be adequately watered and compacted.

No separate payment shall be made for this item i.e. excavation etc. and shall be included in the rate quoted for mortar lining in Item No.1 of the Schedule-'B'

V) METHOD OF CONSTRUCTION:

5.1) ACCESS OPENING FOR LINING:

Access to be pipeline for placing field applied cement mortar lining shall be obtained by the Contractor as below:-

- 1) By use of temporarily omitted short "roll-out sections of pipe, wherever possible and as approved by the Engineer-in-charge.
- 2) By cutting "half-cap" openings in the completed pipeline.  
As soon as tender is awarded to the Contractor, he shall determine the progress of the pipe laying work and advise in respect of locations for such openings to the Engineer-in-charge who in turn, shall finalise work plan for such openings with the contractor for pipe laying wherever feasible.

5.2) PREPARATION OF PIPE SURFACES:

The interior surface of the pipeline shall be cleaned prior to placement of cement mortar lining. The pipe interior surface shall be free of oil, grease and accumulations of water. All loose mill scale, dirt, rust and construction debris shall be removed from the interior surface of the new steel pipeline. This may be accomplished by use of stiff street broom or a drag brush. Shot or sand blasting is not required. Waste and rubbish material removed shall be disposed as directed by the Engineer-in-charge.

5.3) MACHINE APPLICATION OF MORTAR LINING:

5.3.1) CLEAN-UP AHEAD OF MACHINE:

Immediately prior to the travel of the lining machine through the pipeline, all foreign material such as sand, loose mortar that might have accumulated shall be removed.

5.3.2) INSPECTION OF PIPELINE BEFORE LINING :

The lining shall not be started until the Engineer-in-charge inspects the cleaned pipeline and given his permission to start lining process. Any lining done without obtaining the prior permission of the Engineer-in-charge shall be rejected and shall not be considered for payment. The Contractor shall have to remove the same and clean up the pipeline again at his risk and cost before such portion is lined after permission subsequently.

5.3.3) LINING PROCEDURE



Lining procedure be done by spray coating with cement mortar by means of rotating head. The lining shall be applied in one course by a machine travelling through the pipe and discharging the mortar over all pipe sections and long radius bends. The discharge shall be from the rear of the machine so that the newly applied mortar will not be marked. The rate of travel of the machine and the rate of mortar discharge shall be mechanically regulated to produce a smooth surface and uniform thickness throughout. The mortar shall be densely packed and adhere wherever applied, there shall be no injurious rebound.

#### 5.3.4) PROCEDURE AT JOINTS

Joints shall be packed with mortar before lining where necessary to provide a smooth surface across the joint. Such mortared area shall be moist and checked before placement of machine applied lining, over the joint area.

#### 5.4) SURFACE FINISH:

The mortar lining shall be mechanically trowelled except for the places where hand trowelling or the placement of an untrowelled lining is expressly allowed in Clause 5.4.3 below:-

##### 5.4.1) TROWELLED LINING:

The lining machine shall be provided with attachment for mechanically trowelling the mortar. Both the application and trowelling of the mortar shall take place at the rear of the machine so that the freshly placed and trowelled mortar will not be damaged. The trowel attachment shall be such that the pressure applied to the lining will be uniform and produce a lining of uniform thickness with a smooth finished surface, free of spiral shoulders. The finished surface, of machine placed trowelled lining shall be examined according to the procedure stated below:-

Ten (10) places shall be selected in straight section of the pipe which has been lined in each day's run according to a predetermined sampling method agreed on by the Engineer-in-charge and the Contractor. In each of the 10 places, a 12-inch (300 mm) straight edge shall be laid parallel to the axis of the pipe. In nine of the 10 places the space between the lined surface and the straight edge shall at no point be greater than 1/16 inch (1.6 mm)

##### 5.4.2) UNTROWELLED LININGS:

The finished surface shall be smooth and regular except that it may exhibit a slightly dimpled appearance similar to the surface of an orange. Ridges or uneven built-up caused by irregularity in the travel rate of the machine shall not be allowed.

5.4.3) Untrowelled lining may be allowed in sections of a pipeline where the pipe is to be lined is excessively out of round, in dead end sections, in segments containing sharp bends and angle points.



The section in which pipes are out of round by more than 2% shall be allowed to remain untrowelled provided that finish is orange peel finish.

Before mortar lining work in any section is taken in hand, the Contractor jointly with the Engineer's representative shall check for out of round conditions of the pipe in that section and jointly record observations for out of round condition of more than 2%

5.5) HAND APPLICATION MORTAR LINING:

Hand-placed mortar shall have a uniform surface with smooth transitions to adjacent machine placed lining.

5.5.1) ALLOWABLE HAND PLACEMENT:

In place where machine placing of cement mortar lining is impractical such as sharp bends, specials or areas closely adjacent to valves etc. lining shall be performed by hand.

5.5.2) MATERIALS:

Cement Mortar for hand work shall be of the same materials as the mortar for machine placed lining.

5.5.3) CLEANING:

Areas to be lined be thoroughly cleaned as specified in 5.2 and if necessary, shall be moistened with water immediately prior to placing the hand applied mortar.

5.5.4) TROWELLING:

Steel finishing trowels shall be used for the hand application of cement mortar, except at bends. The outer edges of hand trowelled area may be brushed in order to reduce the abutting offset.

5.5.5) TIMING:

All hand lining work in a section of the pipe line shall be completed within 24 hours after completion of the machine application of mortar lining by machine. The mortar lining by Machine for further portion shall be delayed or stopped to ensure compliance with this schedule.

5.6) SPECIAL REQUIREMENTS AT OPENINGS:

Laterals and connections to the pipe being lined shall not be left obstructed by the lining operations. Openings in the pipe line for manholes, outlets and blowoffs etc. shall be temporarily closed and covered with removable covering or other suitable devices to prevent the intrusion of the cement mortar into such openings. On completion of the lining the Contractor shall remove all such covers and shall repair any lining damaged in the process.

5.7) CURING:



5.7.1) GENERAL REQUIREMENTS:

Curing operations shall begin immediately following completion of the machine placement of the mortar lining in a section of the pipeline. The section of pipe shall be closed with air tight covers over all openings and the lining shall be maintained in moist condition. The pipeline shall remain close and moist atmosphere until the pipeline is filled.

5.7.2 CURING BY CONTRACTOR:

When a section of pipeline has been completed, the Contractor shall be responsible for careful curing of the mortar lining until the pipeline has been taken over by the Owner.

Normally the pipeline will be taken over by the Owner within 30 days from the date the entire pipeline is tested and defects corrected, if any. His rates will include curing of pipeline upto this period.

In case the Owner is not able to take over the pipe line within this period the Contractor has to continue his arrangements for curing for further period upto a maximum of 180 days. The Contractor shall not be paid any additional rate for sprinkling the pipeline from outside and/or flooding the pipeline with sufficient water and sealing openings and for keeping mortar lining in cured condition, so as not to cause damage to the lining.

5.7.3) CURING BY OWNER:

Owner shall not take any responsibility for curing. Sections of the mortar lined pipes shall be filled with water by the Contractor as soon as possible after lining operation, in such a manner as not to damage mortar lining. There shall be no pressure of any section until the mortar lining has been in place for at least 24 hours, except for pressure induced by variations in the grade of the pipeline.

5.7.4) SPRINKLING EXTERIOR:

The exterior surface of pipe exposed to sunlight shall be sprinkled with water and kept moist in the day time during the period of lining finishing and curing when such sprinkling is required, as determined by the Contractor or the Engineer-in-charge to prevent cracking of the lining.

VI) INSPECTION, GUARANTEES & PAYMENTS:

6.1) RESPONSIBILITY OF OWNER AND CONTRACTOR:

The entire procedure of applying cement mortar lining shall be subject to continuous inspection by the Owner, but such inspection shall not relieve the Contractor of the responsibility to furnish material and perform work in accordance with the specifications.

All cement mortar lining not applied in accordance with the specifications shall be subject to rejection by the Owner. Lining so rejected shall be removed and placed or repaired by the Contractor at the expense of the Contractor.



6.2) ALL PLACES ACCESSIBLE TO ENGINEER-IN-CHARGE:

The Engineer-in-charge shall have free access to all areas, places or facilities concerned with the furnishing of material or the performance of work.

6.3) CONTRACTOR TO ASSIST ENGINEER-IN-CHARGE

The Contractor shall furnish the Engineer-in-charge reasonable assistance without charge, in carrying out the inspection duties and specifically in obtaining information with respect to the character of material used and the progress and manner of the work.

6.4) PIPE INSPECTION PROCEDURE:

The owner shall inspect the pipeline following the application of the cement mortar lining to identify defective areas in the lining, the determine compliance with the specifications.

6.4.1) PIPE INSPECTION:

A manual visual inspection of the lined pipe interior shall be made by the owner to determine the quality of the lining and to identify defective areas in the lining for repair. Forrendining layer thickness test, the Contractor will keep a daily account of work done in Sq.Mt. and the quantity of mortar used in Cum., accounting for bulkage of mortar with reference to sand volume. At the close of the day's work the theoretical thickness will becalculated and the details submitted to the Engineer-in-charge.

6.5) DEFECTIVE LINING:

Defects in the cement mortar lining include, but are not limited to sand pockets, voids, oversanded areas, excessively cracked and drummy areas and areas of unsatisfactory surface finish.

6.6) REPAIR OF DEFECTIVE LINING:

6.6.1) Small defective areas shall be repaired by manual removal of defective lining and by hand reapplication of mortar lining. Defective areas emcompassing the full dia. of the pipe where lining shows evidence of failure, undue irregularity of inferior workmanship requires excessive patching or shows segregation of or deficiency in cement content, the contractor shall remove the mortar lining in such faulty section reclean the pipes and reline in accordance with the specifications such portion at no extra cost. Engineer's decision regarding the above shall be final and binding on the Contractor.

6.6.2) LINING CRACKS:



Temperature and shrinkage crack in the mortar lining less than 1/16 inch (1.6 mm) need not be repaired. Cracks wider than 1/16 inch (1.6 mm) need not be repaired if it can be demonstrated to the satisfaction of the Owner that the cracks will heal autogenously under continuous soaking in water. The autogeneous healing process may be demonstrated by any procedure that keeps the lining of the pipe continually wet or moist.

6.7) PROTECTION OF LINING:

Every precaution shall be taken to prevent injury to the lining. Should the lining be damaged through the fault of the Contractor, at any time prior to completion of the Contractor, such damage shall be repaired conforming to the specifications at the Contractor's expense. The repair of damage lining not attributable to the Contractor shall be carried out and paid for as an extra work basis.

6.8) GUARANTEE AND PERFORMANCE CRITERIA:

6.8.1) GUARANTEE:

The tenders shall stand guarantee for the defect liability period of the work carried out by him as guaranteed in the guarantee form attached. The Security Deposit shall be released only after satisfactory performance during guarantee period (i.e. defect liability period). If on examination of the cement mortar lining work by the owner, within a period of one year after final completion and acceptance of the Contractor work reveals evidence of defective materials or workmanship as defined in the specification, then the Owner may order such remedies as set forth in Sec.6.6 of the specification. The Contractor shall bear the expenses and perform the work in a manner acceptable to the owner. His Security Deposit will be refunded after this requirement is satisfied.

6.8.2) PERFORMANCE CRITERIA SURFACE FINISH:

The Hazen Williams C factor (Chw) shall be the criteria for determining the acceptability of surface finish of cement mortar lining. For acceptance performance, guarantee (Chw) shall not be less than 130.

If in any section of the cleaned and mortarlined pipe, the coefficient 'C' as determined for the loss of head test fails to meet the guaranteed figures, the unit prices for clanging and lining will be reduced as below:-

- 1) If the 'C' Value is deficient by 5 Units or less below the guaranteed coefficient, contract price shall be reduced by 1/2 % of the cost of that particular section per deficient unit of 'C' Value.
- 2) If the 'C' Value is deficient by 10 units or less but above 5 units below the guaranteed coefficient, the contract price shall be reduced by 1% of cost of that particular section, per deficient unit of 'C' Value.



- 3) If the 'C' Value is deficient by more than 10 units below the guaranteed 'C' value, the work shall be considered unsatisfactory and shall be rejected. The Contractor will have to remove the mortar lining carried out and again carry out the mortar lining work to improve 'C' value to the desired values at his cost.

#### 6.8.3) MEASUREMENT OF 'C' VALUE:

The flow tests will be conducted by the Contractor either by himself, if he could produce evidence of having conducted such tests satisfactorily in the past, or through a testing agency well experienced and equipped with the approval of Engineer-in-charge.

Before undertaking such tests, the Contractor and his agency will furnish a write-up fully detailing how the test is proposed to be carried out, adequacy of the procedure, reliability of the results, etc., giving reference to contemporary literature and theoretical background quoting authorities etc. to the satisfaction of the Engineer-in-charge.

The "C" value test shall be carried out by any one of the agencies/consultants mentioned below or as per instructed by Engineer In charge.

1. National Engineering Environmental Research Institute (NEERI), Nagpur.
2. Indian Institute of Science, Bangalore.
3. Tata Consulting Engineers, Mumbai.
4. Engineers India Ltd., Delhi.

The testing charges shall be borne by contractor himself and other arrangement for conducting "C" value test shall be made by the Contractor himself.

#### 6.9 MODE OF MEASUREMENT FOR PAYMENT:

The measurement shall be taken jointly by representatives of the Contractor and the Engineer-in-charge.

The length of the pipe line (including tapers, bends, etc.) actually cleaned, mortar lined in accordance with the specifications and accepted by the Engineer-in-charge will be measured along the centre line of the pipeline in running meter and the inner diameter of the bare pipe (i.e. before mortar lining) shall be measured to work out the cement mortar lined area for making payment. No deduction shall be made for small opening at manhole, Air Valve, cross connections, etc. The Contractor shall provide all assistance to the Engineer-in-charge for taking measurements.

The rate quoted shall be on square meter basis, and it shall include mobilising of machinery for work, supply of material, manpower access openings in the pipeline by cutting (above ground as well as underground pipeline) for machine feeding the mortar, providing operational platform, cleaning the pipeline and removing the debris from the pipeline, machine mortar lining and mechanically trowelling, curing, controlling temperature in the pipeline during the progress of work, welding the





removed portion of the pipe removed for access opening, gunniting/concreting or providing outercoating using 4 mm thick Thermofusible tape called "PYPECOAT" at external surface of the M.S. Plate Welded on cut portion for access after completing the lining work for such portion of underground pipeline, establishing working condition in the pipeline and thereafter preventing damages to mortarlining, inspection and testing, commissioning and any other incidental items of works as per scope of work. Length shall be measured upto unit of a Cm. Area shall be worked out correct up to two decimals, a Sq.Meter.

#### 6.10) VARIATION IN QUANTITY:

The length of pipeline to be mortar lined as shown in Schedule-"B" is estimated length. There may be + OR - 30 % variation in quantity. The rates quoted by the Tenderer shall not vary if the actual work carried out varies + OR - 30 % of quantity shown in the Schedule-"B"

#### **DTS No. 13**

**Providing and applying sand blasting on external surface of M.S. pipes in such a manner that surface should adhere the outer coating as directed by the Engineer-in-charge.**

- 1.1 The item includes the surface preparation and pretreatment to be provided to the external surface of M.S. pipes having one end plain and one end swelled to make the pipe ready for the application of outercoating of cement mortar gunniting. It includes removal of all dirt, dust, oil, grease, swarf etc. from the surface of pipe. The sand blasting shall be carried out strictly as per the process lay down in IS:1477:1971 (Part-I). The sand blasting shall be carried out upto such extent that the surface of pipe shall have light greyish colour with minor impression of blasting. It should be carried out in such away that the surface of pipe shall be free from visible mill scale, rust, corrosion, red oxide or paint, if any and other foreign materials.
- 1.2 As the pipes are to be stacked along the alignment of laying site, the sand blasting shall be carried out on site. The contractor has to make arrangement of barricading with the use of partition made of wooden posts and G.I. sheets or other suitable material to safeguard the tress passers/vehicles as & when required. The barricading should be made in such a manner that it should not create any inconvenience/hinderances to the paddastral/vehicular traffic.
- 1.3 The contractor has to make his own arrangement to shift/roll/adjust the pipes convenient of sand blasting on site.
- 1.4 S.M.C. may order the contractor to execute the item in full or in part as per the requirement. Payment shall be made for the pipes completed with sand blasting.



- 1.5 The sand Blasting shall be carried out in the presence of an authorised representative of S.M.C. The Engineer-in-charge may exercise the right to examine the sand blast cleaned surface before application of cement mortar guniting. If the surface is not meeting the specifications, it is liable for rejection and the contractor shall have to perform the same repeatedly at his expense to the satisfaction of Engineer-in-charge.
- 1.6 **MODE OF MEASUREMENT AND PAYMENT.**  
The item includes sand blasting, shifting and rolling the pipes. The payment shall be made on Sq.Mt. base for the pipes upon which the sand blasting is carried out.

**DTS No. 14**

**Conveying, lowering and laying in position sleeve/swaged ended outercoated spiral welded pipes as of size mentioned below with specials in correct line and level upon levelled trenches. The rate includes conveyance from store to site of work, loading, unloading, hoisting, marginal cutting wherever required, assembling and welding and hydraulic testing etc. complete as directed by the Engineer-in-charge.**

- (i) 711 mm dia(OD of Steel Tube) 7.1 mm thickness**
- (ii) 813 mm dia(OD of Steel Tube) 8 mm thickness**
- (iii) 1016 mm dia(OD of Steel Tube) 10 mm thickness**
- (iv) 1219 mm dia(OD of Steel Tube) 10 mm thickness**

Lowering, laying and welding for M.S. Pipe.

The pipes and specials shall be transported and laid by using timber sticks. Peddy shall be provided by the laying contractor between coated pipes and timber sticks to avoid damage to the coating maintain the diameter.

If due to certain site conditions, it is not possible to use the standard specials as provided in the tender, and if the faces of the pipes or specials have to be suitably cut, the same shall be done with permission of the Engineer. Such cutting shall not be paid extra.

The contractor shall be required to maintain sufficient stocks all along the alignment so that his work may not suffer.

Loading, unloading, lowering and laying of pipes and specials shall be done by the crane only. Rubber packing, slink of canvas or non-abrassive material or any such protective material should invariably be used during the handling activity in order to protect the outer coating and edges of pipes and specials. Any damage or deformation or defect occurred during these activities shall be rectified and made good by the contractor at his own cost.

The pipes and specials shall be stacked with help of cranes and along the site in a manner as shall be directed by the Engineer from time to time. Pipes and Specials shall not be stacked under any circumstances in manner as would cause inconvenience or damage or injury to traffic or pedestrians. Pipes and specials, when stacked in places where light is insufficient at night, shall be painted with white lime so that they are better seen by the



vehicular traffic. In case any claims for damage or injury to any person or property on account of the stacked pipes or specials are received, the tenderers shall be held responsible for the same.

The pipes and specials before laying shall be brushed internally throughout the length to remove any rubbish, soil or stones that may have accumulated therein.

#### LOWERING PIPES IN TRENCHES & ASSEMBLING THEM :

The pipes shall be lowered into the trench gently by removing one or two struts at a time only. It shall be seen that no part of the shoring is disturbed or damaged during this operation. It will also be necessary to see that the outercoating if any is not damaged in any way. Care should also be taken to see that the shape of the pipe does not change even momentarily, and to maintain a rigid circular shape, spiders shall be provided at both faces if necessary. After the pipe is lowered in the trench, it shall be laid in correct line and level by the use of levelling instruments, sight rails, theodolites etc. In the case of steel pipes and specials, care shall be taken to see that the longitudinal joints of two consecutive pipes at each joints shall be staggered by 90 degrees so that no two consecutive strakes have coincident longitudinal joints. No extra payment will be made for any difficulty encountered at particular points in the alignment.

While assembling the pipes, the ends shall have to be brought close enough so as to allow proper jointing either by welding for steel pipes, spun yarn and lead for C.I.pipes. There shall be lateral displacement between the pipe faces to be jointed. If necessary, spiders from inside and tightening rings from outside shall be used to bring the two pipe ends in perfect contact and alignment. Circumferential cutting of the face of the pipe without any extra cost to the Corporation may be permitted in special cases by the Engineer, provided that the work is executed by experienced cutters capable of taking straight and uniform cuts when the pipe is properly assembled and checked for correct line and level, it shall be supported on wooden wedges, firmly so as not to get disturbed subsequently. Some earth filling in the middle of the pipe may also be carried out at this site so as to avoid the pipe losing its alignment.

Reference bench mark at least two per kilometer shall be fixed before the work of laying the pipelines is started. These bench marks should be fixed a little away from the field works and should be securely fixed in cement concrete.

The pipes and specials shall be inspected before laying and defects noticed if any such as protrusions, grows, dents, notches etc. shall be rectified. Repairs by hammering with or without heating shall not be permitted. Any damage to the coating shall also be carefully examined and rectified. The pipes and specials shall be handled carefully to avoid damage at all stages and in such a manner as not to distort their circularity or not to cause any damage to the inner lining or outer coating. Pipes shall not be thrown down from the trucks nor shall they be drained or rolled along hard surface. Slinks of canvas or equally non abrasive material of suitable width or special attachment, shaped to fit the pipes ends shall be used to lift and lower the pipes and specials. Before alignment, assembling and



welding, the pipe faces shall be cleaned by scraping, using wire brushes or any other method as directed by the Engineer.

#### **STRAPS & DISTANT PIECES :**

Where work is done from two faces and the connection has to be made, straps may have to be introduced. Such straps shall be fabricated in the field by cutting pipes, slitting them longitudinally and slipping them over the ends to be connected in the form of a collar with make-up piece inserted to increase the circumference. Minimum lap of 3" on either end of the pipe shall be kept. Filter welds shall be run externally along the circumference of the strap and the joints of the make-up piece shall be of butt weld type.

Cutting of such straps shall not be paid for separately but shall be treated as part of the pipeline, the two ends of which are to be connected.

If any distance pieces (i.e. pieces shorter than a full pipe length) are required to be used in conjunction with straps or elsewhere, they shall also be treated as part of the pipeline and no extra payment shall be made for cutting them to the required length out of a full pipe, and for any other work involved in laying and jointing them.

#### **SPECIALS :**

Specials such as bends, single or composite, tappers shall be laid in the same way as the pipes

#### **MAKING BRANCH & TEE CONNECTIONS :**

This provides for interconnections at existing mains running parallel or near by with new mains. This includes cutting of the existing mains, fixing branch tees and collars in position, dewatering the trenches by means of heavy duty pumps. It is likely that the water supply may be hampered while carrying out the branch connections with the existing mains. It should therefore, be specifically noted that the contractor will be required to carry out the work day and night, so that the water supply may be restored as soon as practicable. The branch connection work will be carried out one by one after the pipeline is laid, tested and perfectly ready to be charged with water. If the branch connection works will be carried out with the express permission in writing of Engineer-in-charge and as directed by him. The payment for the same shall be made on the basis of running feet of the respective sizes. The length of the specials shall be measured along the centre line.

The item also includes cutting of pipes and specials for accommodating specials, valves etc. in correct positions and also includes conveying, lowering and fixing in position M.S./C.I. specials like tee, collars, tapper, bends, etc. including cutting the pipe line, dewatering the trench by means of pumping for making branch and end connection on existing pipeline etc. complete without any extra cost to the Corporation. If the Contractor fails to complete the work of connecting head line with existing ones within a period of one month after



having instructed to do so. The same will be carried out by the departments at the risk and cost of the contractor.

**Welding of joints of the pipes:**

The welding of joints of the pipes in the field shall comply with I.S.816-1965 or its latest amendments.

The welds shall be run in three runs of welding. Out of three weld two weld shall be run outside the pipe and one weld shall be run inside the pipe. The welding and testing of the weld shall also be done as per the procedure laid down in I.S.S. 823-1964 or its latest amendments. Experienced welders whose performance shall be tested from time to time, shall only be permitted to carry out the welding work. No apprentices or helpers shall be allowed to do any welding whatsoever. If any unauthorised person is found to do welding work, he shall be removed from the work and the work carried out by him will have to be redone after gauging out the same. The following points shall be borne in mind by the contractors.

**ELECTRODES :**

The contractors shall use standard electrodes its number (i.e.type) depending on the thickness of plate and the type of joint. They shall also use standard current and voltages required for the machine in use. Electrodes shall conform to I.S.814-1974, and I.S.815-1966. Electrodes used must be of ESAB-INDIA, ADVANI and D&H only.

**TESTING OF WELDED JOINTS :**

**(i) GENERAL :**

The welded joints shall be tested in accordance with Indian Standard Specifications I.S.823-1964 and I.S.3600-1973 or to its latest amendments. The test pieces shall be taken out from the pipes pointed out by the Engineer without any delay. They shall be immediately delivered at the Engineer's Office for being numbered, machined and tested. The shape of the test pieces removed from the pipes shall be such that it will give a specimen of the required dimension and at the same time leave a hole in the pipe with rounded corners. This hole shall be closed up by patch plating from the outside so as to have over lap of 3" on all sides of the opening. Great care shall be taken in preparing these plates so as to get a good lap weld. The cost of providing the required M.S. Plates for this, is included in the item. After the jointing is completed, all protruding portions shall be chipped off, and the portion of the pipeline near the field joint shall be thoroughly scrapped and cleaned to receive the guinite.

**(ii) DETAILS OF TEST:**

The following test shall be made.



### **TENSILE TEST :**

The test specimen taken perpendicularly across the weld shall be shaped in accordance with the I.S.No.1663-1962. The specimen shall be taken from the end of the pipe or at any joint in the pipe as directed by the Engineer and shall be cut with the weld approximately in the middle of the specimen. The tension test specimen shall be machined. The protruding welding portions from both inside and outside shall be removed by machining or grinding before the specimen is tested.

At least one field joint out of every 100 shall be subjected to test by taking out a specimen. If a test specimen shows defective machining or develops flaws not associated with welding, it may be discarded and another specimen substituted.

The weld joint shall show a strength not less than the minimum tensile strength specified for the plate.

### **BEND TEST :**

The bend test specimen shall be prepared in the same way as for tensile test and tested in the presence of the Engineer. The specimen shall be taken from the same pipe selected for tensile test. The specimen shall stand being bent cold through 180 degrees around a pin, the diameter of which is equal  $4 \frac{1}{2}$  times the thickness of the plate without developing cracks. In making the bend test, the side of the specimen representing the inside of the pipe shall be placed next to the pin.

### **(iii) PROCEDURE IN CASE OF FAILURE OF THE TESTS :**

A failure of the joint will indicate that the operator is not careful as other factors such as current, voltage, electrodes, etc. are already determined. For the first failure, the operator shall be warned and if a second failure takes place, he will be removed from the work and another suitable operator substituted. Joints or the portion thereof shall be gauged and repaired to the satisfaction of the Engineer. In order to maintain a good standard in welding welder shall be tested before they are entrusted with the job.

A record shall be maintained showing names of welders and operators who have worked on each individual joint. The work should preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or pair shall be as far as possible be completed by them in all respects, including, sealing run. No helper or other unauthorised welder shall be permitted to carry out any welding work whatsoever. In case of infringement of above, the person concerned shall be removed as directed by the Engineer.

### **(iv) RE-TEST :**



If the results of tensile or bend test or any test do not conform to the requirement specified, retest of two additional lengths from the same section shall be made, each of which shall conform to the required specification. In case of failure of one or both, extensive gauging and repairing shall be carried out as directed by the Engineer before the section can be accepted.

**(v) EXPENSES FOR TESTING :**

All expenses in connection with taking out test samples machining and testing them in a laboratory, transporting etc. shall be borne by the contractor. The tensile and bend test shall be carried out in some Government or Semi-Government institute by paying the necessary fees. This will be arranged by the Municipality at the contractor's cost.

**ARREARS OF WELDING WORK :**

It is necessary for the contractor to see that the welding work is done systematically leaving no arrears to be done subsequently. The contractors shall provide sufficient number of plants for this purpose including stand by and shall have enough personnel on the welding job, so as to maintain steady progress. A proper sequence of operation is very necessary in the pipe laying work and the contractor shall see that the work as per schedule is carried out from day to day. Unless this is done, the Engineer may suspend pipe laying operation until arrears have been tackled to his satisfaction. No compensation for extension of time shall be given for any stoppage of work owing to such causes.

Where the work is to be done in roads and thorough fare, long trenches should not be always left open number any circumstances. It is, therefore, incumbent upon the contractors to follow a planned procedure of work so as not to leave any arrears of work. The daily progress of excavation work for preparing trenches shall met with the refilling of the trenches in the completed portion.

**Outer coating on the welded joints:-**

The outside exposed welded steel surface shall be covered by providing outer coating of Corrosion & Chloride resistant treatment of "Corocrete TE" (which is thixotropic two component resin system with modified amine hardner). as specified in I.No.(4) of tender. The outer coating work at joints is to be carried out in situ at the site of laying by supporting the pipes temporarily on timber props. Care shall be taken to see that the pipes remains perfectly circular while welding and outer coating is being given. This shall be done by providing adequate number of spiders. These spiders shall not be allowed to deslodge until the pipeline is laid in position in the trench and jointed.

The outer coating shall be provided after testing the pipe at specified pressure.

The item includes all the tools, machineries, materials, labour etc. complete for providing outer coating.



The item includes cutting of sleeve/ swaged end of pipe of necessary for making lap joint perfect for welding of joint. when required.

This item also includes marginal cutting of the edge of the pipe or special circumferentially, making the ends bevelled to suit perfect but joint with the adjacent edge/end of the or special.

The item includes conveyance of pipes from store to site of work loading, unloading, hosting marginal cutting wherever required, assembling welding and hydraulic testing. The required equipment, water and labour shall be provided by contractor at his cost.

Mode of measurement & payment:-

The payment shall be made on per Running meter basis for the completed item.

#### **DTS No. 15**

**Labour work for Feb. & and supplying at site the M.S. specials as required at site and suitable for field welding at site having 7 To 12 mm th. plate. The size and dimensions shall be confirming to IS :7322 as directed by Engineer-in-charge. The item includes conveyance from store to site of work loading unloading, hosting marginal cutting wherever required, assembling & welding & hyd. Testing etc. Comp as directed by the Engineer-in-charge.**

#### **Detail Specification as per below.**

Ends of the specials shall be made properly which shall be suitable for field welding along with the adjacent pipe.

Outer coating/ inner coating shall be as per DTS No.5 and 6 of this tender.

Pipes/specials not conforming to the specifications and not serviceable in the opinion of the Engineer-in-charge, shall have to be remanufactured and to be provided at the site by the Contractor at his own cost.

In case of difference of opinion between the contractor and the Engineer-in-charge, the decision of the City Engineer or equivalent shall be considered final and binding to the contractor.

The welding shall be done by using the approved electrodes as instructed by the Engineer-in-charge.

Manufacturing of the specials shall be done at the own premises/factory of the Contractor at Surat only. Surat Municipal Corporation will not allot any space for the same. Alternatively, contractor may manufacture the specials at site in such a manner that it does not obstruct the vehicular traffic or pedestrians on road.

Electrodes and Welding:





Electrodes to be used welding work shall conform to IS:814 & 815 and welding shall conform to IS 816:822 & 823. The electrodes must be of make "ESAB-INDIA", "Advani", and "D&H" only.

The steel core shall be formed by shaping and welding together steel plates of specified thickness. But welding shall be adopted for all longitudinal and circumferential welds. All welds shall be made down hand by the welding process. Welding shall be done so that there shall be thorough fusion and complete penetration. Prior to welding the plates shall be fitted closely and during welding they shall be held firmly. The metal arc welding shall be done as per I.S.816/1969 code of practice for use of metal ARC welding for general construction in mild steel and I.S. 823-1964 code of procedure for manual metal arc welding of mild steel.

**Mode of measurement :-**

The payment shall be made on the per Kg. basis

**DTS No. 16**

**Extra Cutting of Spirally welded pipes having wall thickness up to 12 mm thick for making it of suitable length or making the existing edge true vertical to have perfect square joints including all material equipments and labour required for cutting the pipes excluding cutting of pipe for M.S. Specials.**

- (a) Above 5 mm to 10 mm thick.
- (b) Above 10 mm thick.

The item includes cutting of 711 to 1626 mm dia. M.S. pipes for making it into suitable lengths or making existing edges true vertical or exactly matching to the side of the adjacent pipe and/or edge of the M.S. Special to have perfect square joints. The item includes all materials, equipments and labours required for cutting the pipes. The pipes should be cut with due care to have true vertical or required shaped edges. If due to any reason, the pipes are not cut as required, the cost of the damaged portion shall be recovered from the contractor and more over he shall have to again cut the pipes as per the requirement without claiming any extra cost. It shall be seen that for re-cutting the pipes, the minimum length of the pipes shall be wasted as the pipes are too costly. The pipes shall be cut using standard cutting machines and materials which shall be in accordance to relevant Indian Standard. If required, the pipes shall have to be properly shaped before cutting for which no extra payments shall be made.

The quantity shown in the tender is very approximate and the work shall have to be carried out at the quoted rates for the quantity required to be executed according to the exigency during the progress of the work.

**Mode of measurement :-**

Payment shall be made per Rmt. basis of the end of pipe cut by the contractor

**DTS No. 17**

**Extra field welding in all position with required number runs, for M.S. pipes internally and/or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification.**



The welding and joints of the pipes in the field shall comply with I.S.816-1965 or its latest amendments.

The welds shall be run in three runs of welding. Out of three weld two weld shall be run outside the pipe and one weld shall be run inside the pipe. The welding and testing of the weld shall also be done as per the procedure laid down in I.S.S. 823-1964 or its latest amendments. Experienced welders whose performance shall be tested from time to time, shall only be permitted to carry out the welding work. No apprentices or helpers shall be allowed to do any welding whatsoever. If any unauthorised person is found to do welding work, he shall be removed from the work and the work carried out by him will have to be redone after gauging out the same. The following points shall be borne in mind by the contractors.

#### ELECTRODES :

The contractors shall use standard electrodes its number (i.e.type) depending on the thickness of plate and the type of joint. They shall also use standard current and voltages required for the machine in use. Electrodes shall conform to I.S.814-1974, and I.S.815-1966. Electrodes used must be of ESAB-INDIA, ADVANI and D&H only.

#### TESTING OF WELDED JOINTS :

##### (i) GENERAL :

The welded joints shall be tested in accordance with Indian Standard Specifications I.S.823-1964 and I.S.3600-1973 or to its latest amendments. The test pieces shall be taken out from the pipes pointed out by the Engineer without any delay. They shall be immediately delivered at the Engineer's Office for being numbered, machined and tested. The shape of the test pieces removed from the pipes shall be such that it will give a specimen of the required dimension and at the same time leave a hole in the pipe with rounded corners. This hole shall be closed up by patch plating from the outside so as to have over lap of 3" on all sides of the opening. Great care shall be taken in preparing these plates so as to get a good lap weld. The cost of providing the required M.S. Plates for this, is included in the item. After the jointing is completed, all protruding portions shall be chipped off, and the portion of the pipeline near the field joint shall be thoroughly scrapped and cleaned to receive the guinite.

##### (ii) DETAILS OF TESTS

The following test shall be made.

#### TENSILE TEST :



The test specimen taken perpendicularly across the weld shall be shaped in accordance with the I.S.No.1663-1962. The specimen shall be taken from the end of the pipe or at any joint in the pipe as directed by the Engineer and shall be cut with the weld approximately in the middle of the specimen. The tension test specimen shall be machined. The protruding welding portions from both inside and outside shall be removed by machining or grinding before the specimen is tested.

At least one field joint out of every 100 shall be subjected to test by taking out a specimen. If a test specimen shows defective machining or develops flaws not associated with welding, it may be discarded and another specimen substituted.

The weld joint shall show a strength not less than the minimum tensile strength specified for the plate.

#### BEND TEST :

The bend test specimen shall be prepared in the same way as for tensile test and tested in the presence of the Engineer. The specimen shall be taken from the same pipe selected for tensile test. The specimen shall stand being bent cold through 180 degrees around a pin, the diameter of which is equal 4 1/2 times the thickness of the plate without developing cracks. In making the bend test, the side of the specimen representing the inside of the pipe shall be placed next to the pin.

#### (iii) PROCEDURE IN CASE OF FAILURE OF THE TESTS :

A failure of the joint will indicate that the operator is not careful as other factors such as current, voltage, electrodes, etc. are already determined. For the first failure, the operator shall be warned and if a second failure takes place, he will be removed from the work and another suitable operator substituted. Joints or the portion thereof shall be gauged and repaired to the satisfaction of the Engineer. In order to maintain a good standard in welding welder shall be tested before they are entrusted with the job.

A record shall be maintained showing names of welders and operators who have worked on each individual joint. The work should preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or pair shall be as far as possible be completed by them in all respects, including, sealing run. No helper or other unauthorised welder shall be permitted to carry out any welding work whatsoever. In case of infringement of above, the person concerned shall be removed as directed by the Engineer.

#### (iv) RE-TEST :

If the results of tensile or bend test or any test do not conform to the requirement specified, retest of two additional lengths from the same section shall be made, each of which shall conform to the required specification. In case of failure of one or both, extensive gauging and repairing shall be carried out as directed by the Engineer before the section can be accepted.



(v) EXPENSES FOR TESTING :

All expenses in connection with taking out test samples machining and testing them in a laboratory, transporting etc. shall be borne by the contractor. The tensile and bend test shall be carried out in some Government or Semi-Government institute by paying the necessary fees. This will be arranged by the Municipality at the contractor's cost.

(D) ARREARS OF WELDING WORK :

It is necessary for the contractor to see that the welding work is done systematically leaving no arrears to be done subsequently. The contractors shall provide sufficient number of plants for this purpose including stand by and shall have enough personnel on the welding job, so as to maintain steady progress. A proper sequence of operation is very necessary in the pipe laying work and the contractor shall see that the work as per schedule is carried out from day to day. Unless this is done, the Engineer may suspend pipe laying operation until arrears have been tackled to his satisfaction. No compensation for extension of time shall be given for any stoppage of work owing to such causes.

Where the work is to be done in roads and thorough fare, long trenches should not be always left open number any circumstances. It is, therefore, incumbent upon the contractors to follow a planned procedure of work so as not to leave any arrears of work. The daily progress of excavation work for preparing trenches shall met with the refilling of the trenches in the completed portion.

(E) Outer coating on the welded joints:-

The outside exposed welded steel surface shall be covered by providing outer coating of Corrosion & Chloride resistant treatment of "Corocretin TE" (which is thixotropic two component resin system with modified amine hardner). as specified in I.No.(4) of tender. The outer coating work at joints is to be carried out in situ at the site of laying by supporting the pipes temporarily on timber props. Care shall be taken to see that the pipes remains perfectly circular while welding and outer coating is being given. This shall be done by providing adequate number of spiders. These spiders shall not be allowed to deslodged until the pipeline is laid in position in the trench and jointed.

The outer coating shall be provided after testing the pipe at specified pressure.

The item includes all the tools, machineries, materials, labour etc. complete for providing outer coating.

This item also includes marginal cutting of the edge of the pipe or special circumferentially, making the ends bevelled to suit perfect but joint with the adjacent edge/end of the or special.

Mode of Measurement:-

The rate shall be as per Running meter basis and includes all materials and labour required for welding the joints, outer coating at joints etc. complete.



#### **DTS No. 18**

**Lowering, laying and jointing in position following Sluice valves / BF valves, Electrically operated valve, Resilience seated SV including of all labour**

- (a) 600 mm dia Sluice Valve PN-1.0
- (b) 700 mm dia B/F Valve PN-1.0
- (c) 800 mm dia B/F Valve PN-1.0
- (d) 900 mm dia B/F Valve PN-1.0
- (e) 1000 mm dia B/F Valve PN-1.0
- (f) 1200 mm dia B/F Valve PN-1.0

Valves shall be lowered and fixed in proper position and right to the plump and flange joints with the sets of tail pieces shall be carried out perfectly water tight. Nut bolts, rubber inseration etc. required for jointing shall be provided by the Contractor.

#### **Mode of the measurement and payment:-**

The rate shall be for unit of one number.

#### **DTS No. 19**

**Providing, testing of corrogate design stainless steel expansion bellows with flanges, 15 mm axial movement, 300 mm overall length with the rods, nuts etc.**

- (a) 600 mm dia Sluice Valve PN-1.0
- (b) 700 mm dia B/F Valve PN-1.0
- (c) 800 mm dia B/F Valve PN-1.0
- (d) 900 mm dia B/F Valve PN-1.0
- (e) 1000 mm dia B/F Valve PN-1.0
- (f) 1200 mm dia B/F Valve PN-1.0

#### **GENERAL DESIGN REQUIREMENT**

Expansion bellow shall be designed as per the details furnished in the data sheet and shall be in accordance with the EJMA/ ASME standard.

The bellows shall be metallic corrugated design and shall have double flange. The material for bellow shall be SS 304. Fatigue life expectancy considered for the Expansion Bellows shall be minimum 7000 cycles.



After satisfactory testing of the Bellows, prior to dispatch, all internal and external un-machined ferrous surfaces of the Bellows shall be thoroughly clean, dry and shall be made free from rust and grease before painting.

All exposed machined surfaces 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 shall adhere perfectly to the surface. The inside coating shall not contain any constituent soluble in water or any ingredient which could impart any taste or smell to water.



**Document : Technical Data Sheet for Metallic Expansion Bellows**

SR. NO.	PARTICULARS	DESCRIPTION	BLANK DATA TO BE FILLED BY BIDDER
<b>1.0</b>	<b>LIQUID DATA</b>		
1.1	Fluid / Specific gravity	Water / 1.0	
1.2	Temperature	Ambient	
<b>2.0</b>	<b>EXPANSION BELLOWS DATA</b>		
2.1	Make	Pl. furnish detail	
2.2	Manufacturing Standard	EJMA / ASME	
2.3	Size range and quantity	As per SOQ	
2.4	Overall length in mm	As per SOQ	
2.5	Pressure Rating	PN : 1.0	
2.6	Axial expansion in mm	5	
2.7	Axial compression in mm	15	
2.8	Mode of installation	Horizontal	
2.9	Ends	Flanged, FF as per IS-1538 having off center bolt holes	
2.10	No of Convolution	Pl. furnish	
2.11	Thickness of Weld End	Pl. furnish	
2.12	Thickness of internal sleeve	Pl. furnish	
<b>3.0</b>	<b>MATERIAL OF CONSTRUCTION</b>		
3.1	Bellows ( M )	SS 304	
3.2	Internal Sleeves ( M )	SS 304	
3.3	Flanges ( M )	CI/MS	
3.4	Lugs	CI/MS	
3.5	Rods	IS 1367 VI 1994 CI 4.6	
3.6	Hardware	C.S IS 1367	
<b>4.0</b>	<b>TESTING</b>		
4.1	Hydrostatic Test pressure	15 kg / sq.cm	

M- Denotes material test required

**Mode of the measurement and payment:-**

The rate shall be for unit of one number.

**DTS No. 20**

**Lowering, laying and jointing in position following Air valves including of all labour, jointing material, including nut bolts and giving satisfactory hydraulic testing etc. complete.**

- (a) 200 mm dia
- (b) 150 mm dia
- (c) 100 mm dia



Valves shall be lowered and fixed in proper position and right to the plump and flange joints with the sets of tail pieces shall be carried out perfectly water tight. Nut bolts, rubber inseration etc. required for jointing shall be provided by the Contractor.

**Mode of the measurement and payment:-**

The rate shall be for unit of one number.

**DTS No. 21**

**Providing & laying Cement Concrete 1:3:6 (1 Cement, 3 Course sand, 6 graded stone aggregate 40 mm.Nominal size) with ramming, curing etc. complete including cost of form work**

- (a) For Pipe Encasing
- (b) For foundation and plinth.
- (c) For Thrust Block

1. Item shall be carried out in general and shall be as per IS 456:1984 or revised from time to time shall be followed.

1.1 The materials like cement, sand, coarse aggregates shall be as per the general specification of the materials and as per relevant IS.

2. Concrete Mix :

In ordinary concrete, the proportion of cement to fine aggregate to carse aggregates shall be 1:3:6 i.e. one part of cement and three parts of sand and six parts of coarse aggregates. The volume of cement is considered to be 1.20 cft.

The crushing strength of 6 "square cube shall be as per Table No.1, I.S.456 i.e. for 7 days 105.5 Kg/cm<sup>2</sup>(1500 lb/Sq.in) and for 28 days 158.2 Kg/Cm<sup>2</sup> (2250 lbs/Sq.in).

3. Water Contents :

The water contents for an ordinary concrete mix should generally be equal to 27 to 35 litres per bag. Allowance for surface water present in aggregates shall be made when computing the water content.

Form work :

4. General :

The form work shall confirm to shape, lines and dimensions as shown on plan and be so constructed as to remain sufficiently rigid during the placing and compacting of concrete and shall be sufficiently tight to prevent lose of liquid from the concrete.

For form work constructions of plywood or steel plates will be used except for small junction and crossing.

Clearing of forms :





All rubbish, chipping shaving and saw dust shall be removed from the interior of forms before the concrete is placed and form work in context with concrete shall be cleaned thoroughly wetted or treated with the approved composition.

Stripping time :

The frame shall be structured after expiry of following period.

- (a) Vertical sides of beams and columns, columns footing -48 Hours
- (b) Bottom of slabs upto 4.6 M.Span. - 7 Days
- (c) Bottom of slabs above 4.6 M.to 6.0 M.Span. -14 Days
- (d) Removal of props under beam upto 6 M. Span. -14 Days
- (e) Removal of props under beam above 6 M.Span. -21 Days

Procedure when removing the form work :

All form work shall be removed without such sock on vibration as would damage the reinforced concrete. The concrete should be sufficiently hardened before the so fits and props are removed proper precautions shall be taken in cold whether.

5. Centering :

The centering to be provided shall got approved from the Engineer-in-charge. It shall be sufficiently strong to ensure safety of the form work and concrete work before, during and after pouring concrete, watch shall be kept to see the behaviour of centring and form work satisfactory during the concreting. Erection shall also be such that it would allow the removal of forms in proper without damaging either concrete for forms to be removed.

The props of centering should be provided in on firm foundations or base of sufficient strength to carry the load without settlement. The props shall be strong durable and not less than 3" dia. If wooden pulling are used. In case of centering of slabs, the props shall be of 3" dia c/c for beams and shall be placed not more than 2 to 2'-3" c/c.

The cross horizontal struts shall be provided at every 8" to 10" height of props. The centering and form work will be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor or responsibility for strength and safety of the form works and centering. If there is failure of form work or centering, contractor shall be responsible for any damage to work, or injury to life and property.

6. Scaffolding :

All scaffolding and hoisting arrangements ladders etc., required for the concreting shall be provided and removed, on completion of the work by contractor at his own expense. The scaffolding, hoisting arrangements, ladders etc. shall be strong to withstand all the live, dead, and impact, load, expected to act and shall be subject to



approval of the Engineer-in-charge. However the contractor shall be completely responsible for the work and workman etc.

7. Workmanship :

The quantity of cement shall be assumed to be per bag having volume 1.2 cft. The quantity of fine and coarse aggregates shall be measured in volumetric basis i.e. steel phromes of 0.30 x 0.30 x 0.38 high.

8. Mixing :

Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of the materials and mass is uniform in colour and consistency.

The case of failure of the mechnary, hand mixing shall be permitted but in such cases, 10% extra cement shall have to be used without any extra cost to the Corporation.

9. Transporting :

Concrete shall be handled from the place of mixing to the place of final deposit at regidle, as practicable by methods which will present the segregation or base any in gradients. During not or cold weather, concrete shall be transported in deep containers.

10. Placing and compacting :

Concrete shall be carried out continuously upto construction joints, the position and arrangements shall be determined by the department. When the work has to be resumed on the surface which are hardened such surface shall be roughned on before the new concrete is laid.

11. Compacting :

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement and into corner of form work by means of mechanical vibrator and wooden screeds, so that whole mass becomes compact and homogenous and there is no air bubble or honey combing. At the time of concreting, proper care shall be taken, so that honey combing formation is minimum.

After the form work is removed, if any such honey combing etc. work is found, it shall be immediately finished with the cement mortar 1:1, so that the crevices are properly filled and no reinforcement is exposed. If however, the honey combing is found of any severe nature and is found through out the surface of concreting, exposing the reinforcement. The concrete work shall be rejected and redone without any extra cost.



12. The concrete shall be covered with a layer of stacking canvas hession or similar absoremnt materials and kept constant wet for 20 days from the date of placing of concrete for R.C.C. slab cement or lime mortar cykes 7 c.m. to 10 c.m.height shall be filled with water. If proper curing arrangement is not done by contractor the same shall be done by department at risk and cost of the contractor and the contractor shall be fully responsibility for the same.

13. Testing :

The work test concrete shall be carried out as per Appendix `E' of I.S.456. The size of cubes shall be 15 cm x 15 cm x 15 cm. The mould for test specimen shall be made of steel plated. They shall not very from the std. dimension by more than one percent. The moulds shall be so constructed that there will not be leakage of water from the test specimen during moulding.

More samples of concrete consisting six cubes sizes 150 mm x 150 mm x 150 mm shall be taken for every 45 cms. or part there of concrete work. The conctractor may taken his own arrangement for taking samples and testing of the samples in Government laboratores at his own cost. A register shall be maintained at site of the work.

Results of the test shall be as per requirements as per I.S. If the results are found slightly below the prescribed limit and within permissible range. The work shall be accepted by the Engineer-in-charge as a special case if deemed proper otherwise the work shall be rejected.



14. Finishing :

After removing the centering all exposed R.C.C.members shall be tightly chiselled to have proper key with mortar plastering work and shall be finished with cm 1:3 cement plastered of required thickness of 1/2" to bring the work in line and level including cement finishing etc.

Item includes all materials, labours, tools plants and machinery required for the satisfactory completion of item in cluding forms, centering, scaffolding and carrying out necessary test as per I.S.516:1959 including finishing etc. complete.

Rates :

The item shall be measured and paid on cubic meter basis.

**DTS No. 22**

**Providing & laying ordinary cement concrete in C.C.1:1.5:3 (1 Cement,1.5Coarse sand & 3 coarse agreegate 20 mm Nominal Size)**

- (a) For RCC Slab in C.C.1:1.5:3 for valve chamber
- (b) For RCC Encasing
- (c) For Thrust Block

1. Materials :-

Water shall conform to M-1, Cement shall conform to M-3. Sand shall conform to M-5. Grit shall conform to M-6. Graded stone aggregate 20 mm nominal size shall conform to M-9.

2. General :-

2.1 The concrete mix is not required to designed by preliminary tests. The proportion of the concrete mix shall be 1:1 1/2:3

[1 cement:1 1/2 coarse sand:3 graded stone aggregate 20 mm nominal size] by volume Concrete work shall have exposed concrete surface or as specified the item.

2.2 The designation ordinary M-100, M-150, M-200, M-250 specified as per I.S. corresponding approximately to 1:3:6 1:2:4, 1:1:1, 1:1 1/2: 3 and 1:1:2 nominal mix of ordinary concrete by volume respectively with conforming to IS:456.

2.3 The ingredients required for ordinary work, containing one bag of cement of 50 kg. by weight [0.0342 cu.m.] for different proportion of mix shall be as under.

Grade of concrete	Total quantity of dry aggregate by volume per 50 kg. of cement to be taken as the sum of individual	Proportion of line aggregate to coarse aggregate	Quantity of water per 50 kg.of cement maximum



	volume of fine and coarse aggregate maximum		
M-100 [1:3:6]	300 Litres	Generally 1:2 for fine aggregate to	34 litres
M-150 [1:2:4]	220 "	Coarse aggregate by volume but subject	32 "
M-200 [1:1.5:3]	160 "	to and upper limit of 1:1 1/2 & lower	30 "
M-250 [1:1:2]	100 "	limit 1:3	27 "

- 2.4 The water cement ratios shall not be more than those specified in the table. The cement content of the mix specified in the table 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 table is not exceeded.
- 2.5 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.
- 2.6 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.
- 2.7 For reinforced concrete work, coarse aggregates having a nominal size of 20 mm are generally considered satisfactory.
- 2.8 For heavily reinforced concrete members as in the case of the ribs of main beams the nominal maximum size of coarse aggregate should usually be restricted to 5 mm, less than the minimum clear distance between the main bars, or 5 mm, less than the minimum cover to the reinforcement whichever is smaller.
- 2.9 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 some times be as great as or greater than the minimum cover.
- 2.10 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 admixtures.

### 3. WORKMANSHIP :



3.1 General :- The bars shall be kept in position by the following method:

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 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.

In case of cantilevered or doubly reinforced beams or slabs, the main reinforcing bars shall be held in position by introducing cabin spacers or supports bars at 1.0 to 1.2 metres centres.

In case of columns and wall, the vertical bars shall be kept in position by means of timber templates with slots accurately cut in them, the templates 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 10 days. This coat of thin neat cement shall be removed before concreting.

3.2 Proportioning :-

Proportioning shall be done by volume, except cement which shall be measured in terms of bags of 50 kg. weight. The volume of one such bag being taken as 0.0342 cu. metre. Boxes of suitable sizes shall be used for measuring sand and aggregate. The size of the boxes [ internal ] shall be 35x25 cms. and 40 cms. deep. While measuring the aggregate and sand, the boxes shall be filled without shaking, ramming or hammering.

The proportioning of sand shall be on the basis of its dry volume and in case of damp sand, allowances for bulking shall be made.

3.3 Mixing :-

3.3.1 For all work, 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 half minute. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate shown complete coating of mortar containing its proportionate amount of cement. In



no case shall the mixing be done for less than two minutes after all ingredients have been put into the mixer.

- 3.3.2 When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons, it shall be done on the smooth watertight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor 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 throughly 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 percent above that specified.



- 3.3.3 Mixer 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 concrete to another.
- 3.4 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 test 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.
- 3.5 Inspection :
- 3.5.1 Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit 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.
- 3.5.2 Centring 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 for reinforcement laid in position. For access to different parts suitable mobile platform 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.
- 3.6 Transporting and laying :-
- 3.6.1 The method of transporting and placing concrete shall as approved. Concrete shall be so transported and placed that no contamination segregation or loss of its constituent material takes place.
- 3.6.2 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 structure until the approval of Engineer-in-charge.
- 3.6.3 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 unless a proper construction joint is formed. Concrete shall be compacted in its final position within 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 metre when internal vibrators are used and not exceeding 0.30 metre in all other cases.

3.6.4 Unless otherwise agreed to by the Engineer-in-charge, concrete shall not be dropped into place from a height exceeding 2 meters.

3.6.5 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 layers 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 free water removed, and then coated with neat cement grout, The first layers 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 spot.

3.6.6 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.

3.6.7 Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream upto form an even surface. Compaction shall be completed before the initial setting starts i.e. within 30minutes 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.

3.7 Curing :-

Immediately after compaction, concrete, weather including rain, running water, shocks, vibration, traffic, rapid temperature changes frost and drying out process it shall be covered with wet sacking, hessian or other similar absorbant material approved, soon after the initial set and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonary work over foundation concrete may be started after 48 hours of its laying but curing of concrete shall be continued for a minimum period of 14 days.

3.8 Sampling and Testing of concrete :-

3.8.1 Samples from fresh concrete shall be taken as per IS 1199:1959 and cubes shall be made, cured and tested at 7 days and 28 days as per requirements in accordance with IS 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 following.

3.8.2	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-and above	4+one additional sample for each additional 50 cmt. or part there of.

Note:- Atleast one sample shall be taken from shift. The 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 suitably 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.

3.8.3 The average strength of the group of cubes cast for each day shall not be less than the specified cube strength of 150 kg/cm<sup>2</sup> 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 proportion given for a particular grade does not yield the specified strength such concrete shall be classified as belonging the 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.

3.9 Stripping :

3.9.1 The Engineer- in- charge shall be informed in advance by the contractor of his intention to struck 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 & 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'c] and where ordinary concrete is used forms may be struck after expiry of period specified in the Item No.4 for respective item of form work.

3.9.2 All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soffit are removed, the concrete surface shall be exposed, where necessary in order to ascertain that the concrete has sufficiently hardened. Centring 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 removeable parts shall be extracted without causing any damage to the concrete and remaining holes filled with



mortar. No permanently embedded metal part 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 Executive Engineer shall inspect the work and satisfy by random checks that concrete provided is of good quality.

3.9.3 Immediately after the removal of forms all exposed bolts etc. Passing through the cement 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 hole be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depression, 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 the proportions used in the grade of concrete that is being finished and so 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.

3.9.4 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 portions of the structure affected.

4.0 Mode of measurement and payment :

4.1 The consolidated cubical contents of concrete work as specified in item shall be measured. The concrete laid in excess of section shown on drawings or as directed shall not be measured. No deductions shall be made for.

[a] Ends of dissimilar materials such as joints, beams, posts, girders, rafters, purline, trusses, corbels and steps etc. upto 500 sq.cm. in section.

[b] Opening upto 0.1 sq.m.

[c] The volume occupied by reinforcement shall not be deducted from R.C.C. work.

4.2 The rate includes cost of all materials labour, tools and plant required for mixing, placing in position vibrating and compacting, finishing as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate excludes the cost of form work.

4.3 The rate shall be for a unit of one cubic metre.

#### **DTS No. 23**

**Providing & fixing T.M.T Fe-500 Bar reinforcement for RCC work including, bending, binding and placing in position etc. complete.**

**(a) For Valve Chamber**

**(b) For RCC Encasing**



**(c) For Thrust Block**

**1.0 MATERIALS**

1.1 Mild steel bars shall conform to M-14 TMT bar shall conform to M-15, Mild steel binding wires shall conform to M-17.

**2.0 WORKMANSHIP**

2.1 The work shall consist of furnished and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.

2.2 Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.

2.3 Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings.

Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material.

Bars bent during transportation or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified for mild steel a "U" type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of the circle having an equivalent effective area.

The hooks shall be suitably encased to prevent any splitting of the concrete. The cold twisted steel bars shall be used without hooks at the ends. Deformed bars without hooks shall, however, comply with relevant anchorage requirements.

2.4 All the reinforcement bars shall be accurately placed in exactly the same position as shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm. in size, and by using stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of the concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices.



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. All the bars are to be spliced and which are likely to be exceeding 10 days shall be protected by a thick coat of neat cement grout.

- 2.5 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.
- 2.6 As far as possible, bars of full length shall be used, in case this is not possible, overlapping of bars shall be done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. or 1.25 times the maximum size of the coarse aggregate whichever is greater between them. Where not feasible, overlapping bars shall be bound with annealed wires, not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.
- 2.7 Wherever indicated on the drawings or desired by the Engineer-in-charge bars shall be joined by couplings which shall have a cross section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to I.S.-226.
- 2.8 When permitted or specified on the drawings, joints of reinforcement bars shall butt-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 for 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 I.S.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.

### 3.0 MODE OF MEASUREMENT & PAYMENT



- 3.1 For the purpose of calculating consumption, wastage shall not be permitted beyond 7.5%. Excess consumption over 7.5% will be charged at penal rate as per special condition of contract .
- 3.2 Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the same basis of as per M-14 even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.
- 3.3 The rate for reinforcement includes cost of steel binding wires, its transporting from departmental store to work site cutting, bending, placing and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage.
- 3.4 The rate shall be for unit of one MT.  
Note :-Read M.S.Binding wire instead of G.I. binding wire when and where specified

#### **DTS No. 24**

**Providing & constructing brick work using Fly ash bricks having crushing strength not less than 35 kg/sqcm in foundation and plinth in CM (1:6) (1 cement : 6 fine sand)  
Conventional**

#### 1.0 MATERIALS

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-5, Flyash Flyash building bricks shall conform to M-12, Cement mortar shall conform to M-8.

#### 2.0 WORKMANSHIP

- 2.1 Proportion : The proportion of cement mortar shall be 1:6 (1 cement, 6 fine sand) by volume.
- 2.2 Wetting of Flyash building bricks : The Flyash building 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 Flyash building bricks are wetted with water, is an indication of thorough wetting of Flyash building bricks.
- 2.3 Laying : Flyash building bricks shall be laid in English bond unless directed otherwise. Half or cut Flyash building 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 Flyash building bricks 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 Flyash building bricks 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 Flyash building bricks course shall be kept in uniform.

The Flyash building bricks shall be laid with frogs up wards. A set of tools comprising of wooden straight edges, manson's spirit level, square half metre 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 Flyash building bricks work shall be kept not more than one metre over the rest of the work. Where this is not possible, the work shall beraked 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.

- 2.4 Joints : Flyash building bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 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 done.

The face of Flyash building bricks shall be cleaned the very day on which the Flyash Building brick work is laid and all mortar dropping removed.

- 2.5 Curing : Green work shall be protected from rain suitably. Masonary 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.

- 2.6 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 pucca 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.

- 2.7 Fixtures - The frames of doors, windows, cup-boards etc. shall be housed into the Flyash building bricks work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with Flyash building bricks work, but for ordinary steel doors and windows required opening for frames, hold-fasts etc. shall be left in the wall and frames embeded later on in order to avoid damage to the frames.
- 2.8 Scaffolding - Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied together with horizontal pieces, over which the scaffolding plunks 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 Flyash building bricks 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.
- 2.9 Packing out of Joints - For the face of Flyash building bricks work, where plastering is to be done, joints shall be raked out to a depth not less than thickness of joints. The false of Flyash building bricks work shall be cleaned and mortar dropping removed on very same day that Flyash Flyash building bricks work is laid.
- 3.0 MODE OF MEASUREMENTS & PAYMENT :
- 3.1 The measurements of this item shall be taken in cubic meter and for the Flyash building bricks masonry fully completed for limiting dimensions not exceeding those shown on the plans or as directed shall be final.
- 3.2 No deductions shall be made from quantity of Flyash building bricks work. No extra payment will be made for embedding in masonry holes in respect of the following items -
- i] Ends of joints, beams, posts, girders, rafters, purlins truses corbel, steps etc. where cross sectional area does not exceed 500 Sq.Cm.
  - ii] Opening not exceeding 1000 Sq.Cm.
  - iii] Wall plate sand bed plates, bearing of slab, chajjas, and like whose thickness does not exceed 10 Cms. and the bearing does not extend the full thickness of wall.
  - iv] Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.
  - v] Iron fixtures; pipes upto 300 mm. dia. hold fasts of doors and windows built into masonry and pipes etc. for concealed wiring.
  - vi] Forming charges of section not exceeding 350 Sq.Cm. in masonry.
  - vii] Apertures for fire places, shall not be deducted nor shall extra labour required to make splaying of jams, throating and making arches over the aperture be paid for separately.





3.3 The rate shall be for a unit of one cubic metre.

#### **DTS No. 25**

**Providing and applying 10 mm thick cement plaster in single coat on brick / concrete walls similar surface for plastering and finished even and smooth with a floating coat of neat cement slurry mixed with admixture of lime or neeru required proportion etc. complete in C.M. 1:3 (1 cement : 3 sand) as directed by the Engineer-in-charge.**

##### 1.0 MATERIALS

Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M-8.

##### 2.0 WORKMANSHIP

2.1 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.

2.2 Preparation of Background - The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, afflorsence 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.

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.

##### 2.3 APPLICATION OF PLASTER

The plaster about 15 x 15 Cms. shall be first applied horizontally and vertically at not more than 2 metres 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 of wooden flat according as a smooth or a sandy granular texture is required. Excessive trowelling 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 recommending 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.

### 3. MODE OF MEASUREMENTS & PAYMENT

- 3.1 The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.
- 3.2 All plastering shall be measured in square metres unless otherwise specified. Length, breadth or height shall be measured correct to a centimetre.
- 3.3 Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.
- 3.4 This item includes plastering at any level.
- 3.5 For jambs, soffits, sills etc. for openings not exceeding 0.5 Sq.Mts. each in area for ends of joints, beams, posts, girders, step etc. not exceeding 0.5 Sq.Mts. each in area for and for openings exceeding 0.5 Sq.Mts. and not exceeding 3 Sq.Mts. in each area deductions and additions shall be made in the following manner ---
  - a] No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 Sq.Mts. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings for finish to plaster around ends of joints, beams, posts etc.
  - b] Deduction for openings exceeding 0.5 Sq.Mts. but not exceeding 3 Sq.Mts. each shall be made as follows and no additions shall be made for reveals, jambs, soffits sills etc. of these openings --



- i] When both faces of all wall are plastered with same plaster, deduction shall be made for one face only.
- ii] When two faces of wall are plastered with different types of plaster or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for doors, windows etc. on which width of reveals is less than that on the other side but no deduction shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and/or pointing as the case may be.

3.6 The rate shall be for a unit of one Sq.Mts.

**DTS No. 26**

**Providing & fixing M.S. manhole frame and cover of 0.6 x 0.45 mt.size and approx.50 kg weight with prime coat of red oxide and two coats of oil paint having plate thickness of 12 mm etc. complete as directed by Engineer in charge.**

The rate shall be for unit of one Number.

**DTS No. 27**

**Providing & fixing C.I.Steps of Size 500 mm x 150 mm x 22.5 mm.painted with a coat of primer and two coats of oil paint etc. complete as directed by Engineer in charge.**

- 1 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 centre to centre in the staggered position in the vertical direction with two staggered raws at 385 mm centre to centre in the horizontal direction the top of the manhole shall not be more than 300 mm above the benching and the centre line of two staggered raws shall be the centre 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-415 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.

- 2 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 grap chequered portion of the steps shall be well kept outside the masonry.
- 3 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 refixed correctly as per the drawings or as mentioned above.



Providing and fixing C.I.Steps...

C.I. steps of 500 x 150 x 22.5 mm size shall be of best quality.

Painting material for anti-corrosive shall be of best quality.

C.I.Steps shall be fixed as and where directed. The steps shall be ambwedded firming in masonry wall and fixing in horizontal space between two steps shall will be as directed by the Engineer-in-charge.

The rate includes cost of all labours and materials required for completion of this item.

Mode of measurement:-

The rate shall be for a unit of one number.



## **DTS No. 28**

**Drilling of 1800 mm dia. Horizontal borehole for water main pipeline under the road including strata with required length including fixing of 1626 mm dia. MS casing pipe 16.0 mm thick Epoxy coated on both side pipe line with welding pushing etc. complete. Providing and fixing Safety Chain wherever necessary as per the stipulation in the design complete. The item also includes providing, supplying, laying, jointing and welding of water main of 1219 mm OD MS carrier pipe – 10 mm thick conforming to IS-3589 : 2001 with epoxy coated on both sides of pipe).**

**1626 mm (OD) MS casing pipe + 1219 mm OD MS Carrier pipe**

Drilling of 1800 mm dia Horizontal borehole for water main pipeline under the road incl in all strata with required length incl fixing of 1626 mm dia MS casing pipe with welding pushing etc complete with all material, labour, fabrication, hydraulic testing of pipe etc. complete.

### **GENERAL SPECIFICATIONS**

Tentative location(s) of road crossings, State highway crossings, canal and other such crossings are shown in the construction drawings. The pipeline shall be installed in M.S. casing pipes conforming to the specifications given herein.

The casing pipes shall be installed in accordance with the details given in drawing and the casing, bushing and insulators, etc., shall be installed on the carrier pipe as detailed in drawings. Casing shall be installed with even bearing throughout its length and shall slope towards one end, as specified or desired by the engineer-in-charge. The ends of the casing shall be sealed to outside of carrier pipe in accordance with the details given in drawing.

Before installation, holes for installing vent pipes shall be cut and burrs if any shall be removed. The welding of both carrier pipe and casing pipe shall be done in accordance with the welding specifications, given herein. Before installing the casing pipe, it should be cleaned of all internal obstructions and during installation care should be taken to keep the inside clean.

The section of carrier pipe to be placed in any casing shall be closed at each end, hydrostatically tested preferably with dead weight tester for at least two hours. Only on successful completion of this test, shall the carrier pipe section be inserted in the casing pipe. The installation of casing may open cut as circumstances may permit or require as directed by the engineer-in-charge.

The installation of casing in bended section of the carrier pipe shall be performed by metre bends of the casing pipe provided that the length of each metre cut out of casing pipe shall be such as to provide a clearance of at least 1-1/2" between the inside of the casing pipe and the outside of the coated carrier pipe.

Excavation for casing installation shall be immediately backfilled at the completion of the work with suitable solid matter and packed thoroughly to prevent seepage of water into the excavation.



At road crossings the work shall be performed to the specifications of local authorities or such public bodies as may be in charge (S) of roads, to be crossed.

In case, however the minimum requirements of the governing agencies are less than those set out in the drawing or the specifications given herein, then the requirements given in the drawings and the specifications given for encased line shall be followed.

Whereas the casing pipe in the case of encased line to be laid normal by boring, tunnelling, engineer-in-charge may at his discretion permit open-cuts to be made for the installation of casing provided, however, that the Contractor shall procure the necessary permit / license for the same from competent authority. At locations wherein the open cut methods are permitted, the Contractor shall pass the carrier pipe through the casing located in the trench after the approval of the engineer-in-charge in writing and care shall be exercised to avoid damage to pipe coating and wrapping during this operation. The Contractor shall produce a certificate in writing from concerned authorities for its satisfactory restoration and payment thereafter.

At all crossings the carrier pipe shall be laid straight without bends so that if necessary the pipe at a later date may be replaced without cutting the casing. The carrier pipe shall extend at least 2 meters beyond the end of casing pipe at either end straight.

At road crossings the Contractor shall eliminate unnecessary bending of pipe to conform to the contour of ground by gradually deepening the ditch at such approaches as directed by the engineer-in-charge. Where the installation of the casing has been made by open cut Contractor shall install suitable temporary bridge work ensuring the safety of the traffic aids and safeguards for protection of the public safety, or he shall provide suitable diversions as desired by the engineer-incharge.

At all roads/canal pipeline crossings shall be done with Cased Crossing by Jacking with Augur Boring Method except specifically instructed by EIC.

The method of carrying out a cased crossing by boring for various crossings on this pipeline route shall be jointly inspected by the representative of the Client and Contactor for each category of work prior to commencement of actual work. Pipeline under Road applicable portion of the right-of-way shall be encased in accordance with the specification. This item of work shall include, necessary clearing and grading required therefore, trenching to the depths and widths required, welding of casing and carrier pipes, testing, lowering in, installation of vent assemblies, end seals, insulator and all other fittings that may be required, backfilling, clean up, complete restoration to the original condition and further strengthening and protective works as may be required. The work shall be carried out in accordance with the drawings and as directed by the engineer-in-charge. For various operations mentioned above, the specifications pertaining to these operations shall apply in addition to the specifications given herein.



The Contractor shall be permitted to use William Sons type Neoprene seals in place of concrete end seals for the crossings. The item shall be procured by the Contractor himself as per the provisions under the appropriate head of work in case Contractor so desires. The representative of the SMC may also be associated to determine the quality of the material and its delivery schedule from the open market. However, the particular work defined under the proper head shall not be delayed on account of non-availability of Neoprene end seals. In such case, concrete seals may be provided.

On both ends of pushing concrete supports are to be provided as per direction of engineer-in-charge.

**MODE OF PAYMENT:**

The payment shall be made on Rmt basis.

**ROAD CROSSINGS BY HDD**

Complete work of the road/rail/approach/canal crossing (between the limits are defined as approved drawings) by HDD method including pipe to work site(s), manpower, equipment, other resources , fabrication, string preparation of pipes, welding, welding repair, radiography, coating of field joints with special type Heat Shrink Sleeve and repair of pipeline coating with special repair patch materials as per Specification, pre testing / post testing etc. of complete string made for crossing etc. and execution of, but not limited to, following works in accordance with specifications and instruction of Engineer-in-charge.

Pre-construction survey based on site visit, collection of data (if required) from concerned Authority including design and detail engineering with stress calculations and making of crossing drawings for getting their approval from concerned Authority/ Engineer-in-charge.

Drilling to required depth for all types of strata, all depth to accommodate the pipeline laying at all conditions encountered during rail/ road/water crossing/ live pipe rack crossing by approved HDD methods for providing minimum cover specified in code/ specification or the actual depth as decided by concerned authority, whichever is more.

Backfilling of the ditch/ trench including restoration and cleanup of area and all other works including, cleaning, final hydrotesting etc.coating field joints with special type heat shrinkable sleeves (Direx) and repair of pipeline coating with special repair patch material as per specifications (inclusive of supply of material), for HDD crossing.

**MODE OF PAYMENT:**

The payment shall be made on Rmt basis.

**DTS No. 29**



**Drilling of 1600 mm dia. Horizontal borehole for water main pipeline under the road including strata with required length including fixing of 1422 mm dia. MS casing pipe 14.2 mm thick Epoxy coated on both side pipe line with welding pushing etc. complete. Providing and fixing Safety Chain wherever necessary as per the stipulation in the design complete. The item also includes providing, supplying, laying, jointing and welding of water main of 1016 mm OD MS carrier pipe – 10 mm thick conforming to IS-3589 : 2001 with epoxy coated on both sides of pipe).**

**1422 mm (OD) MS casing pipe + 1016 mm OD MS Carrier pipe**

Drilling of 1600 mm dia Horizontal borehole for water main pipeline under the road incl in all strata with required length incl fixing of 1422 mm dia MS casing pipe with welding pushing etc complete with all material, labour, fabrication, hydraulic testing of pipe etc. complete.

Remaining specifications as per **DTS No. 28.**





### **DTS No. 30**

**Drilling of 1400 mm dia. Horizontal borehole for water main pipeline under the road including strata with required length including fixing of 1219 mm dia. MS casing pipe 12.5 mm thick Epoxy coated on both side pipe line with welding pushing etc. complete. Providing and fixing Safety Chain wherever necessary as per the stipulation in the design complete. The item also includes providing, supplying, laying, jointing and welding of water main of 813 mm OD MS carrier pipe – 8 mm thick conforming to IS-3589 : 2001 with epoxy coated on both sides of pipe).**

**1219 mm (OD) MS casing pipe + 813 mm OD MS Carrier pipe**

Drilling of 1400 mm dia Horizontal borehole for water main pipeline under the road incl in all strata with required length incl fixing of 1219 mm dia MS casing pipe with welding pushing etc complete with all material, labour, fabrication, hydraulic testing of pipe etc. complete.

Remaining specifications as per **DTS No. 28.**

### **CONSTRUCTING PIPELINE (1626 MM DIA MS PIPE + 1219 MM DIA MS PIPE) CARRYING BRIDGE ACROSS SARTHANA KHADI**

### **DTS No. 31**

**Clearing the site before commencement of work and after completion of the work.**

#### **201 CLEARING AND GRUBBING**

##### **201.1 Scope**

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, rubbish, top organic soil, etc. to an average depth of 150 mm in thickness, which in the opinion of the Engineer are unsuitable for incorporation in the works, from the area of road land containing road embankment, drains, cross-drainage structures and such other areas as may be specified on the drawings or by the Engineer. It shall include necessary excavation, backfilling of pits resulting from uprooting of trees and Stumps to require compaction, handling, salvaging, and disposal of cleared materials with all leads and lifts. Clearing and grubbing shall be performed in advance of earthwork operations and in accordance with the requirements of these Specifications.

##### **201.2 Preservation of Property/Amenities**

Roadside trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all highway facilities within or adjacent to the highway which are not to be disturbed shall be protected from injury or



damage. The Contractor shall provide and install at his own cost, suitable safeguards approved by the Engineer for this purpose.

During clearing and grubbing, the Contractor shall take all adequate precautions against soil erosion, water pollution, etc., and where required, undertake additional works to that effect vide Clause 306. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of waste materials, etc., and the schedules for carrying out temporary and permanent erosion control works as stipulated in Clause 306.3.

### **201.3 Methods, Tools and Equipment**

Only such methods, tools and equipment as are approved by the Engineer and which will not affect any property to be preserved shall be adopted for the Work. If the area has thick. Vegetation / roots / trees, a crawler or pneumatic tyred dozer of adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps. All trees, stumps, etc., falling within excavation and fill lines shall be cut to such depth below ground level that in no case these fall within 500 mm of the bottom of the subgrade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/subgrade shall be removed between fill lines to the satisfaction. of the Engineer. All branches of trees extending above the roadway shall be trimmed as directed by the Engineer.

All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding area.

Ant-hills both above and below the ground, as are liable to collapse and obstruct free subsoil water flow shall be removed and their workings, which may extend to several metres shall be suitably treated.

### **201.4 Disposal of Materials**

All materials arising from clearing and grubbing operations shall be taken over and shall be disposed of by the Contractor at suitable disposal sites with all leads and lifts. The disposal shall be in accordance with local, State and Central regulations

### **201.5 Measurements for Payment**



Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of hectares. Cutting of trees upto 300 mm in girth and removal of their stumps, including removal of stumps upto 300 mm in girth left over after trees have been cut by any other agency, and trimming of branches of trees extending above the roadway and backfilling to the required compaction shall be considered incidental to the clearing and grubbing operations. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same.

Ground levels shall be taken prior to and after clearing and grubbing. Levels taken prior to clearing and grubbing shall be the base level and will be accordingly used for assessing the depth of clearing and grubbing and computation of quantity of any unsuitable material which is required to be removed. The levels taken subsequent to clearing and grubbing shall be the base level for computation of earthwork for embankment.

Cutting of trees, excluding removal of stumps and roots of trees of girth above 300 mm shall be measured in terms of number according to the girth sizes given below:-

- i) Above 300 mm to 600 mm
- ii) Above 600 mm to 900 mm
- iii) Above 900 mm to 1800 mm
- iv) Above 1800 mm

Removal of stumps and roots including backfilling with suitable material to required compaction shall be a separate item and shall be measured in terms of number according to the sizes given below:-

- i) Above 300 mm to 600 mm
- ii) Above 600 mm to 900 mm
- iii) Above 900 mm to 1800 mm
- iv) Above 1800 mm

For the purpose of cutting of trees and removal of roots and stumps, the girth shall be measured at a height of 1 m above ground or at the top of the stump if the height of the stump is less than one metre from the ground.

## **201.6 Rates**

201.6.1 The Contract unit rates for the various items of clearing and grubbing shall be payment in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment and incidentals



necessary to complete the work. These will also include removal of stumps of trees less than 300 mm girth excavation and back- filling to required density, where necessary, and handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads. Clearing and grubbing done in excess of 150 mm by the Contractor shall be made good by the Contractor at his own cost as per Clause 301.3.3 to the satisfaction of the Engineer prior to taking up earthwork. Where clearing and grubbing is to be done to a level beyond 150 mm, due to site considerations, as directed by the Engineer, the extra quantity shall be measured and paid separately.

201.6.2 The Contract unit rate for cutting trees of girth above 300 mm shall include handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

201.6.3 The Contract unit rate for removal of stumps and roots of trees girth above 300 mm shall include excavation and backfilling with suitable material to required compaction, handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

201.6.4 The Contract unit rate is deemed to include credit towards value of usable materials, salvage value of unusable materials and off-set price of cut trees and stumps belonging to the Forest Department. The off-set price of cut trees and stumps belonging to the Forest Department shall be deducted from the amount due to the Contractor and deposited with the State Forest Department. In case the cut trees and stumps are required to be deposited with the Forest Department the Contractor shall do so and no deduction towards the off-set price shall be effected. The offset price shall be as per guidelines/ estimates of the State Forest Department.

201.6.5 Where a Contract does not include separate items of clearing and grubbing, the same shall be considered incidental to the earthwork items and the Contract unit prices for the same shall be considered as including clearing and grubbing operations.

## **DTS No. 32**

**Marking of centre line of bridge alignment along longitudinal axis and giving out foundation layout with theodolite levels including providing necessary masonry reference pillars, establishing bench mark etc. as directed.**

1. The center line axis of the dual two lane bridge is to be done for bridge and also for approaches / retaining walls in both ends shall be surveyed along their lengths. Center line pegs for each two lane bridge, ramps including foundation pegs at each location and at suitable distance of 3.0 m c/c along the approach on each side shall be fixed.



2. All deviation angles of the central line axis for both the two lane bridge including tangent distances shall be demarcated with pegs fixed in to the ground.
3. The rate on Lump sum basis shall include all equipments, survey instruments, necessary survey party, supply and fixing of pegs including, fixing of pillars for intermediate stations labour, materials required in completing the job as required, as per direction of Engineer-in-charge.
4. Contractor has to carry out full topographical survey including working of center line with total station instrument.
5. The rate shall be paid per L.S.

### **DTS No. 33**

#### **Constructing temporary bund**

- 1 The item provides for the diversion of water course by suitable means such as by constructing ring bunds, coffer-dams, channeling, islanding or any other suitable means as may be necessary and approved by Engineer-in-charge. This item will not include dewatering of foundations, trenches, which will be covered in the item of open excavation. The contractor shall take all necessary protective measures against possible erosion due to tide variations if any and maintain the coffer dams, bund or island in proper manner during construction. He shall not be entitled for any payment or compensation in the event of washing of the coffer dam, bund or island at any time, either due to tidal waters if any or floods, or any other reasons whatsoever, and the contractor shall reconstruct the same. If required at his risk and cost. The size of the coffer dam, bund or island shall be such as would allow without obstruction and inconvenience, enough working free space all around the foundation works.
- 2 The constructor shall plan, construct and maintain satisfactorily necessary diversion channels and protective works so as to safely pass the stream flow and also satisfactorily meet with any sudden rise of flow due to tides, flood or any other reason, without damaging the foundation works. The coffer dam or bund shall be such as to give sufficient working space for construction, inspection and installations of pumping machinery inside the enclosed area. The coffer dam or bund shall be of adequate section and properly designed, constructed to prevent ingress of water as practically as possible in the foundation pits and to protect green concrete or masonry work.
- 3 Adequate pumping arrangement shall be made for dewatering the inside of coffer dam, bunds etc. pumps of adequate capacity and in required number shall be provided to ensure adequate pumping.



- 4 The coffer dam, bund or island shall be completely removed and their materials shall be disposed of in the manner as directed by the Engineer-in-charge when no longer required.
- 5 The measurements for paying will be per number of pier or abutment for which diversion of water course etc. is required to be made. Unit of abutment will be inclusive of returns or wingwalls attached to it.
- 6 The unit cost includes all materials labour and equipment to complete the job. Diversion of channels etc. will have to be constructed and maintained till all operations to complete the entire bridge structure are completed as may be necessary.

#### **DTS No. 34**

#### **Empty boring for providing 1000 mm dia. R.C.C. bored piles for required depth with all plants & equipments as required.**

#### **1111 DRIVING**

#### **1111.1 General Procedure**

Details of the equipment and the method proposed for driving the piles shall be submitted for scrutiny and approval of the Engineer. Piles shall be installed from firm ground or from temporary supports or from fixed platform. The arrangement shall provide sufficient rigidity to ensure accuracy of pile driving under all conditions of tide, stream flow or hammer drop.

During driving the top of pile shall be protected by a suitable helmet of substantial steel construction. The helmet shall provide uniform bearing across the top of the pile and shall hold the pile centrally under the hammer. No pile shall be driven unless inspected and approved by the Engineer. Piles shall be driven from a fixed frame of sufficient rigidity to ensure accuracy of driving within specified tolerances. The force of the hammer shall be directed centrally and axially during driving. Forces producing undue bending or torsional stresses in piles shall not be applied during driving.

The stroke of a single acting or drop hammer shall be limited to 1.2 m unless otherwise permitted by the Engineer. A shorter stroke may be necessary when there is danger of damaging the pile.

Piles shall not be bent or sprung into position but shall be effectively guided and held on line during the initial stages of driving. Attempts to correct any tendency for the pile to run off line by the application of significant horizontal restraint will not be permitted. Shortly after the commencement of driving and at regular intervals throughout the driving operation, checks shall be made to ensure• that the pile frame does not exert any undue lateral force on the pile due to restraint within the helmet.



If the indications are that a pile will finish outside the specified tolerances, driving operations on that pile will cease. The pile shall be withdrawn, the hole filled and the pile re-driven at the cost of the Contractor.

To avoid the possibility of premature "set-up" pile driving shall be continuous in the later stages, without any deliberate stops. (delays of an hour or less may lead to significant "set-up" in piles i.e. resistance to further driving increases after driving is stopped).

If any pile is damaged in any way during driving, it shall be repaired or replaced as directed by the Engineer, at the cost of the Contractor. If during driving, the head of a pile is damaged to the extent that further driving is not possible, the head shall be cut off and driving continued. The cost of cutting off shall be borne by the Contractor and where, as a result of such cutting off the head, the pile is too short, the Contractor, shall, at his own cost, supply and splice on sufficient length of pile to restore the pile to its correct length.

Piles should be driven to the minimum acceptable penetration shown on the drawings. This may require pre-boring and/or jetting as indicated in Clause 111.2, with the approval of the Engineer.

Piles shall be driven to nominal refusal or the required ultimate dynamic capacity mentioned on the drawings or until the top of the pile is at the level required and specified on the drawing whichever gives the lowest toe elevation. The Engineer's decision in these matters shall be final. Nominal refusal shall be taken as equivalent to 25 mm total penetration for the final 20 blows using a hammer of driving energy as specified and shall be used as the criterion for acceptance for piles founded on rock. Severe driving which results in an average set per blow less than 0.5 mm will not be permitted.

Where hard drilling is encountered because of dense strata or obstructions located above the predetermined pile tip level, nominal refusal shall not be considered to have been achieved unless the Engineer is satisfied that the total number of blows, as the average driving resistance specified for nominal refusal, indicates that further driving will not advance the pile through dense strata or obstructions.

The pile shall be driven as accurately as possible to the vertical or to specified batter. Straining the pile into position can damage it and the driving equipment should be adjusted as much as possible to follow the position of the pile. Any deviation from the proper alignment shall be noted and promptly reported to the Engineer. If the deviation is to such an extent that the resulting eccentricity cannot be taken care of by strengthening the pile cap or pile tips, such a pile shall, at the discretion of the Engineer, be replaced or supplemented by an additional pile. . Unless otherwise specified, the



permissible positional deviation for piles shall be limited to those indicated in Clause 1116.

Care shall be taken not to damage the pile by over-driving. Any sudden change in the rate of penetration which cannot be ascribed in the nature of the ground shall be noted and its cause ascertained, if possible, before driving is continued.

While withdrawing a casing used in the construction of cast in-situ pile, consideration shall be given to the possibility of damaging any other nearby pile. The danger of damaging is greater in compact soils than in loose soils. No pile shall be bored or driven within 3 m of a newly cast pile until at least 24 hours after completion of its Installation.

Driving piles in loose sand tends to compact the sand which in turn increases the skin friction. Therefore, driving a number of friction piles in a group shall proceed outward from the centre as otherwise it will be difficult to drive the inner piles to the same depth as the others.

In the case of stiff clay also, the driving for a group of piles shall proceed outward from the centre. However, in case of very soft soil, the driving may proceed from outside to inside, so that the soil is restrained from flowing out during driving operations.

If there is a major variation between the depth at which adjacent foundation piles in a group meet refusal, a boring shall be made nearby to ascertain the cause of this difference. If the boring shows that the soil contains pockets of highly compressive material below the level of the shorter pile, it will be necessary to enforce penetration of all the piles to a level below the bottom of the zone which shows such pockets.

#### **1111.2 Pre-boring and Jetting**

Driving of the piles may be assisted by pre-boring holes or by the use of jets or both, subject to the approval of the Engineer. These may be used essentially to achieve the minimum penetration shown on the drawings where such penetration is not reached under normal conditions of driving indicated in Clause 1111.1.

The diameter of the hole shall not be greater than the diagonal dimension of the pile less 100 mm.

The maximum depth of the pre-boring shall be such that the specified set (or less) is obtained when the toe of the pile is at founding level. Pre-boring shall be as approved by the Engineer and shall be carried out only up to a level of





one metre above the founding level. The pile shall be driven for at least one metre below the pre-bored hole. To ensure that the pile is properly supported laterally in the hole, any space remaining around the pile at the ground level after driving is completed, shall be backfilled with approved granular material.

When water jetting is used, at least two jets shall be attached to the pile symmetrically. The volume and pressure of water at the outlet nozzles shall be sufficient to freely erode material adjacent to the toe of the pile. The maximum depth up to which jetting is carried out shall be such that the specified set (or less) is obtained when the toe of the pile is at founding level. Jetting shall cease as directed by the Engineer and shall proceed only up to 1 m above the founding level. The pile shall be driven at least 1 m below the pre-bored hole.

To avoid very hard driving and vibration in materials such as sand, jetting of piles by means of water may be carried out only with the express permission of the Engineer and in such a manner as not to impair the bearing capacity of piles already in place, the stability of the soil or the safety of any adjoining buildings. Details of the arrangement for jetting shall be got approved from the Engineer in advance.

If large quantities of water are used for jetting, provision shall be made for collecting and draining away of water when it comes to the surface of the ground, so that the stability of the piling plant is not endangered by the softening of the ground.

Jetting shall be stopped before completing the driving which shall always be finished by ordinary methods. Jetting shall be stopped if there is any tendency for the pile tips to be drawn towards the pile already driven owing to the disturbance of the ground.

#### **DTS No. 35**

**Providing and casting in situ controlled concrete with quartzite trap metal of size 40 mm or downgraded including ramming, vibrating, curing, under water concreting by tremmie or other equivalent method, finishing etc. complete but excluding the cost of reinforcement for the following items**

- (A) R.C.C. piles in M-35
- (B) R.C.C. piles cap in M-30

**1107 CAST IN-SITU CONCRETE PILES**

**1107.1 General**



Cast in-situ concrete piles may be either installed by drilling a bore into the ground and removing the material or by driving a metal casing with a shoe at the tip and displacing the material laterally. The two types of piles are termed as "bored piles" and "driven piles" respectively. Cast in-situ concrete piles may be cast in metal shells which may remain permanently in place. However, other types of reinforced concrete cast in-situ piles, cased or uncased, may be used if in the opinion of the Engineer the soil conditions permit their use and if their design and the methods of placing are satisfactory.

Certain specific requirements regarding driving of cast in-situ driven piles shall be as per Clauses 1110 and 1111.

Any liner or borehole which is improperly located or shows partial collapses that would affect the load carrying capacity of the pile shall be rejected or repaired as directed by the Engineer at the cost of the Contractor.

Boring shall be carried out using rotary equipment. Percussion type of equipment shall be used only if approved by the Engineer.

The diameter of the finished pile shall not be less than that specified. A continuous record shall be kept by the Engineer as to the volume of concrete placed in relation to the length of pile that is cast.

Defective piles shall be removed or left in place as judged convenient without affecting the performance of adjacent piles or pile cap. Additional piles shall be provided to replace the defective piles.

## **1107.2 Concreting**

Wherever practicable, concrete should be placed in a clean dry hole. Prior to the placing of the reinforcement cage, the pile shaft shall be cleaned of all loose materials. Before concreting of the pile is commenced, it is essential to ensure that no debris remains at the bottom of the shaft, as inadequate cleaning of the base can lead to formation of a soft base or soft toe which may result in reduction of load bearing capacity of the pile.

Reinforcement for the pile as shown on the drawing shall be tied in place to form a cage which is lowered into the pile shaft. Suitable spacers shall be provided to maintain the required cover to reinforcing steel. Reinforcements at the bottom should not be provided with L-bends as these may interfere with cleaning of the pile base.

Where concrete is placed in dry and a casing is present, the top 3 m of the pile shall be compacted using internal vibrators.



Where the casing is withdrawn from cohesive soils for the formation of cast in-situ pile, the concreting should be done with necessary precautions to minimize the softening of the soil by excess water. Where mud flow conditions exist, the casing of cast in-situ piles shall not be allowed to be withdrawn.

Care shall be taken during concreting to prevent the segregation of the ingredients. The displacement or distortion of reinforcement during concreting and while extracting the casing, shall also be avoided.

If the concrete is placed inside precast concrete tubes or consists of precast sections, these shall be free from cracks or other damage before being installed.

The concrete shall be properly graded, shall be self-compacting and shall not get mixed with soil, excess water, or other extraneous matter. Special care shall be taken in silty clays and other soils which have the tendency to squeeze into the newly deposited concrete and cause necking. Sufficient head of green concrete shall be maintained to prevent inflow of soil or water into the concrete.

The placing of concrete shall be a continuous process from the toe level to the top of the pile. To ensure compaction by hydraulic static heads, rate of placing concrete in the pile shaft shall not be less than 6 m (length of pile) per hour.

### **1107.3 Casing**

When concreting is carried out for a pile, a temporary casing should be installed to sufficient depth so as to ensure that fragments of soil from the sides of the hole do not drop into the concrete as it is placed. When the bore hole is stabilized using drilling mud, the temporary casing is not required except near the top.

The metal casing shall be of sufficient thickness and strength to hold its original form and show no harmful distortion while driving or when adjacent casings are driven.

Cast in-situ concrete driven piles shall be installed using a properly designed detachable shoe at the bottom of the casing.

Bored cast in-situ piles in soils which are stable, may often be installed with only a small casing length at the top. A minimum of 2 m length of top of bore shall invariably be provided with casing to ensure against loose soil falling into the bore. In cases in which the side soil can fall into the hole, it is necessary to stabilize the side of the bore hole with drilling mud, or a suitable steel casing. Permanent steel liner shall be provided at least up to maximum scour level. The minimum thickness of steel liner shall be 6 mm.



Permanent steel liner shall be provided for the full depth of the pile in the following situations where:

- i) The surrounding soil is marine clay
- ii) Soft soil is present
- iii) Surrounding soil has sulphate content equal to or more than 1%
- iv) Surrounding water has sulphate content equal to or more than 2500 ppm
- v) Leakage of sewage is expected

For bored cast in-situ piles, casing/liner shall be driven open ended with a pile driving hammer capable of achieving penetration of the liner to the depth shown on the drawing or as approved by the Engineer. Materials inside the casing shall be removed progressively by air lift, grab or percussion equipment or other approved means.

Where bored cast in-situ piles are used in soils liable to flow, the bottom of the casing shall be kept sufficiently in advance of the boring tool to prevent the entry of soil into the casing, leading to formation of cavities and settlements in the adjoining ground. The water level in the casing should generally be maintained at the natural ground water level for the same reasons. The joints of the casing shall be made as leak-tight as possible to minimize inflow of water or leakage of slurry during concreting.

The diameter of the boreholes shall not be more than the inside diameter of the liner when the liners are installed before boring. When the liners are installed after boring, the diameter of the boreholes shall not be more than the outside diameter of liner + 2 mm, unless otherwise approved by Engineer.

#### **1107.4 Use of Tremie**

The concrete should invariably be poured through a tremie with a funnel, so that the concrete can be properly deposited in the hole without segregation. For concreting done by tremie, the following requirements which are particularly applicable shall be ensured:

- a) The hopper and tremie should be a leak proof system.
- b) Diameter of tremie shall be not less than 200 mm for use with 20 mm diameter down aggregate.
- c) The first charge of concrete should be placed with a sliding plug pushed down the tube ahead of it or with a steel plate with adequate charge to prevent mixing of concrete and water. However, the plug should not be left in the concrete as a lump.



- d) The tremie pipe should always penetrate well into the concrete with an adequate margin of safety against accidental withdrawal of the pipe. The tremie should be always full of concrete.
- e) The pile should be concreted wholly by tremie and the method of deposition should not be changed part way up the pile, to prevent laitance from being entrapped within the pile.
- f) All tremie tubes shall be thoroughly cleaned after use.
- g) For concrete placed through tremie, there is no need to add 10 percent extra cement.
- h) Concreting of piles shall be carried out continuously. In exceptional cases of interruption of concreting the tremie shall not be taken out of the concrete under any circumstances. The tremie pipe shall be raised and lowered slowly from time to time to prevent it from getting stuck in the concrete while ensuring its lower end does not come out of concrete. The concreting shall be resumed before final setting time of concrete, which shall be established before the start of the piling operation. For achieving longer setting time of the concrete, super plasticizers having retarding properties/retarders can be used. If any of these requirements are not met, the pile shall be rejected.



### **1107.5 Removal of Concrete above Cut-off Level**

It is desirable that the concrete above cut-off level is removed before the concrete is set. This may be done manually or by specially made bailer or other device. Such removal of concrete helps in preventing the damage of the good concrete below the cut-off level, which results from chipping by percussion method.

The removal of concrete shall be within  $\pm 25$  mm from the specified cut off level, preferably on the minus side. After removal of such concrete, the concrete shall be compacted with rammer with spikes or vibrated.

In case the concrete is not removed before setting, a groove shall be made on outer perimeter by rotary equipment before chipping by percussion method.

The minimum embedment of cast in-situ concrete piles into pile cap shall not be less than 50 mm. Any defective concrete at the head of the completed pile shall be cut away and made good with new concrete. The clear cover between the bottom reinforcement in pile cap from the top of the pile shall be not less than 25 mm. The reinforcement in the pile shall be exposed for full anchorage length to permit it to be adequately bonded into the pile cap. Exposing such length shall be done carefully to avoid damaging the rest of the pile.

### **1114 PILE CAP**

Casting of pile cap should be at a level higher than low water level unless functionally required to be below low water level. In such cases dewatering shall be resorted to allow concreting in dry conditions. Pile caps shall be of reinforced concrete. A minimum offset of 150 mm shall be provided beyond the outer faces of the outermost piles in the group. If the pile cap is in contact with earth at the bottom, a leveling course of minimum 80 mm thickness of M 15 nominal mix concrete shall be provided. In marine conditions or areas exposed to the action of harmful chemicals, the pile cap shall be protected with a coating such as bituminous based coal tar epoxy or epoxy based coating or with suitable anti corrosive paint. Concrete with high alumina cement, shall not be used in marine environment.

The attachment of the pile head to the cap shall be adequate for the transmission of loads and forces. A portion of pile top may be stripped of concrete and the reinforcement anchored into the cap; Manual chipping may be permitted three days after casting of pile, while pneumatic tools for chipping shall be permitted only seven days after casting of pile. The top of pile after stripping shall project at least 50 mm into the pile cap.



The top of concrete in a pile shall be brought above cut-off level to permit removal of all laitance and weak concrete before pile cap is laid. This will ensure good concrete at the cut-off level.



## **1115 IMPORTANT CONSIDERATIONS, INSPECTION/PRECAUTIONS FOR DIFFERENT TYPES OF PILES**

### **1115.1 Driven Cast In-Situ Piles**

1115.1.1 Specialist literature and the guidelines from the pile construction industry shall be consulted regarding the method of installation, equipment and accessories for pile driving and recording of data.

1115.1.2 During installation of piles, the final "set" of penetration of pile per blow of hammer shall be checked taking an average of last 10 blows.

1115.1.3 The pile shoes which may be of either cast iron conical type or mild steel flat type shall have double reams for proper seating of the removable casing tube inside the space between the reams.

1115.1.4 Before commencement of pouring of concrete, it shall be ensured that there is no ingress of water in the casing tube from the bottom. Further, adequate control during withdrawal of the casing tube is essential so as to maintain sufficient head of concrete inside the casing tube at all stages of withdrawal.

1115.1.5 Concrete in piles shall be cast up to a minimum height of 600 mm above the designed top level of pile, which shall be stripped off at the time of construction of pile cap.

### **1115.2 Bored Cast In-Situ Piles**

1115.2.1 While concreting uncased piles, voids in concrete shall be avoided and sufficient head of concrete is to be maintained to prevent inflow of soil or water into the concrete. It is also necessary to take precautions during concreting to minimize the softening of the soil by excess water. Uncased cast in-situ piles shall not be allowed where mild flow conditions exist.

1115.2.2 The drilling mud such as bentonite suspension shall be maintained at a level sufficiently above the surrounding ground water level throughout the boring process, to ensure the stability of the strata which is being penetrated until the pile has been concreted.

1115.2.3 Where bentonite suspension is used to maintain the stability of the borehole, it is essential that the properties of the material be carefully controlled at stages of mixing, supply to the borehole and immediately before concrete is placed. It is usual to limit:

- i) The density of bentonite suspension to 1.05 g/lee
- ii) The marsh cone viscosity between 30 and 40





- iii) The pH value between 9.5 and 12
- iv) The silt content less than 1 percent
- v) The liquid limit of bentonite not less than 400 percent

These aspects shall act as controlling factors for preventing contamination of bentonite slurry for clay and silt.

- 1115.2.4 The bores shall be washed by bentonite flushing to ensure clean bottom at two stages viz. after completion of boring and prior to concreting after placing of reinforcement cage. Flushing of bentonite shall be done continuously with fresh bentonite slurry till the consistency of inflowing and outflowing slurry is similar.
- 1115.2.5 For concreting of piles using tremie, Clause 1107 of these Specifications may be referred.
- 1115.2.6 For very long or large diameter piles, use of retarding plasticizer in concrete is desirable.
- 1115.2.7 For large diameter piles, it may be essential to conduct non-destructive pile integrity tests to evaluate integrity of the pile.
- 1115.2.8 Where possible, it may be desirable to grout the base of-pile with cement slurry under suitable pressure after concrete in the pile attains the desired strength. For this purpose, conduit pipes with easily removable plugs at the bottom end should be placed in the bore along with reinforcement cage before concreting.

## **1118 MEASUREMENTS FOR PAYMENT**

For supply of precast concrete, timber or steel piles of specified cross-section the measurement shall be in metres of the length of piles ordered in writing by the Engineer measured from the head to the butt of the shoe or the tapered point. Reinforcement in precast concrete piles shall not be measured for payment.

For cast in-situ driven and bored concrete piles of specified cross-section, the measurement shall be the length in metres of the accepted pile that remains in the finished structure complete in place. Reinforcement in cast in-situ driven and bored concrete piles shall be measured for payment as per Section 1600 of these Specifications.

Routine and Initial Pile Load Tests shall not be measured for payment.



For installation of the pile, i.e. by drilling in the case of precast concrete, timber, steel and cast in-situ driven piles, and by boring in the case of cast in-situ bored pile the measurement shall be the length in metres that remains in the finished structure complete in place, limited to that shown on drawings or ordered by the Engineer. No distinction shall be made for penetration through hard strata or rock and socketing into rock.

For steel liners / casing shown on the drawings to be permanently left in place, the measurement shall be by weight in tonnes that remains in the finished structure complete in place, limited to that shown on drawings or ordered by the Engineer.

For the pile cap, the quantity of concrete shall be measured in cubic metres as per Section 1700 of these Specifications and reinforcement in pile cap shall be measured in tonnes as per Section 1600 of these Specifications.

#### **1119 RATE**

The contract unit rate for supplying precast concrete, timber or steel piles shall include cost of all labour, materials, tools and equipment, and other work involved in making or fabricating the pile complete as shown on the drawing, and where required its loading, transport, delivery to site, unloading and stacking at the place indicated by the Engineer. The cost of reinforcement including treatment as per Section 1600 of these specifications in precast concrete shall be deemed to be included in the quoted rate for supply of piles. The contract unit rate shall also include costs of all labour, materials, equipments and all other incidentals involved in conducting routine and initial pile load tests, including installation of piles for initial load tests.

The contract unit rate for cast in-situ driven and bored piles shall include the cost of concrete and all other items as per Section 1700 of these Specifications. The contract unit rate shall also include costs of all labour, materials, equipments and all other incidentals involved in conducting routine and initial pile load tests, including installation of piles for initial load tests.

The contract unit rate for reinforcement in cast in-situ driven and bored piles shall be as per Section 1600 of these Specifications.

The contract unit rate for installation of piles shall include full compensation for furnishing all labour, materials, tools and equipment, and incidentals for doing all the works involved in driving timber, precast concrete and steel piles, driving or making bores for cast in-situ driven and bored concrete piles, cutting off pile heads, all complete in place to the specified penetration of piles. Providing temporary liner/casing and its withdrawal and placing



reinforcement in position shall also be deemed to be included in the rate for installation of piles and no additional payment shall be made for the same.

The contract unit rate for permanent steel liners shall include cost of all labour, fabrication, treatment to the liner and placing the steel liner to the required depth as shown on the drawings and as ordered by the Engineer.

The contract unit rate for concrete in pile cap shall cover all costs of labour, materials, tools, plant and equipment, formwork and staging including placing in position, sampling and testing and all as per Section 1700 of these Specifications. Unit rate quoted shall also include the treatment to be given to the surfaces of the pile cap. Reinforcement in the pile cap shall be paid for separately as per Section 1600 of these Specifications.



## DTS No. 36

**Providing and placing in position TMT bar reinforcement Fe - 500 grade for RCC bored piles including cutting, bending, hooking, binding with 18 SWG annealed binding wire, placing in position, providing C.C. cover blocks in position to ensure required cover at time of concreting etc. complete as per detailed drawing & as directed by Engineer-in-Charge.**

### **1601 DESCRIPTION**

This work shall consist of furnishing and placing coated or uncoated mild steel or high strength deformed reinforcement bars of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

### **1602 GENERAL**

Steel for reinforcement shall meet the requirements of Section 1000 of these Specifications.

Reinforcements may be either mild steel or high strength deformed bars. They may be uncoated or coated with epoxy.

### **1603 PROTECTION OF REINFORCEMENT**

Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or by thoroughly cleaning it using any suitable method such as sand blasting, mechanical wire brushing etc., as directed by the Engineer. Reinforcements shall be stored above the ground in a clean and dry condition, on blocks, racks or platforms and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete, with a brush coat of neat cement mixed with water to a consistency of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

In case of fusion bonded epoxy coated reinforcement or hot dipped galvanized bars used, reference shall be made Clause 1010.3.2 of Section 1000 of these specifications.



#### **1604 BENDING OF REINFORCEMENT**

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar Bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer using a proper bar bender, operated by hand or power to obtain the correct shape and radii of bends.

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work. They shall not be heated to facilitate straightening.

#### **1605 PLACING OF REINFORCEMENT**

- a) The reinforcement cage should generally be fabricated in the yard at ground level and then shifted and placed in position. The reinforcement shall be placed strictly in accordance with the drawings and shall be assembled in position only when the structure is otherwise ready for placing of concrete. Prolonged time gap between assembling of reinforcement and casting of concrete, which may result in rust formation on the surface of the bars, shall not be permitted.
- b) Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.
- c) Bars shall be kept in position usually by the following methods:
  - i) In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover, shall be placed between the bars and formwork, subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the



- Engineer, provided they have the same strength and specification as those of the member.
- ii) In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut in them accurately, or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed upto a level just below their location.
  - iii) Layers of reinforcements shall be separated by spacer bars at approximately one metre intervals. The minimum diameter of spacer bars shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.
  - iv) Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc: or other subsidiary reinforcement shall be provided to fix the reinforcement firmly in its correct position.
  - v) Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc., as devices for positioning reinforcement shall not be permitted.
- d) Bars coated with epoxy shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose. Refer Section 1000 of these Specifications for other requirements.
- e) Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concreting is commenced.

## **1606 BAR SPLICES**

### **1606.1 Lapping**

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, shall be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1.25 times the maximum size of coarse aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points along the span where stresses are low.

### **1606.2 Welding**



1606.2.1 Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

1606.2.2 While welding may be permitted for mild steel reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS:1786 shall in general be prohibited. Welding may be permitted in case of bars of other than Fe 240 grade including special welding grade of Fe 415 grade bars conforming to IS:1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula :

$$CE = c + \frac{Mn}{6} + \frac{Cr+Mg+V}{5} + \frac{Ni+Cu}{15}$$

is 0.4 or less.

160.6.2.3 The method of welding shall conform to IS:2751 and IS:9417, any supplemental specifications and Clause 1904.8 of these Specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetelene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory joint performance. Precautions on overheating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.

All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V butt joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and shall be not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible, Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators and welding procedure, are adequate to produce and maintain uniform quality at par with that attainable in shop welding, to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall be qualified by tests prescribed in IS:2751. Inspection of welds shall conform to IS:822 and destructive or non-destructive testing may be



undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in two or three stages, the surface shall be cleaned properly after each stage. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Only competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS:814.

1606.2.4 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 so staggered that at any one section, not more than 20 percent of the bars are welded.

1606.2.5 Specimens of welded pieces of reinforcement taken from the site shall be tested. The number and frequency of tests shall be as directed by the Engineer.

### **1606.3 Mechanical at Couplers and Anchorages**

#### **1606.3.1 Mechanical Couplers**

Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swaged on to bars in end to end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 percent of the characteristic strength of the reinforcement bar.

#### **1606.3.2 Anchorages**

Bars may be anchored with approved patented mechanical anchorages as indicated on the drawing or as approved by the Engineer. The anchorages shall be connected to the reinforcing bar by the use of taper thread system. The anchorage shall be capable of developing the characteristic strength of reinforcement without damage to concrete and shall have sufficient diameter and width to develop adequate shear cone strength. The connection shall develop 125% of the characteristic strength of reinforcement bar.

### **1607 TESTING AND ACCEPTANCE**

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. Additional tests, if required, will be got carried out by the Contractor at his own cost.





The supply fabrication and placing of reinforcement shall be in accordance with these Specifications and shall be as checked and accepted by the Engineer.

Manufacturer's test certificate regarding compliance with Indian Standards for each lot of steel, shall be obtained and submitted to the Engineer. If required by the Engineer, the Contractor shall carry out confirmatory tests in the presence of a person authorized by the Engineer.

Cost of these tests shall be borne by the Contractor. The sampling and testing procedure shall be as laid down in IS:1786. If any test piece selected from a lot fails, no re-testing shall be done and the lot shall be rejected.

**1608**

#### **MEASUREMENT FOR PAYMENT**

Reinforcement shall be measured in length including hooks if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of IS:1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing, shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement.



## 1609            **RATE**

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, royalty, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings and as per these Specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the coating work as well as sampling, testing and supervision required for the work.

### **DTS No. 37**

**Providing and placing in position TMT bar reinforcement Fe - 500 grade for pile cap including cutting, bending, hooking, binding with 18 SWG annealed binding wire, placing in position, providing C.C. cover blocks in position to ensure required cover at time of concreting etc. complete as per detailed drawing & as directed by Engineer-in-Charge.**

- 1        The relevant specification for TMT bar reinforcement Fe-500 grade for RCC bored piles shall apply for pilecap in item no. 7.
- 2        Measurement shall be in MT of reinforcement.
- 3        Rate includes labour, material, and all other requirement to complete this item.

### **DTS No. 38**

**Providing & placing in position 5 mm thick M.S. liner plate for 1000 mm. dia R.C.C. bored piles including cutting, bending, fabrication, welding, driving etc. complete as directed by Engineer-in-Charge.**

## 1107.3            **Casing**

When concreting is carried out for a pile, a temporary casing should be installed to sufficient depth so as to ensure that fragments of soil from the sides of the hole do not drop into the concrete as it is placed. When the bore hole is stabilized using drilling mud, the temporary casing is not required except near the top.

The metal casing shall be of sufficient thickness and strength to hold its original form and show no harmful distortion while driving or when adjacent casings are driven.



Cast in-situ concrete driven piles shall be installed using a properly designed detachable shoe at the bottom of the casing.

Bored cast in-situ piles in soils which are stable, may often be installed with only a small casing length at the top. A minimum of 2 m length of top of bore shall invariably be provided with casing to ensure against loose soil falling into the bore. In cases in which the side soil can fall into the hole, it is necessary to stabilize the side of the bore hole with drilling mud, or a suitable steel casing. Permanent steel liner shall be provided at least up to maximum scour level. The minimum thickness of steel liner shall be 6 mm.

Permanent steel liner shall be provided for the full depth of the pile in the following situations where:

- i) The surrounding soil is marine clay
- ii) Soft soil is present
- iii) Surrounding soil has sulphate content equal to or more than 1%
- iv) Surrounding water has sulphate content equal to or more than 2500 ppm
- v) Leakage of sewage is expected

For bored cast in-situ piles, casing/liner shall be driven open ended with a pile driving hammer capable of achieving penetration of the liner to the depth shown on the drawing or as approved by the Engineer. Materials inside the casing shall be removed progressively by air lift, grab or percussion equipment or other approved means.

Where bored cast in-situ piles are used in soils liable to flow, the bottom of the casing shall be kept sufficiently in advance of the boring tool to prevent the entry of soil into the casing, leading to formation of cavities and settlements in the adjoining ground. The water level in the casing should generally be maintained at the natural ground water level for the same reasons. The joints of the casing shall be made as leak-tight as possible to minimize inflow of water or leakage of slurry during concreting.

The diameter of the boreholes shall not be more than the inside diameter of the liner when the liners are installed before boring. When the liners are installed after boring, the diameter of the boreholes shall not be more than the outside diameter of liner + 2 mm, unless otherwise approved by Engineer.

Measurement shall be in MT.

Rates includes all labour, material as directed by Engineer in charge.



#### **DTS No. 39**

**Conducting low strain pile integrity testing on RC Bored foundation piles using pile integrity tester equipment manufactured by Pile Dynamics Inc. of USA or TNO of Netherland or equivalent that confirms to ASTM D5882.**

The relevant specifications for pile testing as per MORTH clause 1113 shall apply to this.

Low strain pile integrity testing on RC bored foundation piles using pile integrity tester equipment manufactured by pile dynamics inc. of USA or TNO of Netherland or equivalent that confirms to ASTM D5882 shall be conducted.

Test shall be conducted by experienced independent test agency.

The measurement shall be per number of load test on piles.

The rate includes cost of materials, labour, plants and equipments etc. required for carrying each load test.

#### **DTS No. 40**

**Conducting high straining dynamic pile testing on R.C. of Bored piles using pile driving analyzer. The equipment shall have ability to record both force and velocity. Both strain and acceleration sensors shall be used to collect data and atleast two pairs shall be connected at diametrically opp. sides of the pile. The test and equipment shall conform to ASTM - D4945 - 1989. The test shall be conducted by an experienced independent test agency.**

1. The relevant specifications for pile testing as per MORTH clause 1113 shall apply to this.
2. High strain dynamic pile testing shall be as per ASTM-D4945-1989.
3. Test shall be conducted by experienced independent test agency.
4. The measurement shall be per number of load test on piles.
5. The rate includes cost of materials, labour, plants and equipments etc. required for carrying each load test.

#### **DTS No. 41**

**Providing below pile cap, levelling course with ordinary cement concrete M-15 using quartzite trap metal of size 40 mm or downgraded including vibrating, ramming and curing etc. complete.**

#### **1114 PILE CAP**

Casting of pile cap should be at a level higher than low water level unless functionally required to be below low water level. In such cases dewatering shall be resorted to allow concreting in dry conditions. Pile caps shall be of reinforced concrete. A minimum offset of 150 mm shall be provided beyond



the outer faces of the outermost piles in the group. If the pile cap is in contact with earth at the bottom, a leveling course of minimum 80 mm thickness of M 15 nominal mix concrete shall be provided. In marine conditions or areas exposed to the action of harmful chemicals, the pile cap shall be protected with a coating such as bituminous based coal tar epoxy or epoxy based coating or with suitable anti corrosive paint. Concrete with high alumina cement, shall not be used in marine environment.

The attachment of the pile head to the cap shall be adequate for the transmission of loads and forces. A portion of pile top may be stripped of concrete and the reinforcement anchored into the cap; Manual chipping may be permitted three days after casting of pile, while pneumatic tools for chipping shall be permitted only seven days after casting of pile. The top of pile after stripping shall project at least 50 mm into the pile cap.

The top of concrete in a pile shall be brought above cut-off level to permit removal of all laitance and weak concrete before pile cap is laid. This will ensure good concrete at the cut-off level.

Measurement shall be in Cum.

Rates include all labour, material, vibrating, ramming and curing etc. complete.

#### **DTS No. 42**

#### **Providing and fixing in position elastomeric bearing as per drawing**

#### **2005 ELASTOMERIC BEARINGS**

Elastomeric bearings shall cater for translation and/or rotation of the superstructure by elastic deformation.

#### **2005.1 Materials**

- i) Chloroprene Rubber (CR) only shall be used.
- ii) Grades of raw elastomer of proven use in elastomeric bearings, with low crystallization rates and adequate shelf life viz. Neoprene WRT, Neoprene W, Bayprene 110, Bayprene 210, Skyprene B-5, Skyprene B-30, Denka S-40V and Denka M-40, shall be used.
- iii) No reclaimed rubber or vulcanized wastes or natural rubber shall be used.
- iv) The polychloropene content of the compound shall not be lower than 60 percent. The ash content shall not exceed 5 per cent of its weight. Polychloropene content shall be determined in accordance with ASTM- D297 and ash content as per IS:3400-Part XXII.



- v) Use of synthetic rubber-like materials such as Ethyl Propylene Dimonomer (EPDM), Isobutane Isoprene Copolymer (IIR) and Chloro-Isoprene Copolymer (CIIR) shall not be permitted.

### 2005.1.2 Properties of Elastomer

The elastomer shall conform to the properties specified in Table 2000-1.

**Table 2000-1: Properties of Elastomer**

Property	Unit	Value of the Characteristic Specified			Test Method IS Specification Reference
(1)	(2)	(3)			(4)
1. Physical properties					
1.1 Hardness	IRHD	50±5	60 ±5	70 ± 5	18:3400 (Part II)
1.2 Minimum tensile strength					
- Moulded test piece	MPa	17	17	17	18:3400 (Part I)
- Test piece from bearing		14	14	14	
1.3 Minimum elongation at break					
- Moulded test piece	%	450	400	300	18:3400 (Part II)
- Test piece from bearing	%	400	350	250	18:3400 (Part II)
2. Maximum compression set(%) (24 h, 100 ± 1 °C)	%	< 35			IS:3400 (Part X)
3. Accelerated aging (72 h, 100 ± 1 °C) (Maximum change from un-aged value)					IS:3400 (Part IV)
3.1 Maximum change in hardness	IRHO	±5			
3.2 Maximum change in tensile strength	%	±15			
3.3 Maximum change in elongation	%	±30			



2005.1.3 Shear modulus (G) is the apparent "conventional shear modulus" of the elastomer bearing determined by testing. At nominal temperature of  $23\text{ }^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , the value of G shall comply with the values given in **Table 2000-2**.

**Table 2000-2 : Shear Modulus at Nominal Temperature**

Hardness (IRHD)	G (MPa)	Tolerances of G (MPa)
(1)	(2)	(3)
50±5	0.7	±0.15
60±5	0.9	± 0.18
70±5	1.15	± 0.20

2005.1.4 The adhesion strength of elastomer to steel plates determined according to 18:3400 (Part XIV) method A, shall not be less than 7 Kn/m.

2005.1.5 For elastomeric bearings (CR) used in adverse climatic conditions, the ozone resistance of elastomer shall be proved satisfactory when assessed by test according to 15:3400 (Part XX). The testing shall be carried out for a duration of 96 hours at a temperature of  $40\pm 1^{\circ}\text{C}$ , strain of 30 per cent and ozone concentration of 100 pphm by volume.

If any cracking is detected by visual observation at the end of the test, the material shall be considered unsatisfactory. No specific tests for assessment of low temperature resistance are deemed necessary.

**Note:** For use of elastomer in extreme cold climates, the Engineer may specify special grade of low temperature resistant elastomer in conformity with operating ambient temperature conditions. The specifications for such special grade elastomer including the tests for low temperature resistance, shall be mutually agreed by the Engineer and the producer/ supplier and are outside the purview of these Specifications.

2005.1.6 Laminates of mild steel conforming to IS:2062/IS:1079 or equivalent international grade, shall only be permitted. The yield stress of the material shall not be less than 250 MPa. Use of any other material like fibre glass or similar fabric as laminates, shall not be permitted.

2005.1.7 The manufacturers of elastomeric bearings shall satisfy the Engineer that they have in-house facilities for carrying out the following tests on elastomer in accordance with the relevant provisions of ASTM D-297.

The Engineer shall invariably get the test (a) performed in his presence or in the presence of his authorized representative. In case of any dispute regarding



interpretation of results, the Engineer may carry out test as per ASTM S-3452-78 (chromatography test) at the manufacturer's cost in a recognized test house. The elastomer specimen to conduct the test shall be obtained from the bearing selected at random for destructive test. The remaining part of the test bearing shall be preserved by the Engineer for any test to be done later, if required.

## **2005.2 Manufacturing and Workmanship**

- i) Plain pad and strip bearing shall be moulded in one piece, or comprise single pieces cut from previously moulded strips or slabs. Cutting shall produce a smooth surface without injurious heating of the elastomer.
- ii) Bearing with steel laminates shall be moulded as a single unit in a mould and vulcanized under heat and pressure. Moulding of elements in separate units and subsequent bonding as well as cutting from large sized cast, shall not be permitted.
- iii) The moulds used shall have standard surface finish adequate to produce bearings free from any surface blemishes.
- iv) Steel plates for laminates shall be sand/grit blasted, clean of all mill scales and shall be free from all contaminants prior to bonding by vulcanization. Rusted plates with pitting shall not be used. The plates shall be rounded so as to be free of sharp edges.
- v) Bonding shall be carried out during vulcanization using suitable bonding agent for bonding of elastomer to steel such that the bond peel strength is at least 7 N/mm widths when tested in accordance with IS:3400 Part XIV method A.
- vi) Spacers used in mould to ensure cover and location of laminates shall be of minimum size and number practicable. Any hole at surface or in edge cover shall be filled in subsequently.
- vii) Care shall be taken to ensure uniform vulcanizing conditions and homogeneity of elastomer through the surface and body of bearings.
- viii) The vulcanizing equipment/press shall be such that between the platens of the press, the pressure and temperature are uniform and capable of being maintained at constant values as required for effecting a uniform vulcanization of the bearing.
- ix) The moulding dies utilized for manufacturing the bearings shall be so set inside the platen of the press that the pressure developed during vulcanization of the product is evenly distributed and the thickness maintained at all places are within acceptable tolerance limits taking into consideration the expansion/shrinkage allowance of vulcanizate (the product of vulcanization).





- x) The raw compound which is introduced inside the metal dies for vulcanization shall be accurately weighed each time and shall be of sufficient quantity to ensure proper flow of material to every part of the die so that a homogeneous and compact bearing is produced without any sign of sponginess or deficiency of material at any place.
- xi) Before the rubber mix of any batch is used for producing vulcanized bearings, test pieces in the form of standard slab and buttons shall be prepared in accordance with prescribed standards and salient properties tested and recorded regularly against each batch of production to monitor the quality of the products.
- xii) Bearings of similar size to be used in a particular bridge project shall be produced by identical process and in one lot as far as practicable. Phased production may be resorted to only when the total number of Bearings are large.

### **2005.3 Manufacturing Tolerances**

The bearings shall be fabricated/manufactured with the tolerances specified in Table 2000::3. Tolerances of thickness of individual layer of elastomer, dimension of laminates, and flatness of laminates are primarily meant for quality control during production. In order to measure thickness of individual layer of elastomer, dimension of laminates and flatness of laminates of a finished bearing, it is essential to cut the bearing, which may be done if agreed upon between the manufacturer and the buyer.



	Items	Tolerances
1)	Overall linear plan dimensions	-3 mm, +6 mm
2)	Total mean bearing thickness (The mean thickness is the arithmetic average of the thickness measured at five points on the major surface as indicated for various shaped bearings: Rectangular : corners and centre Circular : corners of inscribed square and centre)	-2.5%, +5%  "
3)	Parallelism	
a)	Of top surface of bearing with respect to the bottom surface as datum	1 in 200
b)	Of one side surface with respect to the other as datum	1 in 100
4)	Thickness of individual layer of elastomer	
a)	Inner layer of elastomer	±12% (max of 2 mm)
b)	Outer layer of elastomer	+20% (max of 1 mm)
c)	Side cover	-0 mm, +3 mm
5)	Dimension of laminates	
a)	Plan dimensions of laminates	-3mm, +0
b)	Thickness of laminate	±10%
c)	Parallelism of laminate with respect to bearing base as datum (with respect to diameter for plates circular in plan and shorter side for plates rectangular in plan)	1 in 100
6)	Flatness Flatness shall be assessed by placing a straightedge along the diagonal or diameter. The gap between the straightedge and the surface shall not exceed the tolerances specified below	
a)	Load bearing surface of the bearing	0.3% of diameter or diagonal or 2% of mean bearing thickness which ever is higher
b)	Steel laminate	1% of diameter or diagonal (max of 1.5 mm)

#### 2005.4 Acceptance Specifications

The manufacturer shall have all the test facilities required for the process and acceptance control tests installed at his plant to the complete satisfaction of the Engineer. The test facilities and their operation shall be open to inspection by the Engineer on demand.



All acceptance and process control tests shall be conducted at the manufacturer's plant. Cost of all materials, equipment and labour shall be borne by the manufacturer unless otherwise specified or specially agreed to between the manufacturer and Engineer.

A testing programme shall be submitted by the manufacturer to the Engineer and his approval obtained before commencement of acceptance testing.

Any acceptance testing delayed 180 days beyond the date of production shall require special approval of the Engineer and modified acceptance specification, if deemed necessary by him.

All acceptance testing shall be conducted by the Inspector with the aid of the manufacturer's personnel having adequate expertise and experience in rubber testing, working under the supervision of the Inspector and to his complete satisfaction.

Inspection and acceptance shall be carried out lot by lot.

#### **2005.4.1 Acceptance Lot**

A lot under acceptance shall comprise all bearings, including the pair of extra test bearings where applicable, of equal or near equal size produced under identical conditions of manufacture, to be supplied for a particular project.

The size and composition of acceptance Lot shall be got approved by the Engineer.

For the purpose of grading levels of acceptance testing, a lot size of 24 or larger number of bearings shall be defined as a 'large lot', while a lot size of less than 24 numbers of bearings shall be defined as a 'small lot'.

When the number of bearings of equal or near equal size for a single bridge project is large and phased production and acceptance is permitted, the number of bearings supplied in any single phase of supply shall comprise a lot under acceptance. When such phased supply is made each such lot shall be considered as a large lot of the purpose of acceptance testing.

#### **2005.4.2 Levels of Acceptance Testing**

The following two Levels of acceptance testing shall be adopted, depending on lot size :

Acceptance testing Level 1 is a higher level of inspection and testing and shall be applicable to large lots only, unless otherwise specified. This shall involve



manufacture of two extra bearings for each lot to be used as test bearings and eventually consumed in destructive testing.

Acceptance testing Level 2 shall be applicable to small lots only, for which one extra bearing shall be manufactured and shall not involve destructive testing of finished bearing. Out of the lot, one bearing shall be selected at random for carrying out material tests. This bearing shall be excluded from the lot accepted.

Acceptance testing Level 1 may be specified for small lots also at the sole discretion of the Engineer taking into account the special importance of a bridge project. The cost of extra bearings, in such cases shall borne by the user, while the cost of all other materials, equipment and testing shall be borne by manufacturer.

### **2005.4.3 Testing**

Acceptance testing shall comprise general inspection, test on specially moulded test pieces and test on complete bearings or sections for measurement of various quality characteristics detailed below:

#### **2005.4.3.1 Acceptance Testing Level1**

General Inspection

- i) All bearings of the lot shall be visually inspected for absence of any defects in surface finish, shape, hardness or any other discernible superficial defects.
- ii) All bearings of the lot shall be checked for tolerances for overall dimensions; mean bearing thickness, parallelism of earing surfaces and flatness of load bearing surfaces as specified in Table 2000-3.
- iii) The test shall be carried out on all bearings as part of the standard production process. The temperature of the room in which the bearings are tested shall not vary more than 10 °C. The main objective of this test is to eliminate poorly made bearings by visual inspection in a quick and efficient way. All bearings of the lot shall be subjected to an axial load to correspond to the design load at serviceability limit state while visual examination is made to check for discernible defects like:

Misalignment of reinforcing plates  
Poor bond at laminate/steel interface  
Variation in elastomer layer thickness  
Any surface defects developed during testing

- iv) During acceptance testing, complete test data shall be furnished by the manufacturer and one bearing per lot shall be selected at random and the same



test shall be repeated. The bearings shall then be visually inspected for defects and the stiffness shall also be measured.

- v) During the test, the deflection between 30 percent and 100 percent of the maximum load for the application shall be recorded and used to check the consistency of the stiffness value. Variation in stiffness of any individual bearing from the mean of the measured values for all such bearings of the lot, shall not be larger than 20 percent of the mean value.
- vi) In case of any visual defect or unacceptable stiffness during acceptance testing, all bearings of the lot shall be subjected to the same test again and only the bearing that passes the test in all respects, shall be accepted.



### Tests on Specially Moulded Test Pieces

- i) Test pieces shall be moulded by the manufacturer with identical compound and under identical vulcanizing conditions as used in the manufacture of the bearings of the acceptance lot. The process shall be open to inspection by the Inspector/Engineer.
- ii) Test pieces offered for inspection shall be identified by suitable markings and duly certified by the manufacturer.
- iii) The quality characteristics to be tested are listed below. The specification reference in parenthesis shall define the corresponding specification for test piece, test method and criterion for acceptance.

Composition (see Note 1 below)

Hardness (Table 2000-1, 1.1)

Tensile strength (Table 2000-1, 1.2)

Elongation at Break (Table 2000-1.1.3)

Compression Set (Table 2000-1, 2)

Accelerated Ageing (Table 2000-1, 3)

Adhesion Strength (Clause 2005.1.4)

Ozone Resistance (see Note 2 below)

**Note 1** The properties enumerated in Clause 2005.1 and specific gravity of elastomer of test pieces from test bearing, shall be compared with those for corresponding specially moulded test pieces furnished by the manufacturer. The following variations shall be deemed maximum acceptable:

Specific Gravity + 02.

Ash Content  $\pm 0.5$  per cent (e.g., if the ash content of elastomer from test bearing is 4%, the ash content of the specially moulded test piece shall be within 3.5% to 4.5% or vice versa)

Hardness (Table 2000-1, 1.1)

Tensile strength (Table 2000-1, 1.2)

Elongation at Break (Table 2000-1, 1.3)

Compression Set (Table 2000-1, 2)

Accelerated Ageing (Table 2000-1, 3)

Adhesion Strength (Clause 2005.1)

**Note 2** Ozone resistance test can be waived by the Engineer for bearings of CR when satisfactory results of ozone resistance tests on similar grade of elastomer may



be available from process control records or development test data furnished by the manufacturer.

Where such process control data are not available or the frequency of testing not deemed adequate, ozone resistance test shall be mandatory for acceptance of bearings of CR.

However, such tests may not be insisted upon for bearings not located in adverse conditions of exposure and where the test on accelerated ageing could be considered as adequate.

Process and acceptance control tests for ozone resistance by an independent testing agency shall be acceptable.

#### **Tests on Complete Bearings or Samples**

- i) Two bearings shall be selected at random from the lot as test bearings. The tests to be conducted are:
  - a) Test for determination of shear modulus (on a pair of bearings) and
  - b) Test for determination of compression stiffness (on one bearing out of the selected pair).

The test specifications and acceptance criteria shall conform to those given in Appendix-3 of IRC:83 Part II. The tested bearings shall be part of the lot accepted.

- ii) The test for determination of shear bond strength shall be conducted on two identical bearings selected at random from the lot as test bearings or on two identical specially moulded sample bearings of plan dimension 200 mm x 300 mm and overall thickness 41. mm (3 elastomer layers of thickness 8 mm each; 4 reinforcing plates of thickness 3 mm each, face cover 2.5 mm, and side cover 4. mm) as agreed upon between the manufacturer and buyer:

The test specifications and acceptance criteria shall conform to those given in Appendix-3 of IRC:83 Part II. This is a destructive test and the test bearings shall not be used in the structure.

#### **2005.4.3.2 Acceptance Testing Level 2**

**General Inspection:** This shall conform to the provisions in Clause 2005.4.3.1 in all respects.

**Test on specially moulded test pieces :** This shall conform to the provisions in Clause 2005.4.3.1 in all respects.



**Test on complete bearings:** Test for determination of shear modulus shall be conducted using two bearings of the lot selected at random and conforming to relevant provisions of Clause 2005.4.3.1. These bearings shall, however, be part of the lot accepted. The remaining tests stipulated in aforesaid clause shall be carried out on two bearings selected at random which shall be excluded from the lot accepted.

#### **2005.4.4 Special Acceptance Inspection**

Special acceptance inspection shall comprise the following :

- i) Acceptance testing by a NABL accredited independent external agency with separate or supplemental test facilities provided by it for polymer identification and confirmation about percentage of polymer content and ash content by TGA method.
- ii) Acceptance testing on test pieces prepared from the surface or body of the test bearings instead of specially moulded test pieces.
- iii) Acceptance testing on cut sample from finished bearing in order to measure thickness of individual layer of elastomer, dimension of laminates and flatness of laminates.
- iv) Acceptance test at ULS condition. Bearings tested at ULS condition cannot be used in the structure as its performance at SLS condition cannot be guaranteed after such test.
- v) Acceptance tests not covered by these specifications but according to the specifications laid down by the Engineer.

Special acceptance inspection may be specified under the following conditions:

- a) Special contract agreement between the manufacturer and the buyer. Cost of additional bearings to be consumed for special acceptance inspection, shall be borne by buyer.
- b) Evidence of unsatisfactory process or acceptance control

#### **2005.4.5 Inspection Certificate**

A lot under inspection shall be accepted by the Inspector and so certified, when no defect is found with respect to any of the quality characteristics tested on samples drawn from the lot, according to specifications laid down to Clause-2005.4.3 covering general inspection tests on specially moulded test pieces and on complete bearings.





In case any bearing is found defective, the lot shall be rejected by the Inspector and so certified.

In case any bearing is found to be defective with respect to any quality characteristic, discerned by general inspection tests specified in Clauses 2005.4.3.1 and 2005.4.3.2,. Tests on specially moulded test pieces and complete bearings as applicable according to those Clauses shall nevertheless be completed. If the said lot, rejected by general inspection, satisfies the acceptance criteria in respect of these other tests, the lot and individual bearings found defective shall be clearly identified in the inspection certificate.

Immediately on completion of inspection by the Inspector authorized by the Engineer, the manufacturer shall obtain an inspection certificate which shall include the details of a lot or lots accepted/rejected by him and records of all test measurements.

#### **2005.4.6 Quality Control Certificate**

The manufacturer shall certify for each lot of bearings under acceptance that :

- a) an adequate system of continuous quality control was operated in. his plant.
- b) the entire process remained in control ,during the production of the lot of bearings under acceptance, as verified from the quality control records/charts which shall be open to inspection of Engineer/Inspector on demand.

A certified copy of results of process control testing done on samples of elastomer used in the production of the lot shall be appended and shall include the following information :

Composition of compound- raw elastomer and ash content, the grade of raw elastomer used including name, source, age on shelf), test result of hardness, tensile strength, elongation at break, compression set, accelerated ageing, etc.

A higher level certification of the process quality control shall be called for at the sole discretion of the Engineer in special cases e.g. where adequate inspection of bearings similar to those comprising the lot under inspection produced in the same plant, is not available with the Engineer or where there is any evidence of process or acceptance control being deemed unsatisfactory. The higher level certification shall comprise submittal of a complete quality control report covering tests as given in Appendix 3 of IRC:83 (Part II), supplementing the quality control certificate.

#### **2005.4.7 Acceptance**



The manufacturer shall furnish the following to Engineer for obtaining acceptance:

- 1) Quality control certificate as laid down in Clause 2005.4.6
- 2) Inspection certificate as laid down in Clause 2005.4.5.

The manufacturer shall furnish any supplementary information on the system of quality control and/or process and acceptance control testing as may be deemed necessary by the Engineer.

In case of any evidence of process or acceptance control testing being deemed unsatisfactory by him, Engineer at his sole discretion may call for a special acceptance testing of the lot according to specifications laid down by him, without any prejudice to his right to reject the lot. The entire cost of such supplementary inspection shall be borne by the manufacturer.

The Engineer shall be the sole authority for acceptance of a lot on scrutiny of the certificates along with any supplementary evidence as mentioned in this Clause, to his complete satisfaction therewith.

In case of rejection of a lot, the Engineer shall reserve the right to call for special acceptance inspection. for the succeeding Jots offered for Inspection, according to the specifications laid down by him. The entire cost of such tightened inspection shall be borne by the manufacturer.

## **2005.5 Certification and Marking**

Bearings shall be transported to bridge site after final acceptance by Engineer and along with an authenticated copy of the certificate to that effect.

Each bearing shall be uniquely and individually numbered on its external faces for identification. The identification number shall be unique and such as to enable other bearings manufactured at the same time, to be traced through the production control records, should the need arise. The manufacturer's name and unique identification number of the bearing should be vulcanized on the top or bottom of the bearing.

An information card giving the following details for the bearings, duly certified by the manufacturer, shall also be appended:

Name of manufacturer Date of manufacture Elastomer grade used Bearing dimensions Production batch no. Acceptance lot no. Date of testing, Name and specific location of bridge



### Explanation of markings used on the bearing

All bearings shall have suitable index markings identifying the information. The markings shall be made in indelible ink or flexible paint and if practicable, should be visible after installation. The top of the bearing and direction of installation shall be indicated.

### **2005.6 Storage and Handling**

Each elastomeric bearing shall be clearly labelled or marked. The bearing shall be wrapped in a cover and packed in timber crates with suitable arrangement to prevent movement and to protect corners and edges.

Care shall be taken to avoid mechanical damage, contamination with oil, grease and dirt, undue exposure to sunlight and weather of the bearings during transport and handling prior to and during installation.

### **2005.7 Installation**

- i) Bearings shall be installed in the structure as specified or approved by the Engineer to ensure that right bearing is being installed at the right location.
- ii) Bearings must be placed between true horizontal surfaces (maximum tolerance 0.2 percent perpendicular to the load) and at true plan position of their control lines marked on receiving surfaces (maximum tolerance  $\pm 3$  mm).
- iii) Concrete surfaces shall be free from local irregularities (maximum tolerance  $\pm 1$  mm in height).
- iv) Departures from common planarity of twin or multiple bearings shall be within such tolerance as may be specified or approved by the engineer.
- v) Design shall be got checked for the actual inclination in seating if larger inaccuracies than those specified are permitted.
- vi) For cast in-situ concrete superstructure where bearings are installed prior to concreting, the forms around the bearings shall be capable of easy removal. Forms shall also fit the bearings snugly and prevent any leakage of mortar/grout. Any mortar contaminating the bearings during concreting shall be completely removed before setting.
- vii) Fixing of bearing to precast concrete or steel superstructure elements, shall be done by application of epoxy resin adhesive to interface, after specified surface preparation. The specifications for adhesive material, workmanship and control



shall be approved by the Engineer. Care shall be taken to guard against faulty application and consequent possibility of behaviour of the adhesive layer as a lubricant. The bonding by the adhesive shall be deemed effective only as a device for installation and shall not be deemed to secure bearings against displacement for the purpose of design. .

- ix) Lifting of a cast in-situ post-tensioned bridge deck for relieving time dependent deformation shortly after installation of bearings, should be avoided. In case such lifting is unavoidable, the lifting arrangement, proper seating of the girder on the bearing, etc. shall be rigidly controlled to avoid any risk of misalignment.
- x) Bulging of the rubber layer between the reinforcing steel laminates on free exposed perimeter under load, which is a normal phenomenon, shall be examined carefully for detecting any evidence of crack or bond failure.
- xi) In case seating of bearings on a non-horizontal plane is required, it shall be carried out in accordance with acceptable practice and particular specifications as may be laid out and directed by the Engineer.
- xii) As a measure of ample precaution against accidental displacement, the bearings shall be placed in a recess as shown in Fig. 9 of IRC:83. (Part II).
- xiii) After installation, bearings and their surrounding areas shall be left clean.

#### **2005.8 Maintenance**

- i) The maintenance of bearings shall be carried out according to a planned schedule.
- ii) The structure should be designed and detailed in such a way that the bearings are easily accessible after installation for inspection and maintenance. Arrangements for insertion of jacks to lift the bridge deck shall be made in detailing of structure.
- iii) The exposed bearing surface shall be maintained clean and free from contamination with grease, oil or other deleterious matter.
- iv) Annual routine maintenance inspection or special maintenance inspection of all bearings shall be made to check the following aspects and results reported:

The top and bottom load bearing surfaces shall be in full contact with the plinth (bottom supporting surface) and the soffit (top supporting surface). If there is imperfect contact between the bearing surfaces and the soffit and plinth, the angle between the soffit and plinth shall be checked against the design specifications.



The magnitude of the shear deflection of each bearing shall be checked to ensure that it is within the design specifications.

A visual inspection shall be made of all the accessible edges. A note shall be made of the size and position of any cracks, splits or uneven bulges.

The plinth and soffit shall be examined for signs of displacement from original position of bearing which may be indicated by black marks left on the plinth and soffit.

Where applicable, the sliding surfaces shall be examined for cleanliness and for any movements beyond the design range.

Where applicable protective coating and/or dust protection shall be examined for signs of deterioration.

- v) Damaged bearings shall be replaced immediately. To avoid differences in stiffness, all adjacent bearings on the same line of support shall also be replaced.

#### **DTS No. 43**

**Steel work welded, in built up sections, framed work including cutting hoisting, fixing in position and applying a primer coat of red lead paint. in trusses and trussed purlins up to 25 m span and 15 m overall height**

#### **(A) For Superstructure**

#### **1901 DESCRIPTION**

This work shall include furnishing, fabricating, transporting, erecting and painting structural steel, rivet steel, cast steel, steel forgings, cast iron and other incidental metal construction of the kind, size and quantity in conformity with the drawings and these Specifications or as directed by the Engineer.

#### **1902 GENERAL**

General requirements relating to the supply of material shall conform to the Specifications of IS:1387 for the purpose of which the supplier shall be the Contractor and the purchaser shall be the Engineer.

Finished rolled material shall be free from cracks, flaws, injurious seams, laps, blisters, ragged and imperfect edges and other defects. It shall have a smooth and uniform finish, and shall be straightened in the mill before shipment. It



shall also be free from loose mill scale, rust, pits or other defects affecting its strength and durability.

The acceptance of any material on inspection at the rolling mill, foundry or fabricating plant where material for the work is manufactured, shall not be a bar to its subsequent rejection, if found defective.

Unless otherwise specified, high tensile steel rivets conforming to IS:1149 shall be used only for members of high tensile steel conforming to IS:961 and shall not be used for members of mild steel.

Unless otherwise specified, bolted connection of structural joints using high tensile friction grip bolts shall comply with requirements of IS:4000.

Cast iron shall not be used in any part of the bridge structure, except where it is subject to direct compression.

### **1903**

#### **MATERIALS**

#### **1903.1**

All materials shall conform to Section 1000 of these Specifications. Special requirements are given below:

Mild steel for bolts and nuts shall conform to IS:226 but have a minimum tensile strength of 44 kg/sq.mm and minimum percentage elongation of 14.

High tensile steel for bolts and nuts shall conform to IS:961 but with a minimum tensile strength of 58 kg/sq.mm.

Use of high strength friction grip bolts shall be permitted only on satisfactory evidence of performance to the requirements (not covered by these Specifications) specified by the Engineer or as laid down in special provisions.

For cast steel, the yield stress shall be determined and shall not be less than 50 percent of the minimum tensile strength.

Plain washers shall be of steel. Tapered or other specially shaped washers shall be of steel or malleable cast iron.

Parallel barrel drifts shall have a tensile strength not less than 55 kg/sq.mm with elongation of not less than 20 percent measured on a gauge length of 4 VS.

( $S_0$  = cross-sectional area).

#### **1903.2**

Materials for castings and forgings, fasteners, welding consumables and welding shall be as under:



### **1903.2.1 Castings and Forgings**

Steel castings and forgings shall comply with the requirements of the following Indian Standards, as appropriate:

IS:1030	Carbon Steel Castings for General Engineering purposes
IS:1875	Carbon Steel Billets, blooms, slabs, bars for forgings
IS:2004	Carbon Steel Forgings for General Engineering purposes
IS:2644	High Tensile Steel Castings
IS:2708	1.5 Percent Manganese Steel Castings
IS:4367	Alloy and tool steel forgings for general industrial use

### **1903.2.2 Fasteners**

Bolts, nuts washers and rivets shall comply with the following or relevant Indian Standards as appropriate:

IS:1148	Hot rolled rivet bars (up to 40 mm dia) for structural purposes
IS:1149	High tensile steel rivet bars for structural purposes
IS:1363	Hexagon head bolts, screw and nuts product grade C (Parts 1 to 3)
IS:1364	Hexagon head bolts, screw & nuts product grade A and B (Parts 1 to 3)
IS:1367	Technical supply conditions for threaded steel fastener (Parts 1 to 18)
IS:1929	Hot forged steel rivets for hot closing (12-36 mm dia)
IS:2155	Cold forged steel rivets for hot closing (6-16 mm dia)
IS:3640	Hexagon fit bolts
IS:3757	High strength structural bolts
IS:4000	High strength bolts in steel structures
IS:5369	Plain washers and Jock washers - general requirements
IS:5370	Plain washers with outside dia = 3 X inside dia
IS:5372	Taper washers for channels (ISMC)
IS:5374	Taper Washers for I beams (ISMB)
IS:5624	Foundation bolts
IS:6610	Heavy washers for steel structures
IS:6623	High strength structural nuts
IS:6639	Hexagon bolts for steel structures
IS:6649	Hardened and tempered washers for high strength structural bolts and nuts.
IS:7002	Prevailing torque type steel hexagon nuts

### **1903.2.3 Welding Consumables**



Welding consumables shall comply with the following Indian Standards as appropriate :

- IS:814 (Part 1) Covered Electrodes for Metal Arc Welding of Structural steel for welding other than sheets
- IS:814 (Part 2) For welding sheets
- IS:1395 Low and medium alloy steel covered electrodes for manual Metal Arc Welding
- IS:3613 Acceptance Tests for wire flux combinations for submerged arc welding of structural steel
- IS:6419 Welding rods and bare electrodes for gas shielded arc welding of structural steel
- IS:6560 Molybdenum and chromium-molybdenum low alloy steel welding rods and bare electrodes for gas shielded arc welding
- IS:7280 Bare wire electrodes for gas shielded arc welding of structural steel

#### **1903.2.4 Welding**

- IS:812 Glossary of terms relating to welding and cutting of metals
- IS:816 Code of practice for use of metal arc welding for general construction in mild steel
- IS:822 Code of procedure for inspection of welds
- IS:1024 Code of practice for use of welding in bridges and structures subject to dynamic loading
- IS:1182 Recommended practice for radiographic examination of fusion welded butt joints in steel plates
- IS:4853 Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes
- IS:5334 Code of practice for magnetic particle flaw detection of welds
- IS:7307 Approval tests for welding procedures : Part 1 fusion welding of steel
- IS:7310 Approval tests for welders working to approved welding procedures: Part 1 fusion welding of steel





IS:7318 Approval tests for welders when welding procedure is not required  
: Part 1 Fusion welding of steel

IS:9595 Recommendations for metal arc welding of carbon and carbon  
manganese steels

1903.3 Corrosion resistant steel to be used in aggressive environment shall be low alloy  
steels containing a total of 1 percent to 2 percent alloys, in particular copper,  
chromium, nickel and phosphorous.

#### **1903.4 Paints**

All materials for paints and enamels shall conform to the requirements specified  
on the drawings or other special provisions laid down by the Engineer.

The type of paints which can be used shall be as follows :

- a) Ordinary i.e. paints based on drying oils, alkyd resin, modified alkyd  
resin, phenolic varnish epoxy
- b) Chemical Resistant - one pack type (ready for use) or two pack type  
(mixed before use).
- c) Vinyl
- d) Chlorinated rubber
- e) Bituminous - (IS:9862)
- f) Epoxy - (IS:14925)
- g) Polyurethane - (IS:13759)
- h) Zinc rich - (IS:14589)

Unless otherwise specified, paints shall conform to the relevant Indian  
Standards. Paints shall be tested for the following qualities as per Specifications  
given in the relevant IS codes:

- Weight (for 10 litres of paint, thoroughly mixed)
- Drying time
- Consistency
- Dry thickness and rate of consumption

#### **1904 FABRICATION**

##### **1904.1 General**

All work shall be in accordance with the drawings and as per these  
Specifications. Fabrication work shall be taken up only after receipt of approved  
fabrication/working drawings. It shall be ensured that all parts of an assembly  
fit accurately together. All members shall carry mark number and item number



and, if required, serial number. Method of marking shall be commensurate with the process of manufacture and such as to ensure retention of identity at all stages.

Unless specifically required under the contract, corresponding parts need not be interchangeable, but the parts shall be match marked as required under Clause 1904.9.

Templates, jigs and other appliances used for ensuring the accuracy of the work shall be of mild steel; where specially required, these shall be bushed with hard steel. All measurements shall be made by means of steel tape or other device properly calibrated: Where bridge materials have been used as templates for drilling, these shall be inspected and passed by the Engineer before they are used in the finished structure.

All structural steel members and parts shall have straight edges and plane surfaces. They shall also be free from twist. If necessary, they shall be straightened or flattened by pressure unless they are required to be of curvilinear forms. Adjacent surfaces or edges shall be in close contact or at uniform distance throughout.

The Contractor shall submit his programme of work to the Engineer for his approval at least 15 days before the commencement of fabrication, which shall include the proposed system of identification and erection marks together with complete details of fabrication and welding procedures. He shall also submit for approval of Engineer, a Quality Assurance Plan according to the nature of fabrication work (whether welded or riveted) which should clearly define the points of checking and inspection during the stages of fabrication as well as supply of materials.

The Contractor shall prepare shop drawings for fabrication of any member and obtain approval of the Engineer before the start of work. Complete information regarding the location, type, size and extent of all welds shall be clearly shown on the shop drawings. These drawings shall distinguish between shop and field welds.

#### **1904.2 Laminations in Plates**

The following areas of plates shall not have laminations:

- a) Steel plates and sections in which tension stresses are transmitted through thickness of plate or in region in which lamination could affect the buckling behavior and bending compression.



- b) On each side of welded bearing diaphragm, strip of flange and web plate for a length equal to 25 times their thickness.
- c) The strip of web plate for a length of 25 times its thickness on each side of single sided bearing stiffener welded to web.
- d) For welded cruciform joints transmitting tensile stress through the plate thickness, for a length 4 times the thickness of plate on each side of attachment.
- e) For edges of plates where corner welds are provided on the surface of such plates.
- f) Other areas of plates or sections as may be specified by the Engineer.

### **1904.3 Straightening and Bending**

1904.3.1 The straightening of plates, angles and other shapes shall be done by methods not likely to produce fracture or any injury to the metal. Hammering shall not be permitted. Heating, if permitted by the Engineer in special cases, shall be followed by as slow cooling as possible. Following the straightening of a bend or buckle, the surface shall be carefully inspected for evidence of fracture. Sharp kinks and bends may lead to rejection of material.

1904 3.2 Straightening by heating shall be done under controlled procedure. Temperature of the steel shall not be more than 650°C. Heating and cooling rate shall be appropriate to the particular type of steel and shall be as agreed and approved by the Engineer. Accelerated cooling shall not be carried out without the approval of the Engineer.

### **1904.3.3 Bending and Curving**

Steel having yield stress more than 360 MPa shall not be heat curved. Rolled beams and girders may be curved by either continuous or V-type heating as approved by Engineer.

- a) For the continuous method, a strip of sufficient length along the edge of top and bottom flange shall be heated simultaneously to desired temperature to obtain required curve.
- b) For V-type of heating, the top and bottom flanges shall be heated in truncated triangular or wedge-shaped areas having their base along the flange edge and spaced at regular intervals along each flange. The truncate triangular pattern shall have an angle 15 to 30 with base not more than 250 mm long. The spacing and temperature shall be as required to obtain the required curvature and heating shall be at approximately the same rate along the top and bottom flanges.



For flange thickness of 32 mm or more, both inside and outside surfaces shall be heated concurrently.

The heat bending shall be conducted so that the temperature of steel does not exceed 620°C. The girder shall not be artificially cooled until temperature comes down to 315°C by natural cooling. The method of artificial cooling shall be as approved by Engineer.

Camber for rolled beams may be obtained by heat curving methods approved by Engineer. For camber in plate girders, the web shall be cut to prescribed camber with suitable allowance for shrinkage due to cutting, welding and heat curving.

#### **1904.4 Preparation of Edges and Ends**

1904.4.1 All structural steel parts, where required, shall be sheared, cropped, sawn or flame cut and ground accurately to the required dimension and shape. Material shall be cleaned and any burrs, scales or abnormal irregularities shall be removed.

1904.4.2 End/edge planing and cutting shall be done by any one of the following prescribed methods or left as rolled:

- Shearing, cropping, sawing, machining, machine flame cutting.
- Hand flame cutting with subsequent grinding to a smooth edge.

Sheared edges of plate not more than 16 mm thick, which are for secondary use such as stiffeners and gussets, shall be subsequently ground to smooth profile.

If ends of stiffeners are required to be fitted, they shall be ground, so that the maximum gap over 60 percent of the contact area does not exceed 0.25 mm.

1904.4.3 Where flame cutting or shearing is done, at least one of the following requirements shall be satisfied.

- The cut edge is not subjected to applied stress.
- The edge is incorporated in weld.
- The hardness of cut edge does not exceed 350 HV 30.
- The material is removed from edge to the extent of 2 mm or minimum necessary, so that the hardness is less than 350 HV 30.
- Edge is suitably heat treated by approved method to the satisfaction of the Engineer and it is shown by dye penetrant or magnetic particle test that cracks have not developed.
- Thickness of plate is less than 40 mm for machine flame cutting of materials conforming to IS:2062 up to Grade E250 (Fe 410w). The requirement of



hardness below 350 HV 30 of flame cut edges shall be specified by the Engineer.

The flame cut edges shall be ground or machined over and above the requirements in (a) to (f), wherever specified by the Engineer.

1904.4.4 Where machining for edge preparation in butt joint is specified, the ends shall be machined after the members have been fabricated.

Outside edges of plate and section, which are prone to corrosion shall be smoothed by grinding or filing.

In the case of high tensile steel at least 6 mm of the material from the flame cut edge shall be removed by machining.

Longitudinal edges of all plates and cover plates in plate girders and built-up members shall be machined except in the following cases:

- a) Rolled edges of single universal plates or flats
- b) Covers to single flange plates.
- c) Edges of single plates in compression and edges of single plates of thickness 25 mm or less, in tension, where machine flame cutting is acceptable.
- d) Edges of single shaped plates over 2 mm thick not capable of being machined by ordinary method, which may be machine flame cut and the end surface ground.
- e) Edges of universal plates or flats of the same nominal width used in tiers, if so authorized by the Engineer.

All edges of splice and gusset plates 12 mm thick and over shall be machined and those less than 12 mm thick shall be sheared and ground.

The ends of plates and sections forming the main components of plate girders or of built-up members shall be machined, machine flame cut, sawn or hand flame cut and ground.

Where ends of stiffeners are required to be fitted, they shall be machined, machine flame cut, sawn, sheared and ground or hand flame cut and ground.

The ends of lacing bar shall be rounded unless otherwise specified.

Other edges and ends of mild steel parts shall be sheared and any burrs at edges shall be removed.

#### **1904.5 Preparation of Holes**



### **1904.5.1 Drilling and Punching**

Holes for rivets, black bolts, high strength bolts and countersunk bolts/rivets (excluding close tolerance and turn fitted bolts) shall be either punched or drilled. For bolts/rivets less than 25 mm dia, the diameter of holes shall be 1.5 mm larger while for those of 25 mm dia or more, the diameter of holes shall be 2 mm larger than the diameter of the bolt/rivet.

All holes shall be drilled except those for secondary members such as floor plates, hand rails etc. Members which do not carry the main load can be punched subject to the thickness of member not exceeding 12 mm for material conforming to IS:2062 up to Grade E250 (Fe 410w).

Holes through material of more than one thickness or through main material thickness exceeding 20 mm for steel conforming to IS:2062 up to Grade E250 (Fe 410w) or 16 mm for steel conforming to IS:2062 up to Grade E300 (Fe 440w) and above, shall either be sub-rilled or sub-punched to a diameter of 3 mm less than the required size and then reamed to the required size. The reaming of material more than one thickness shall be done after assembly.

Where several plates or sections form a compound member, they shall, where practicable, be firmly connected together by clamps or tacking bolts and the holes shall be drilled through the group in one operation. Alternatively, and in the case of repetition work, the plates and sections may be drilled separately from jigs and templates. Jigs and templates shall be checked at least once after every 25 operations. All burrs shall be removed.

In the case of repetition of spans, the erection of every span shall not be insisted upon, except where close tolerance or turned bolts are used, provided that methods are adopted to ensure strict interchangeability. In such cases, one span in ten or any number less than ten of each type shall be erected from pieces selected at random by the Engineer and should there be any failure of the pieces to fit, all similar spans shall be erected complete. In the event of spans being proved completely interchangeable, all corresponding parts shall carry the same mark so that sorting of the materials at site is facilitated.

### **1904.5.2 Block Drilling**

Where the number of plates to be riveted exceeds three or the total thickness is 90 mm or more, the rivet holes, unless they have been drilled through steel bushed jigs, shall be drilled out in place 3 mm all round after assembling. In such cases, the work shall be tightly bolted together.

### **1904.5.3 Size of Holes**



The diameters of rivet holes in millimetres are given in Table 1900-1.

**Table 1900-1 :Diameters of Holes for Rivets**

Nominal dia of Rivets (mm)	Dia of Holes (mm)
12	13.5
14	15.5
16	17.5
18	19.5
20	21.5
22	23.5
24	25.5
27	29.0
30	32.0
33	35.0

#### **1904.5.4 Close Tolerance Bolts and Barrel Bolts**

For close tolerance or turn fitted bolts, the diameter of the holes shall be equal to the nominal diameter of the bolt shank + 0.15 mm to - 0.0 mm.

The members to be connected with close tolerance or turn fitted bolts shall be firmly held together by service bolts or clamped and drilled through all thicknesses in one operation and subsequently reamed to required size within specified limit of accuracy as specified in IS:919 tolerance gradeH8.

The holes not drilled through all thicknesses in one operation shall be drilled to smaller size and reamed after assembly.

#### **1904.5.5 Holes for High Strength Friction Grip Bolts**

All holes shall be drilled after removal of burrs. Where the number of plies in the grip does not exceed three, the diameters of holes shall be 1.5 mm larger than those of bolts. Where the number of plies in the grip exceeds three, the diameters of holes shall be as follows, unless otherwise specified by the Engineer:

- in outer plie 1.5 mm larger than diameter of bolts
- in inner plies not less than 1.5 mm and not more than 3.0 mm larger than diameter of bolts



#### **1904.5.6 Removal of Burrs**

The work shall be taken apart after drilling and all burrs left by drilling and the sharp edges of all rivet holes completely removed.

#### **1904.6 Rivets and Riveting**

1904.6.1 The riveting shall be done by hydraulic or pneumatic machine unless otherwise specified by Engineer. The driving pressure shall be maintained on the rivets for a short time after the upsetting is completed.

1904.6.2 The diameter of rivets shown on the drawings shall be the size before heating. Each rivet shall be of sufficient length to form a head of the standard dimensions as given in IS handbook on Steel Sections, Part-1. The underside of the head shall be free from burrs.

1904.6.3 The tolerance on the diameter of rivets shall be in accordance with IS:1148 for mild steel rivets and IS:1149 for high tensile steel rivets. Unless otherwise specified, the tolerance shall be minus.

1904.6.4 When countersunk head is required, the head shall fill the countersunk hole and projection after countersinking shall be ground off wherever necessary. The included angle of the head shall be as follows:

- a) For plates over 14 mm thickness - 90 degree
- b) For plates upto and including 14 mm thickness - 120 degree

1904.6.5 Mild steel rivets shall be heated uniformly to a light cherry red colour between 650°C to 700°C for hydraulic riveting and orange colour for pneumatic riveting. High tensile steel rivets shall be heated up to 1100°C. The rivets shall be red hot from head to the point when inserted and shall be upset in its entire length so as to fill the hole as completely as possible when hot. After being heated and before being inserted in the hole, the rivet shall be made free from scale by striking it on a hard surface. Any rivet whose point is heated more than the prescribed limit, shall not be driven.

Where flush surface is required, any projecting metal shall be chipped or ground off.

1904.6.6 Before riveting is commenced, the parts/members to be riveted shall be firmly drawn together with bolts; clamps or tack welds so that the various sections and plates are in close contact throughout. Every third hole of the joint shall have assembly bolts till riveted. Drifts shall only be used for drawing the work into position and shall not be used to such an extent as to distort the holes. Drifts of a larger size than the nominal diameter of the hole shall not be used.





1904.6.7 Driven rivets, when struck sharply on the head by a quarter pound rivet testing hammer, shall be free from movement and vibrations. Assembled riveted joint surfaces, including those adjacent to the rivet heads, shall be free from, dirt, loose scale, burrs, other foreign materials and defects that would prevent solid seating of parts.

1904.6.8 All loose or burnt rivets, rivets with cracked or badly formed defective heads or rivets with heads which are unduly eccentric with the shanks, shall be removed and replaced. In removing rivets, the head shall be sheared off and the rivet punched out so as not to damage the adjacent metal. If necessary, the rivets shall be drilled out. Re-cupping or re-caulking shall not be permitted. The parts not completely riveted in the shop shall be secured by bolts to prevent damage during transport and handling.

#### **1904.7 Bolts, Nuts and Washers**

##### **1904.7.1 Black Bolts (Black All Over)**

Black bolts are forged bolts in which the shanks, heads and nuts do not receive any further treatment except cutting of screw threads. They shall be true to shape and size and shall have the standard dimensions as shown on the drawings.

##### **1904.7.2 Close Tolerance Bolts**

Close tolerance bolts shall be faced under the head and turned on the shank.

##### **1904.7.3 Turned Barrel Bolts**

The diameter of the screwed portion of turned barrel bolts shall be 1.5 mm smaller than the diameter of the barrel unless otherwise specified by the Engineer. The diameter of the bolts as given on the drawing shall be the nominal diameter of the barrel. The length of the barrel shall be such that it bears fully on all the parts connected. The threaded portion of each bolt shall project through the nut by at least one thread. Faces of heads and nuts bearing on steel work shall be machined.

##### **1904.7.4 High. Strength Friction Bolts and Bolted Connections**

The general requirement shall be as per relevant IS Specifications mentioned in Clause 1903.2.2. Unless otherwise specified by the Engineer, bolted connections of structural joints using high tensile friction grip bolts shall comply with requirements mentioned in IS:4000.

##### **1904.7.5 Washers**



In all cases where the full bearing area of the bolt is to be developed, the bolt shall be provided with a steel washer under the nut of sufficient thickness to avoid any threaded portion of the bolt being within the thickness of the parts bolted together and to prevent the nut when screwed up, from bearing on the bolt.

For close tolerance or turned barrel bolts, steel washers whose faces give a true bearing shall be provided under the nut. The washer shall have a hole diameter not less than 1.5 mm larger than the barrel and thickness not less than 6 mm so that the nut, when screwed up, Will not bear on the shoulder of the bolt.

Taper washer, with correct angle of taper, shall be provided under all heads and nuts bearing on bevelled surfaces.

Spring washers may be used under nuts to prevent slackening of the nuts when excessive vibrations occur.

Where the heads or nuts bear on timber, square washers having a length of each side not less than three limes the diameter of bolts or round washers having a diameter of 3% times the diameter of bolts and with a thickness not less than one quarter of diameter, shall be provided.

#### **1904.7.6 Studs**

Ordinary studs may be used for holding parts together, the holes in one of the parts being tapped to take the thread of the stud. Countersunk studs may be used for making connections where the surfaces are required to be clear of all obstruction, such as protruding heads of bolts or rivets. Studs may also be welded on the steel work in the positions required.

#### **1904.7.7 Service Bolts**

Service bolts shall have the same Clearance.as black bolts and where it is required that there should be no movement prior to final riveting, sufficient drifts or close tolerance bolts shall be used to locate the work.

#### **1904.7.8 Tightening Bolts**

Bolted connection joints with black bolts and high strength bolts shall be inspected for compliance of codal requirements.

All joint surfaces for bolted connection including bolts, nuts and washers shall be free of scale, dirt, burrs, other foreign material and other defects that would prevent solid seating of parts. The slope of surface of bolted parts in contact



with bolt head and nuts shall not exceed 1:20 plane normal to bolt axis; otherwise suitable tapered washer shall be used.

All fasteners shall have a washer under nut or bolt head, whichever is turned in tightening. Each fastener of joint shall be tightened to specified value or to 70 percent of specified minimum tensile strength by hand wrenches (turn of nut method) or calibrated wrenches, manual torque wrenches, impact wrench or any other method specified by the Engineer.

When 'turn of nut' method is used for tightening the bolts in a joint, all bolts shall be first brought to snug-tight condition i.e. tightening by full manual effort using ordinary wrench or by a few impacts of any impact wrench. All bolts in the joint shall then be tightened additionally by applicable amount of nut rotation as specified in 18:4000.

The Engineer shall observe the installation and tightening of bolts to ensure that correct tightening procedure is used and all bolts are tightened. Regardless of tightening method used, tightening of bolts in a joint should commence at the most rigidly fixed or stiffer point and progress towards the free edges, both in initial snugging and in final tightening.

The tightness of bolts in connection shall be checked by inspection wrench, which can be torque wrench, power wrench or calibrated wrench:

Tightness of 10 percent bolts, but not less than two bolts, selected at random in each connection shall be checked by applying inspection torque. If no nut or bolt head is turned by this application, connection can be accepted as properly tightened, but if any nut or head has turned, all bolts shall be checked and, if necessary, re-tightened.

#### **1904.7.9 Drifts**

The barrel shall be drawn or machined to the required diameter for a length of not less than one diameter over the combined thickness of the metal through which the drifts have to pass. The diameter of the parallel barrel shall be equal to the nominal diameter of the hole subject to a tolerance of +0 mm and -0.125 mm. Both ends of the drift for a length equal to 1Y2 times the diameter of the parallel portion of the bar, shall be turned down with a taper to a diameter at the end equal to one-half that of parallel portion.

#### **1904.8 Pins and Pin Holes**

##### **1904.8.1 Pins**



The pins shall be parallel throughout and shall have a smooth surface free from flaws. They shall be of sufficient length to ensure that all parts that they connect, shall have a full bearing on them. Where the ends are threaded, they shall be turned to a smaller diameter at the ends for the thread and shall be provided with a pilot nut, where necessary, to protect the thread when being drawn to place. To facilitate insertion and extraction, pins may be chamfered beyond the required length and provided with suitable holes in the chamfered portion.

Pins more than 175 mm in length or diameter shall be forged and annealed.

#### **1904.8.2 Pin Holes**

Pin holes shall be bored smooth, straight and true to gauge at right angles to the axis of the member and parallel with each other, unless otherwise required. The tolerance in the length of tension members from outside to outside of pin holes and of compression members from inside to inside of pin holes shall be 1 mm. In built-up members, the boring shall be done only after the members have been finally riveted, welded or bolted unless otherwise approved by Engineer.

The specified diameter of the pin hole shall be its minimum diameter. The resulting clearance between the pin and the hole shall not be less than 0.5 mm and not more than 1 mm.

#### **1904.9 Shop Erection and Match Marking**

Before being dispatched, the steel work shall be temporarily erected in the fabrication shop for inspection by the Engineer either wholly or in such portion as the Engineer may require, so that he may be satisfied in respect of both the alignment and fit of all connections. For this purpose; sufficient number of parallel drifts and service bolts tightly screwed up, shall be employed. All parts shall fit accurately and be in accordance with drawings and specifications.

The steel work shall be temporarily assembled at place of fabrication. Assembly shall be of full truss or girder, unless progressive truss or girder assembly, full chord assembly, progressive chord assembly or special complete structure assembly, is specified by the Engineer.

The camber diagram showing camber at each panel point, method of shop assembly and any other relevant detail shall be submitted to Engineer for approval.

The field connections of main members of trusses, arches, continuous beams, spans, bents, plate girders and rigid frame shall be assembled, aligned and



accuracy of holes and camber checked by the Engineer. Only thereafter shall reaming of sub-sized holes to specified size, be taken up.

The assembly shall be dismantled only after final drilling of holes has been completed and the work has been passed by the Engineer. Before dismantling each part shall be carefully marked for re-erection with distinguishing marks and stamped with durable markings. Drawings showing these markings correctly shall be supplied to the Engineer.

Unloading, handling and storage of steel work as per these Specifications shall be the responsibility of the Contractor. The cost of repairs, removal of rejected material, and transportation of replacement material to the site, shall be borne by the Contractor.

In cases where close tolerance or turned barrel bolts are used and interchangeability is not insisted upon, each span shall be erected and its members marked distinctly.

#### **1904.10 Welding**

1904.10.1 All welding shall be done with the prior approval of the Engineer and the workmanship shall conform to the specifications of the relevant Indian Standards as appropriate.



When material thickness is 20 mm or more, special precautions like pre-heating shall be taken as laid down in IS:9595. Surfaces and edges to be welded shall be smooth, uniform and free from fins, tears, cracks and other discontinuities. Surface shall also be free from loose or thick scale, slag rust, moisture, oil and other foreign materials. Surfaces within 50 mm of any weld location shall be free from any paint or other material that may prevent proper welding or cause objectionable fumes during welding.

The general welding procedures including particulars of the preparation of fusion faces for metal arc welding, shall be carried out in accordance with IS:9595.

The welding procedures for shop and site welds including edge preparation of fusion faces shall be as per details shown on the drawings and shall be submitted in writing for the approval of the Engineer, in accordance with Clause 22 of IS:9595, before commencing fabrication.

Any deviation from this procedure has to be approved by the Engineer. Preparation of edges shall, wherever practicable, be done by machine methods.

Machine flame cut edges shall be substantially as smooth and regular as those produced by edge planing and shall be left free of slag. Manual flame cutting shall be permitted by the Engineer only where machine cutting is not practicable.

Electrodes to be used for metal arc welding shall comply with relevant Indian Standards mentioned in Clause 1903.2.3. Procedure test shall be carried out as per IS:3613 to find out suitable wire-flux combination for welded joint.

Assembly of parts for welding shall be in accordance with provisions of Clauses 14 to 16 of IS:9595.

Welded temporary attachment should be avoided as far as possible. If unavoidable the method of making any temporary attachment shall be as approved by the Engineer. Any scars from temporary attachment shall be removed by cutting and chipping and surface shall be finished smooth by grinding to the satisfaction of the Engineer.

Welding shall not be carried out when the air temperature is less than 10°C, when the surfaces are wet, during periods of strong winds and in snowy weather, unless the work and the welding operators are adequately protected.

- 1904.10.2 For welding of any particular type of joint, welders shall undergo the appropriate welders qualification test as prescribed in any of the relevant Indian Standards IS:817, IS:1966, IS:1393, IS:7307 (Part 1), IS:7310 (Part I) and IS:7318 (Part I) to the satisfaction of the Engineer.



1904.10.3 In assembling and joining parts of a structure or of built-up members the procedure and sequence of welding shall be such as to avoid distortion and minimize shrinkage stress.

All requirements regarding pre-heating of parent material and inter pass temperature shall be in accordance with provisions of IS:9595.

1904.10.4 Peening of weld shall be carried out wherever specified by the Engineer:

- a) If specified, peening may be employed to be effective on each weld layer except the first filling layer.
- b) After weld has cooled, the peening should be carried out by light blows from a power hammer using a round nosed tool. Care shall be taken to prevent scaling or flaking of weld and base metal from over peening.

1904.10.5 Where the Engineer has specified that the butt welds are to be ground flush, the loss of parent metal shall not be greater than that allowed for minor surface defects. The ends of butt joints shall be welded so as to provide full throat thickness. This may be done by use of extension pieces, cross runs or other means approved by the Engineer. Extension pieces shall be removed after the joint has cooled and the ends of the weld shall be finished smooth and flush with the faces of the abutting parts.

1904.10.6 The following joints and welds which do not perform well under cyclic loading, are prohibited.

- a) Butt joints not fully welded throughout their cross-section
- b) Groove welds made from one side only without any backing grip
- c) Intermittent groove welds
- d) Intermittent fillet welds
- e) Bevel-grooves and J-grooves in butt joints for other than horizontal position
- f) Plug and slot welds

1904.10.7 The run-on and run-off plate extension shall be used for providing full throat thickness at the end of butt welded joints. These plates shall comply with the following requirements.

- i) One pair of run-on and one pair of run-off plates prepared from same thickness and profile as the parent metal shall be attached to start and finish of all butt welds, preferably by clamps.
- ii) When run-on and run-off plates are removed by flame cutting, they shall be cut at more than 3 mm away from the parent metal and the remaining



metal of the plates shall be removed by grinding or by any other method approved by the Engineer.

#### 1904.10.8 Welding of Stud Shear Connectors

The stud shear connectors shall be welded in accordance with the manufacturer's instructions including those relating to pre-heating.

The stud and the surface to which it is to be welded shall be free from scale, moisture, rust and other foreign material. The stud base shall not be painted, galvanised or cadmium plated prior to welding.

The welds shall be visually free from cracks and shall be capable of developing at least the nominal ultimate strength of studs.

The procedural trial for welding the stud shall be carried out when specified by the Engineer.

#### 1904.11 Tolerances

Tolerances in dimensions of components of fabricated structural steel work shall be specified on the drawings and shall be subject to the approval of the Engineer before fabrication. Unless otherwise specified, all parts of an assembly shall fit together accurately within tolerances specified in Table 1900-2.

A machined bearing surface, where specified by the Engineer, shall be machined within a deviation of 0.25 mm for surfaces that can be inscribed within a square of side 0.5 m.

**Table 1900-2 : Fabrication Tolerances -Individual Components**

1)	Length		
	a)	Member with both ends finished for contact bearing	± 1 mm
	b)	Individual components of members with end plate connection	+0mm l
	c)	Other members of length i) Upto and including 12 M ii) Over 12M	±2mm ±3.5mm
2)	Width		
	a)	Width of built-up girders	±3mm
	b)	Deviation in the width of members required to be inserted in other members	+0mm -3mm





3)	Depth		
	Deviation in .the depths of solid web and open web girders		+3mm -2mm
4)	Straightness		
	a)	Deviation from straightness of colum.n.s	L/3000 subject to maximum of 15 mm where L is length of member
		i) in elevation ii) In plan	+5mm -0mm L/1000 subject to a maximum of 10 mm
5)	Deviation of centre line of web from centre line of flanges in built-up members at contact surface		3mm -
6)	Deviation from flatness of plate of webs of built- up members in a length equal to the depth of the members		0.005 d to a maximum of 2 mm where d is depth of the member
7)	Tilt of flange of plate girders		
	a)	At splices and stiffeners, at supports, at the top flanges of plate girders and at bearings	0.005 b to a minimum of 2 mm where b is width of the member
	b)	at other places	0.015 b to a maximum of 4 mm where b is width of the member
8)	Deviation fromsquareness of flange to web of columns and box girders		U/1000, where L is nominal length of the diagonal
9)	Deviation from squareness of fixed base plate (not machined) . to axis of columns.- This dimension shall be measured parallel to the longitudinal axis of the column at points where the outer surfaces of the column sections make contact with the base plate		D/500, where Dis the distance from the column axis to the poinfunder consideration on the base plate
10)	Deviation from squareness of machined ends to axes of columns		D/1000, where D is as defined in 9 above
11)	Deviation from squareness of machined ends to axes of beams		D/1000, where Dis as defined in 9 above
12)	Ends of members abutting at joints through cleats or end plates, permissible deviation from squareness of ends		1/600 of depth of member subject to a maximum of 1.5mm.

#### 1904.12 Annealing and Stress Relieving

The members to be annealed or stress relieved as indicated in the contract or specified by Engineer, shall have finish machining, boring, etc., done subsequent



to heat treatment. The stress relief treatment shall conform to the following unless otherwise specified by Engineer:

- a) The temperature of the furnace shall not be more than 300°C at the time welded assembly is placed in it.
- b) The rate of heating shall not be more than 220°C per hour divided by maximum metal thickness, subject to maximum of 220°C per hour.
- c) After maximum temperature of 600°C is reached, the assembly shall be held within specified limit of time based on weld thickness. The temperature shall be maintained uniformly throughout the furnace during holding period such that temperature at no two points on the member will differ by more than 80°C.



- d) The cooling shall be done in closed furnace When temperature is 300°C, at the maximum rate of 260°C per hour divided by maximum metal thickness. The local stress relieving shall be carried out if specified and procedure approved by Engineer.

#### **1904.13 Rectification of Surface Defects**

The surface defects revealed during fabrication or cleaning shall be repaired as specified. The repair by welding on any surface defect or exposed edge lamination shall be carried out only with approval of Engineer.

#### **1904.14 Alignment at Splice and Butt Joints**

Bolted splice shall be provided with steel packing plates where necessary, to ensure that the sum of any unintended steps between adjacent surfaces. does not exceed 1 mm for HSFG bolted joints and 2 mm for other joints.

In welded butt joints, misalignment of parts to be joined shall not exceed the lesser of 0.15 times the thickness of thinner part or 3 mm. However, if due either to different thicknesses arising from rolling tolerances or a combination of rolling tolerances with above permitted misalignment, this deviation is more than 3 mm, it shall be smoothed by a slope not steeper than 1:4.

### **1905 ERECTION**

#### **1905.1 General**

These provisions shall apply to erection of steel bridge superstructures or steel main members of bridge superstructures, which span between supports.

If the substructure and the superstructure are built under separate contracts, the Employer will provide the substructure, constructed to correct lines, dimensions and elevations properly finished and will establish the lines and the elevation required for erection purposes.

The Contractor shall erect the structural steel, remove the temporary construction and do all work required to complete the construction included in the contract, in accordance with the drawings and the specifications and to the entire satisfaction of the Engineer.

#### **1905.2 Organisation and Equipment**

The Contractor shall submit erection plans prepared by the fabricator showing the method and procedure of erection, compatible with the details of fabrication.



A detailed scheme shall be prepared showing stage-wise activities, with complete drawings and working instructions. This should be based on detailed stage-wise calculations taking into account specifications and capacity of erection equipment machinery, tools and tackles to be used and temporary working loads as per codal provisions.

The scheme shall also take into account site conditions such as hydrology, rainfall, flood timings and intensity, soil and subsoil conditions in the river bed and banks, maximum water depth, temperature and climatic conditions and available working space.

The scheme shall indicate details of materials required with specifications, quantities, type of storage, etc. It shall also indicate precisely the type of temporary fasteners to be used as also the minimum percentage of permanent fasteners to be fitted during the stage erection. The working drawings should indicate clearly the temporary jigs, fixtures, clamps spacer supports, etc.

All components of the bridge shall be got checked for their adequacy to take care of temporary forces to which they are subjected during erection so as to ensure safety of the structure at all stages of erection.

Unless otherwise provided in the contract, the Contractor shall supply and erect all necessary false-work and staging and shall supply all labour, tools, erection plant and other materials necessary to carry out the work complete in all respects.

The Contractor shall supply all rivets, bolts, nuts, washers, etc. required to complete erection at site with an allowance for wastage of 12% percent of the net number of field rivets, bolts, washers required, or a minimum of five numbers of each item.

Service bolts and nuts, washers and drifts for use in erection shall be supplied at 60 percent (45 percent bolts and 15 percent drifts) of the number of field rivets per span in each size (this includes wastage). A reduction in the numbers of service bolts, etc., may however, be specified by the Engineer if more than one span of each type is ordered.

Prior to actual commencement of erection, all equipment, machinery, tools, tackles, ropes, etc. need to be tested to ensure their efficient working. Frequent visual inspection of vulnerable areas is essential to detect displacements, distress, damages, etc.



Deflection and vibratory tests shall be conducted on supporting structures, launching truss and also the structure under erection. Any unusual deviation or looseness of fittings is to be noted and reviewed.

For welded structures, welders' qualifications and skills are to be checked as per standard norms. Non-destructive tests of joints are to be carried out as per designer's directives.

Precision non-destructive testing instruments should be used for frequent checking of various important parameters of the structures and systematic records should be maintained.

Safety requirements shall conform to IS:7205, IS:7273 and IS:7269 as applicable and all aspects of safety commensurate with economy and speed of construction, shall be considered.

Erection work should start with complete resources mobilized as per latest approved drawings and after a thorough survey of foundations and other related structural work. For works of large magnitude mechanization is to be adopted to the maximum extent possible.

The structure should be divided into erectable modules as per the scheme. The module should be pre-assembled in a suitable yard or platform and its matching with members of the adjacent module checked by trial assembly before erection.

The structure shall be set out to the required lines and levels. The steelwork should be erected, adjusted and completed in the required position to the specified lines and levels with sufficient drifts and bolts. Packing materials shall be available to maintain this condition. Quality surveillance checks need to be carried out frequently.

Before starting work, the Contractor shall obtain necessary approval of the Engineer for the methodology/procedure of erection, drawings of temporary works use of erection equipments and the number and character of tools and plant. The approval of the Engineer shall not relieve the Contractor of his responsibility for the safety of his methodology and equipment or from carrying out the work fully in accordance with the drawings and specifications.

During execution, the Contractor shall have a competent engineer or foreman in charge of the work, who has adequate experience in steel erection and is acceptable to the Engineer.

### **1905.3 Handling and Storing of Materials**



Suitable area for storage of structures and components shall be located near the site of work. The access road should be free from water logging during the working period and the storage area should be on firm levelled ground.

The store should be provided with adequate handling equipment viz. mobile crane, gantries, derricks, chain pulley blocks, winch etc., of capacity as required. Stacking area should be planned and have racks, stands sleepers, access tracks etc. and proper lighting.

Storage should be planned to suit erection work sequence and avoid damage or distortion of material. Excessively rusted, bent or damaged steel shall be rejected. Methods of storage and handling steel, whether fabricated or not, shall be subject to the approval of the Engineer.

Fabricated materials are to be stored with erection marks visible. They should not come into contact with earth surface or water and should be accessible to handling equipment.

All materials, consumables, including raw steel or fabricated material shall be stored specification-wise and size-wise above the ground upon platforms, skids or other supports. They shall be kept free from dirt and other foreign matter and shall be protected as far as possible from corrosion and distortion. Electrodes shall be stored specification-wise and shall be kept in dry warm condition in properly designed racks. The bolts, nuts, washers and other fasteners shall be stored in gunny bags on racks above the ground with protective oil coating. Paint shall be stored under cover in air-tight containers. Small hand tools shall be kept in containers in covered stores.

IS:7293 and IS:7969 dealing with handling of materials and equipment for safe working should be followed. Safety nuts and bolts as directed are to be used while working. The Contractor shall be held responsible for loss or damage to any material paid for by the Employer while in his care or for any damage to such material resulting from his work.

#### **1905.4 Formwork**

The formwork shall be properly designed, substantially built and maintained for all anticipated loads. The Contractor, if required, shall submit plans for approval to the Engineer. Approval of the plans, however, shall not relieve the Contractor of his responsibility for adequacy and effective performance of the formwork.

#### **1905.5 Assembling Steel**

The parts shall be accurately assembled as shown on the drawings and match marks shall be followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged.



Hammering which will injure\_ or distort the members shall not be done. Bearing surface or surfaces to be in permanent contact shall be cleaned, before the members are assembled. The truss spans shall be erected on blocking, so placed as to give the proper camber. The blocking shall be left in place until the tendon chord splices are fully riveted and all other truss connections pinned and bolted. Rivets in splices of butt joints of compression members and rivets in railings shall not be driven until the span has been swung.

All joint surface for bolted connections including bolts, nuts, washers shall be free from scale, dirt, burrs, other foreign materials and defects that would prevent solid seating of parts. The slope of surface of bolted parts in contact with bolt head and nut shall not exceed 1 in 20, in a plane normal to bolt axis; in case it does, suitable tapered washer shall be used.

All fasteners shall have a washer under nut or bolt head, whichever is turned in tightening. Any connection to be riveted or bolted shall be secured in close contact with service bolts or with a sufficient number of permanent bolts before the rivets are driven or before the connections are finally bolted. Joints shall normally be made by filling not less than 50 percent of holes with service bolts and barrel drifts in the ratio 4:1. The service bolts are to be fully tightened as soon as the joint is assembled. Connections to be made by close tolerance or barrel bolts shall be completed as soon as practicable after assembly.

Any connection to be site welded shall be securely held in position by approved methods to ensure accurate alignment, camber and elevation before welding is commenced.

Field riveting, welding, bolting and pin connections shall conform to the requirements of Clause 1904 as appropriate.

The correction of minor misfits involving harmless amounts of reaming, cutting and chipping will be considered a legitimate part of erection. However, any error in the shop fabrication or deformation resulting from handling and transportation which prevents proper assembling and fitting up of parts by moderate use of drifts or by a moderate amount of reaming and slight chipping or cutting, shall be reported immediately to the Engineer. In such cases, the method of correction shall be approved by the Engineer and carried out in his presence.

## **1905.6 Field Inspection**

### **1905.6.1 General**

All materials equipment and work of erection shall be subject to the inspection of the Engineer who shall be provided with all facilities required for this



purpose, including labour and tools, at all reasonable times. Any work found defective is liable to be rejected.

1905.6.2 No protective treatment shall be applied to the work until the appropriate inspection and testing have been carried out. The stage inspection shall be carried out for all operations so as to ensure correctness of fabrication and good quality. Girder dimensions and camber shall not be finally checked until all welding and heating operations are completed and the member has cooled to a uniform temperature.

### **1905.6.3 Testing of Material**

Structural steel shall be tested for mechanical and chemical properties as per appropriate Indian Standards as may be applicable and shall conform to requirements specified in IS:226, IS:2062, IS:11587, IS:181977, IS:8500 and IS:961.

Rivets, bolts, nuts, washers, welding consumables, steel forging, casting and stainless steel shall be tested for mechanical and chemical properties in accordance with the appropriate Indian Standards.

Rolling and cutting tolerance shall be as per IS:1852. The thickness tolerance check measurements for plates and rolled sections shall be taken at not less than 15 mm from edge.

Check for laminations in plates shall be carried out for areas specified in Clause 1904.2, by ultrasonic testing or any other specified method. Flame cut edges without visual signs of laminations need not be tested for compliance with Clause 1904.2, unless otherwise specified by Engineer.

Steel work shall be inspected for surface defects and exposed edge laminations during fabrication and blast cleaning. Significant edge laminations found shall be reported to the Engineer for his decision.

Chipping, grinding machining or ultrasonic testing shall be used to determine depth of imperfection.

### **1905.6A Testing of Connections**

#### **1905.6.4.1 Bolted Connections**

Bolts and bolted connection joints with high strength friction grip bolts, shall be inspected and tested according to IS:4000.

Bolted connection joints with black bolts and high strength bolts shall be inspected and tested for compliance or requirements mentioned in Clause 1904.7.8.





#### **1905.6.4.2 Riveted Connections**

Rivets and riveted connection shall be inspected as per Clause 1904.6 and tested for compliance of codal requirements.

The firmness of joint shall be checked by 0.2 mm filler gauge, which shall not go inside under the rivet head by more than 3 mm. There shall not be any gap between members to be riveted.

Driven rivets shall be checked with rivet testing hammer. When struck sharply on the head with the hammer, the rivet shall be free from movement and vibration. All loose rivets and rivets with cracks, badly formed or deficient heads or with heads which are eccentric with shanks, shall be cut out and replaced.

The alignment of plates at all bolted splice joints and welded butt joints shall be checked for compliance with codal requirements.

Testing of flame cut and sheared edges is to be done, where the hardness criteria given in the code are adopted. Hardness testing shall be carried out on six specimens.

#### **1905.6.4.3 Welded Connections**

Welding procedure, welded connections and testing shall be in compliance with codal requirements.

Welders qualification test shall be carried out as per requirements laid down in 18:7318 (Part 1). For approved welding procedures, the approval tests shall be as per requirements of 18:7310 (Part 1).

All facilities necessary for stage inspection during welding and on completion shall be provided to the Engineer or his inspecting authority by fabricator.

Adequate means of identification (either by identification mark or other record) shall be provided to enable each weld to be traced to the welder(s) by whom its welding was carried out.

All metal arc welding shall be in compliance with 18:9595 provisions.

The method of inspection shall be in accordance with IS:822 and extent of inspection and testing shall be in accordance with the relevant standards or as agreed with the Engineer.

#### **1905.7 Procedure tests for Welds**



The destructive and non-destructive test of weld shall be carried out according to IS:7307 (Part 1).

### **1905.7.1 Non-Destructive Testing of Welds**

One or more of the following methods may be applied for inspection or testing of weld :

- i) Visual Inspection: All welds shall be visually inspected, to cover all defects of weld such as size, porosity, crack in the weld or in the HAZ (Heat Affected Zone) etc. Suitable magnifying glass may be used for visual inspection. A weld shall be acceptable by visual inspection if it is seen that:
  - a) The weld has no cracks.
  - b) Thorough fusion exists between weld and base metal and between adjacent layers of weld metal.
  - c) Weld profiles are in accordance with relevant Clauses of IS:9595 or as agreed with the Engineer.
  - d) The weld is of full cross section, except for the ends of intermittent fillet welds outside their effective length.
  - e) When weld is transverse to the primary stress, undercut shall not be more than 0.25 mm deep in the part that is undercut. When the weld is parallel to the primary stress, undercut shall not be more than 0.8 mm deep in the part that is undercut.
  - f) The fillet weld in any single continuous weld shall be permitted to under run the nominal fillet weld size specified by 1.6 mm without correction, provided that the undersized portion of the weld does not exceed 10 percent of the length of the weld. On the web-to-flange welds of girders, no under-run is permitted at the ends for a length equal to twice the width of the flange.
  - g) The piping porosity in fillet welds shall not exceed one in each 100 mm of weld length and the maximum diameter shall not exceed 2.4 mm, except for fillet welds connecting stiffeners to web, where the sum of diameters of piping porosity shall not exceed 9.5 mm in any 25 mm length of weld and shall not exceed 19 mm in any 300 mm length of weld.



- h) The full penetration groove weld in butt joints transverse to the direction of computed tensile stress, shall have no piping porosity. For all other groove welds, the piping porosity shall not exceed one in 100 mm of length and the maximum diameter shall not exceed 2.4 mm.
- ii) Magnetic Particle and Radiographic Inspection : Welds that are subject to radiographic or magnetic particle testing in addition to visual inspection, shall have no crack.

Magnetic particle test shall be carried out according to IS:5334 for detection of crack and other discontinuity in the weld.

Radiographic test shall be carried out for detection of internal flaws in the weld such as crack, piping porosity inclusion, lack of fusion, incomplete penetration etc. This test may be carried out as per 18:1182 and 18:4853.

- iii) Ultrasonic Inspection : Ultrasonic testing, in addition to visual inspection, shall be carried out for detection of internal flaws in the weld such as cracks, piping porosity inclusion, lack of fusion, incomplete penetration, etc. Acceptance criteria shall be as per 18:4260 or any other relevant IS Specification and as agreed to by the Engineer.

Bearing stiffeners or bearing diaphragms adjacent to welds, flange plates adjacent to web/flange welds, plates at cruciform welds, plates in box girder construction adjacent to corner welds or other details where specified by the Engineer, shall be ultrasonically tested after fabrication.

- iv) Liquid Penetration Inspection: The liquid penetrant test in addition to visual inspection shall be carried out for detection of surface defect in the weld, as per 18:3658.
- v) Non-destructive testing of the following welds shall be carried out using any of the methods described at (ii), (iii) and (iv) above, as may be agreed to by the Engineer.
- a) All transverse butt welds in tension flanges
  - b) 10 percent of the length of longitudinal and transverse butt welds in tension flanges.
  - c) 5 percent of the length of longitudinal and transverse butt welds in compression flanges.
  - d) All transverse butt welds in webs adjacent to tension flanges as specified by the Engineer.



The particular length of welds in webs to be tested shall be agreed with the Engineer, in case (b) or (c).

Any lamination, lamellar tearing or other defect found shall be recorded and reported to the Engineer for his decision.

### **1905.7.2 Testing of Welds for Cast Steel**

The testing of weld for cast steel shall be carried out as agreed to and directed by the Engineer.

### **1905.7.3 Stud Shear Connectors**

Stud shear connectors shall be subjected to the following tests:

- a) The fixing of studs after being welded in position shall be tested by striking the side of the head of the stud with a 2 kg hammer to the satisfaction of the Engineer.
- b) The selected stud head shall not show displacement of more than 0.25 times the height of the stud, from its original position, if struck once with a 6 kg hammer. The stud weld shall not show any sign of a crack or lack of fusion.

The studs whose welds have failed the tests given in (a) and (b) shall be replaced.

### **1905.7.4 Inspection of Members**

#### **1905.7.4.1 Inspection Requirement**

The fabricated member/component made out of rolled and built-up section shall be checked for compliance of the tolerances given in Table 1900-2. Inspection of member/components for compliance with tolerances, and the check for deviations shall be made over the full length.

During checking, the inspection requirement shall be indicated in such a manner that local surface irregularities do not influence the results.

For plate, out-of-plane deviation shall be checked at right angle to the surface over the full area of plate.

The cross girder or cross frame deviation shall be checked over the middle third of its length between each pair of webs and at the end of member for cantilever.



The web of rolled beam or channel section shall be checked for out-of-plane deviation in a longitudinal direction over a length equal to the depth of the section.

During inspection, the component/member shall not have any load or external restraint.

#### **1905.7.4.2 Inspection Stages**

The stages of inspection to be carried out for compliance of tolerances shall include, but not be limited to, the following:

- a) For completed parts, component/members - on completion of fabrication and before any subsequent operation such as surface preparation, painting, transportation, erection.
- b) For webs of plate and box girder, longitudinal compression flange stiffeners in box girders and orthotropic decks and all web stiffeners at site joints - on completion of site joint.
- c) For cross girders and frames, cantilevers in orthotropic decks and other parts in which deviations have apparently increased - on completion of site assembly.

Where, on checking member/component for out-of-plane or out-of-straightness at right angles to the plate surface, and any other instances, the deviation exceeds the tolerance, the maximum deviation shall be measured and recorded. The record shall be submitted to the Engineer who will determine whether the component/member may be accepted without rectification, accepted with rectification or rejected.

Measurement shall be in MT of steel work.

Rate includes all labour, material, cutting, hoisting, fixing in position and applying primer coat of red lead paint.

#### **DTS No. 44**

**Providing and fixing Post and Pipe railing as per detailed drawing including 3 coats of painting to steel works complete.**

1. GI pipe shall be of light duty type. Concrete shall conform to relevant specifications of item of concrete of ordinary grade specified in the item. For structural steel relevant specifications of item of steel cutting edge and for mild steel, relevant specifications of item no. of MS reinforcement shall apply.
2. The pipe railing shall consist of RCC posts of required dimensions as approved by the Engineer in charge or structural steel sections as shown on the drawings. The structural



section shall be anchored to RCC in the manner as directed by the Engineer in charge. Three rows of GI pipe, upper one of 50 mm dis. and lower two of 40 mm diameter shall be provided. Holes of required size shall be made in the posts and the pipe shall be fixed with necessary couplings and three coats of enamel paint shall be applied to iron work (first coat shall be of red lead) if RCC posts are used, they shall be applied 2 coats of white wash. The posts shall be fixed at 2 m to 2.5 m centre of centre depending upon the span length.

3. Railing shall be measured in running meter.
4. Unit rate includes costs of all materials, labour, tools and plant to complete the job.



## DTS No. 45

Providing and casting in situ controlled concrete of M-20 grade for RCC work in super structure including curing, vibrating, compacting, finishing etc. complete.

### (i) deck Slab(Precast)

#### 2307 TOLERANCES

##### 2307.1 Precast Concrete Superstructure

- |    |   |  |
|----|---|--|
| a) | Variations in thickness of top and bottom slab for box girders, top and bottom flange for T-girders and slabs | $\pm 5$ mm to  |
| b) | Variations in web thickness   | -5 mm to +10 mm  |
| c) | Variations in overall depth or width  | $\pm 5$ mm   |
| d) | Variation in length overall and length between bearings   | shall not exceed $\pm 10$ mm or $\pm 0.1\%$ of the span length, which ever is less |
| e) | Permissible surface unevenness in deck slab when measured with a 3 m straight edge or template                | 5 mm   |

##### 2307.2 Cast In-Situ Superstructure

- |    |   |   |
|----|---|---|
| a) | Variations in thickness of top and bottom slab for box girders, top and bottom flange for T-girders and slabs | -5 mm to +10 mm   |
| b) | Variations in web thickness   | -5 mm to +10 mm   |
| c) | Variations in overall depth or width  | $\pm 5$ mm  |
| d) | Variation in length overall and length between bearings   | shall not exceed $\pm 10$ mm or $\pm 0.1\%$ of the span length, whichever is less |
| e) | Permissible surface unevenness in deck slab when measured with a 3 m straight edge or template                | 5 mm.   |

#### 2308 TESTS AND STANDARDS OF ACCEPTANCE

The materials shall be tested in accordance with these Specifications and shall meet the prescribed criteria.



The work shall conform to these Specifications and shall meet the prescribed standards of acceptance.





**2309 MEASUREMENT FOR PAYMENT**

Concrete in superstructure shall be measured in accordance with Section 1700, based on the quantity ordered or as shown on the drawings.

Steel reinforcement (untensioned) in superstructure shall be measured in accordance with Section 1600, based on the quantity ordered or as shown on the drawings.

High tensile steel (prestressing) in superstructure shall be measured in accordance with Section 1800, based on the quantity ordered or as shown on the drawings.

**2310 RATE**

The contract unit rates for concrete, steel reinforcement (untensioned) and high tensile steel (prestressing) shall include all works as given in respective Sections of these Specifications and cover all incidental items for furnishing and providing superstructure as mentioned in this Section and as shown on the drawings.

**DTS No. 46**

**Providing and placing in position TMT bar reinforcement Fe - 500 grade for Precast deck slab including cutting, bending, hooking, binding with 18 SWG annealed binding wire, placing in position, providing C.C. cover blocks in position to ensure required cover at time of concreting etc. complete as per detailed drawing & as directed by Engineer-in-Charge.**

**1601 DESCRIPTION**

This work shall consist of furnishing and placing coated or uncoated mild steel or high strength deformed reinforcement bars of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

**1602 GENERAL**

Steel for reinforcement shall meet the requirements of Section 1000 of these Specifications.

Reinforcements may be either mild steel or high strength deformed bars. They may be uncoated or coated with epoxy.

**1603 PROTECTION OF REINFORCEMENT**



Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or by thoroughly cleaning it using any suitable method such as sand blasting, mechanical wire brushing etc., as directed by the Engineer. Reinforcements shall be stored above the ground in a clean and dry condition, on blocks, racks or platforms and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete, with a brush coat of neat cement mixed with water to a consistency of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

In case of fusion bonded epoxy coated reinforcement or hot dipped galvanized bars used, reference shall be made Clause 1010.3.2 of Section 1000 of these specifications.

**1604 BENDING OF REINFORCEMENT**

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar Bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer using a proper bar bender, operated by hand or power to obtain the correct shape and radii of bends.

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work. They shall not be heated to facilitate straightening.

**1605 PLACING OF REINFORCEMENT**

- a) The reinforcement cage should generally be fabricated in the yard at ground level and then shifted and placed in position. The reinforcement shall be placed strictly in accordance with the drawings and shall be assembled in position only



when the structure is otherwise ready for placing of concrete. Prolonged time gap between assembling of reinforcement and casting of concrete, which may result in rust formation on the surface of the bars, shall not be permitted.

- b) Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.
- c) Bars shall be kept in position usually by the following methods:
  - i) In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover, shall be placed between the bars and formwork, subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.
  - ii) In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut in them accurately, or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed upto a level just below their location.
  - iii) Layers of reinforcements shall be separated by spacer bars at approximately one metre intervals. The minimum diameter of spacer bars shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.
  - iv) Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc. or other subsidiary reinforcement shall be provided to fix the reinforcement firmly in its correct position.
  - v) Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc., as devices for positioning reinforcement shall not be permitted.
- d) Bars coated with epoxy shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose. Refer Section 1000 of these Specifications for other requirements.
- e) Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concreting is commenced.



## **1606 BAR SPLICES**

### **1606.1 Lapping**

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, shall be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1.25 times the maximum size of coarse aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points along the span where stresses are low.

### **1606.2 Welding**

1606.2.1 Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

1606.2.2 While welding may be permitted for mild steel reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS:1786 shall in general be prohibited. Welding may be permitted in case of bars of other than Fe 240 grade including special welding grade of Fe 415 grade bars conforming to IS:1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula :

$$CE = c + \frac{Mn}{6} + \frac{Cr+Mg+V}{5} + \frac{Ni+Cu}{15}$$

is 0.4 or less.

1606.2.3 The method of welding shall conform to IS:2751 and IS:9417, any supplemental specifications and Clause 1904.8 of these Specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetylene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory joint performance. Precautions on overheating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.



All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V butt joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and shall be not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible, Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators and welding procedure, are adequate to produce and maintain uniform quality at par with that attainable in shop welding, to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall be qualified by tests prescribed in IS:2751. Inspection of welds shall conform to IS:822 and destructive or non-destructive testing may be undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in two or three stages, the surface shall be cleaned properly after each stage. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Only competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS:814.

1606.2.4 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 so staggered that at any one section, not more than 20 percent of the bars are welded.

1606.2.5 Specimens of welded pieces of reinforcement taken from the site shall be tested. The number and frequency of tests shall be as directed by the Engineer.

### **1606.3 Mechanical at Couplers and Anchorages**

#### **1606.3.1 Mechanical Couplers**



Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swaged on to bars in end to end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 percent of the characteristic strength of the reinforcement bar.

### **1606.3.2 Anchorages**

Bats may be anchored with approved patented mechanical anchorages as indicated on the drawing or as approved by the Engineer. The anchorages shall be connected to the reinforcing bar by the use of taper thread system. The anchorage shall be capable of developing the characteristic strength of reinforcement without damage to concrete and shall have sufficient diameter and width to develop adequate shear cone strength. The connection shall develop 125% of the characteristic strength of reinforcement bar.

### **1607 TESTING AND ACCEPTANCE**

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. Additional tests, if required, will be got carried out by the Contractor at his own cost.

The supply fabrication and placing of reinforcement shall be in accordance with these Specifications and shall be as checked and accepted by the Engineer.



Manufacturer's test certificate regarding compliance with Indian Standards for each lot of steel, shall be obtained and submitted to the Engineer. If required by the Engineer, the Contractor shall carry out confirmatory tests in the presence of a person authorized by the Engineer.

Cost of these tests shall be borne by the Contractor. The sampling and testing procedure shall be as laid down in IS:1786. If any test piece selected from a lot fails, no re-testing shall be done and the lot shall be rejected.

**1608 MEASUREMENT FOR PAYMENT**

Reinforcement shall be measured in length including hooks if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of IS:1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing, shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement.

**1609 RATE**

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, royalty, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings and as per these Specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the coating work as well as sampling, testing and supervision required for the work.

**DTS No. 47**

**PCC for Screed Decking**

**601 DRY LEAN CEMENT CONCRETE SUB-BASE**

**601.1 Scope**

601.1.1 The work shall consist of construction of (zero slump) dry lean concrete sub-base for cement concrete pavement in accordance with the requirements of these Specifications and in conformity with the lines, grades and cross-sections shown on the drawings or as directed by the Engineer. The work shall include furnishing of all plant and equipment, materials and labour and performing all operations, in connection with the work, as approved by the Engineer.



601.1.2 The design parameters of dry lean concrete sub-base, viz., width, thickness, grade of concrete, details of joints, if any, etc. shall be as stipulated in the drawings.





## **601.2 Materials**

### **601.2.1 Sources of Materials**

The Contractor shall indicate to the Engineer the source of all materials with relevant test data to be used in the dry lean concrete work sufficiently in advance and the approval of the Engineer for the same shall be obtained at least 45 days before the scheduled commencement of the work in trial length. If the Contractor later proposes to obtain the materials from a different source during the execution of main work, he shall notify the Engineer with relevant test data for his approval at least 45 days before such materials are to be used.

### **60.2.2 Cement**

Any of the following types of cement may be used with prior approval of the Engineer:

<b>S.No.</b>	<b>Type</b>	<b>Conforming to</b>
i)	Ordinary Portland Cement 43 Grade	IS:8112
ii)	Portland Slag Cement	IS:455
iii)	Portland Pozzolana Cement	IS:1489-Part I

If the subgrade soil contains soluble sulphates in a concentration more than 0.5 percent, sulphate resistant cement conforming to IS:6909 shall be used.

Cement to be used may preferably be obtained in bulk form. It shall be stored in accordance with stipulations contained in Clause 1014 and shall be subjected to acceptance test prior to its immediate use.

### **601.2.3 Fly-ash**

Fly-ash upto 20 percent by weight of cementitious material (cement+flyash) may be used along with 43/53 grade cement may be used to replace OPC cement grade 43 upto 30 percent by weight of cement. Fly-ash shall conform to IS:3812 (Part 1) and its use shall be permitted only after ensuring that facilities exist for uniform blending through a proper mechanical facility with automated process control like batch mix plant conforming to 18:4925 and 18:4926.

### **601.2.4 Aggregates**

601.2.4.1 Aggregates for lean concrete shall be natural material complying with 18:383. The aggregates shall not be alkali reactive. The limits of deleterious materials shall not exceed the requirements set forth in Table 600-2. In case the Engineer considers that the aggregates are not free from dirt, the same may be washed and drained for at least 72 hours before batching, or as directed by the Engineer.



#### 601.2.4.2 Coarse Aggregates

Coarse aggregates shall comply with clause 602.2.6.2, except that the maximum size of the coarse aggregate shall be 26.5 mm, and aggregate gradation shall comply with Table 600-1.

#### 601.2.4.3 Fine Aggregates

The fine aggregate shall comply with Clause 602.2.6.3.

601.2.4.4 The material after blending shall conform to the grading as indicated in Table 600-1.

**Table 600-1 : Aggregate Gradation for Dry Lean Concrete**

Sieve Designation	Percentage by Weight Passing the Sieve
26.50 mm	100
19.0 mm	75-95
9.50 mm	50-70
4.75 mm	30-55
2.36mm	17-42
600 micron	8-22
300 micron	7-17
150 micron	2-12
75 micron	0-10

#### 601.2.5 Water

Water used for mixing and curing of concrete shall comply with Clause 602.2.7.

#### 601.2.6 Storage of Materials

All materials shall be stored in accordance with the provisions of Clauses 602.2.12 of these Specifications and other relevant IS Specifications.

#### 601.3 Proportioning of Materials for the Mix

601.3.1 The mix shall be proportioned with a maximum aggregate cementitious material ratio of 15:1. The water content shall be adjusted to the optimum as per Clause 601.3.2 for facilitating compaction by rolling. The strength and density requirements of concrete shall be determined in accordance with Clauses 601.7 and 601.8 by making trial mixes. Care should be taken to prevent one size of



aggregate falling into the other size of the hopper of the feeding bin while loading the individual size of aggregates into the bins.

#### **601.3.2 Moisture Content**

The optimum water content shall be determined and demonstrated by rolling during trial length construction and the optimum moisture content and degree of compaction shall be got approved from Engineer. While laying in the main work, the lean concrete shall have moisture content between the optimum and optimum +2 percent, keeping in view the effectiveness of compaction achieved and to compensate for evaporation losses.

#### **601.3.3 Cement Content**

The cement content in the dry lean concrete shall be such that the strength specified in Clause 601.3.4 is achieved. The minimum cement content shall be 150 kg/cu.m of concrete. In case flyash is blended at site as part replacement of cement, the quantity of flyash shall not be more than 20 percent by weight of cementitious material and the content of OPC shall not be less than 120 kg/cu.m.

If this minimum is not sufficient to produce dry lean concrete of the specified strength, it shall be increased as necessary by the Contractor at his own cost.

#### **601.3.4 Concrete Strength**

The average compressive strength of each consecutive group of 5 cubes made in accordance with Clause 903.5.1.1 shall not be less than 10 MPa at 7 days. In addition, the minimum compressive strength of any individual cube shall not be less than 7.5 MPa at 7 days. The design mix complying with the above Clauses shall be got approved from the Engineer and demonstrated in the trial length construction.

#### **601.4 Sub-grade**

The sub-grade shall conform to the grades and cross-sections shown on the drawings and shall be laid and compacted in accordance with Clause 305. The subgrade strength shall correspond to the design strength specified in the Contract. As far as possible, the construction traffic shall be avoided on the prepared sub-grade.

#### **601.5 Drainage Layer**



A drainage layer conforming to Clause 401 shall be laid above the subgrade before laying the Dry Lean Concrete sub-base, as specified in the drawings and the Contract.

## **601.6 Construction**

### **601.6.1 General**

The Dry Lean Concrete shall be laid on the prepared\_ granular drainage layer. The pace and programme of the Dry Lean Concrete sub-base construction shall be matching suitably with the programme of construction of the cement concrete pavement over it. The Dry Lean Concrete sub-base shall be overlaid with concrete pavement only after 7 days of sub-base construction.

### **601.6.2 Batching and Mixing**

The batching plant shall be capable of proportioning the materials by weight, each type of material being weighed separately in accordance with Clauses 602.9.2, 602.9.3.1 and 602.9.3.2. The design features of Batching Plant should be such that the plant can be shifted quickly.

### **601.6.3 Transporting**

Plant mix lean concrete shall be discharged immediately from the mixer, transported directly to the point where it is to be laid and protected from the weather by covering the tipping trucks with tarpaulin during transit. The concrete shall be transported by tipping trucks, sufficient in number to ensure a continuous supply of material to feed the laying equipment to work at a uniform speed and in an uninterrupted manner. The lead of the batching plant to paving site shall be such that the travel time available from mixing to paving as specified in Clause 601.6.5.2 will be adhered to. Tipping truck shall not have old concrete sticking to it. Each tipping truck shall be washed with water jet before next loading as and when required after inspection.

### **601.6.4 Placing**

Lean concrete shall be placed by a paver with electronic sensor on the drainage layer or as specified in the Contract. The equipment shall be capable of laying the material in one layer in an even manner without segregation, so that after compaction the total thickness is as specified. The paving machine shall have high amplitude tamping bars to give good initial compaction to the \_sub-base. One day before placing of the dry lean cement concrete sub- base, the surface of the granular sub-base/drainage layer shall be given a fine spray of water and rolled with a smooth wheeled roller.



Preferably the lean concrete shall be placed and compacted across the full width of the two lane carriageway, by constructing it in one go. In roads with carriageway more than 2 lanes a longitudinal joint shall be provided. Transverse butt type joint shall be provided at the end of the construction in a day. Transverse joints in the concrete pavement shall not be coterminous with the transverse construction joint of the Dry Lean Concrete.

The Dry Lean Concrete shall be laid in such a way that it is atleast 750 mm wider on each side than the proposed width including paved shoulders of the concrete pavement. The actual widening shall be decided based on the specifications of the paver, such that the crawler moves on the Dry Lean Concrete, and the cost of extra width shall be borne by the Contractor.

### **601.6.5 Compaction**

601.6.5.1 The compaction shall be carried out immediately after the material is laid and levelled. In order to ensure thorough compaction, rolling shall be continued on the full width till there is no further visible movement under the roller and the surface is well closed. The minimum dry density obtained shall not be less than 98 percent of that achieved. During the trial length construction in accordance with Clause 601.7. The densities achieved at the edges i.e. 0.5 m from the edge shall not be less than 96 percent of that achieved during the trial construction.

601.6.5.2 The spreading, compacting and finishing of the lean concrete shall be carried out as rapidly as possible and the operation shall be so arranged as to ensure that the time between the mixing of the first batch of concrete in any transverse section of the layer and the final finishing of the same shall not exceed 90 minutes when the temperature of concrete is between 25°C and 30°C, and 120 minutes if less than 25°C. This period may be reviewed by the Engineer in the light of the results of the trial run but in no case shall it exceed 120 minutes. Work shall not proceed when the temperature of the concrete exceeds 30°C. If necessary, chilled water or addition of ice may be resorted to for bringing down the temperature. It is desirable to stop concreting when the ambient temperature is above 35°C. After compaction has been completed, roller shall not stand on the compacted surface for the duration of the curing period except during commencement of next day's work near the location where work was terminated the previous day.

601.6.5.3 Double drum smooth-wheeled vibratory rollers of minimum 80 to 100 kN static weight are suitable for rolling dry lean concrete. In case any other roller is proposed, the same shall be got approved from the Engineer, after demonstrating its performance. The number of passes required to obtain maximum compaction depends on the thickness of the dry lean concrete, the compatibility of the mix and the weight and type of the roller and the same as well as the total requirement of rollers for the jobs shall be determined during



trial run by measuring in-situ density and the scale of the work to be undertaken.

Except on super elevated portions where rolling shall proceed from the inner edge to the outer, rolling shall begin from the edges gradually progressing towards the centre. First, the edge/edges shall be compacted with a roller running forward and backward. The roller shall then move inward parallel to the centerline of the road, in successive passes uniformly lapping preceding tracks by at least one half widths.

- 601.6.5.4 A preliminary pass without vibration to bed the Dry Lean Concrete down shall be given followed by the required number of passes to achieve the desired density and, a final pass without vibration to remove roller with vibration marks and to smoothen the surface.

Special care and attention shall be exercised during compaction near joints, kerbs, channels, side forms and around gullies and manholes. In case adequate compaction is not achieved by the roller at these locations, use of plate vibrators shall be made, if so directed by the Engineer.

- 601.6.5.5 The final lean concrete surface on completion of compaction shall be well closed, free from movement under roller and free from ridges, low spots, cracks, loose material, pot holes, ruts or other defects. The final surface shall be inspected immediately on completion and all loose, segregated or defective areas shall be corrected by using fresh lean concrete material, laid and compacted. For repairing honeycombed/hungry surface, concrete with aggregates of size 10 mm and below shall be spread and compacted as per Specifications. It is necessary to check the level of the rolled surface for compliance. Any level/thickness deficiency shall be corrected after applying concrete with aggregates of size 10 mm and below after roughening the surface. Surface regularity also shall be checked with 3m straight edge. Strength tests shall be carried out, and if deficiency in strength is noticed, at least three (evenly spread) cores of minimum 100 mm dia per km shall be cut to check deficiency in strength. The holes resulting from cores shall be restored by filling with concrete of the specified strength and compacted by adequate rodding.

- 601.6.5.6 Segregation of concrete in the tipping trucks shall be controlled by moving the dumper back and forth while discharging the mix into the same or by any appropriate means. Paving operation shall be such that the mix does not segregate.

#### **601.6.6 Joints**

Construction and longitudinal joints shall be provided as per the drawings.



Transverse butt type joint shall be provided at the end of the construction in a day. Longitudinal construction joint shall be provided only when full width paving is not possible. Transverse joints in Dry Lean concrete shall be staggered from the construction butt type joint in Concrete pavement by 800-1000 mm.

Longitudinal joint in Dry Lean Concrete shall be staggered by 300-400 mm from the longitudinal joint of concrete pavement.

At longitudinal or transverse construction joints, unless vertical forms are used, the edge of compacted material shall be cut back to a vertical plane where the correct thickness of the properly compacted material has been obtained.

#### **601.6.7 Curing**

As soon as the lean concrete surface is compacted, curing shall commence. One of the following methods shall be adopted:

- a) Curing may be done by covering the surface by gunny bags/hessian, which shall be kept wet continuously for 7 days by sprinkling water.
- b) The curing shall be done by spraying with approved resin based' aluminized reflective curing compound conforming to ASTM-C 309-81 in accordance with Clause 602.9.12. As soon as the curing compound has lost its tackiness, the surface shall be covered with wet hessian for three days. The rate of application shall be as recommended by the supplier.
- c) Wax-based white pigmented curing compound with water retention index of not less than 90 percent shall be used to cure the dry lean concrete. The curing compound shall conform to 88:7542. The compound shall be applied uniformly with a mechanical sprayer and with a hood to protect the spray from the wind. The curing compound shall be applied over the entire exposed surface of the Dry Lean Concrete, including sides and edges, at the rate of 0.2 litres/sq.m, or as recommended by the supplier.

The first application, referred to as curing application shall be applied immediately after the final rolling of Dry Lean Concrete is completed. As soon as the curing compound loses tackiness, the surface shall be covered with wet hessian for three days. The second application of curing compound also referred to as the debonding application, shall be applied 24 to 48 hours prior to the placement of the concrete pavement. Any damaged Dry Lean Concrete shall be corrected prior to the second application. Normally, the manufacturer's instructions shall be followed for its application.

#### **601.7 Trial Mixes**



The Contractor shall make trial mixes of dry lean concrete with moisture contents like 5.0, 5.5, 6.0, 6.5 and 7.0 percent using specified cement content, specified aggregate grading and aggregate-cement ratio specified in Clause 601.3.1. Optimum moisture and density shall be established by preparing cubes with varying. Moisture contents. Compaction of the mix shall be done in three layers with vibratory hammer fitted with a square or rectangular foot as described in Clause 903.5.1.1. After establishing the optimum moisture, a set of six cubes shall be cast at optimum moisture for the determination of compressive strength on the third and the seventh day. Trial mixes shall be repeated if the strength is not satisfactory by increasing cement content. After the mix design is approved, the Contractor shall construct a trial section in accordance with Clause 601.8.

If during the construction of the trial length, the optimum moisture content determined as above is found to be unsatisfactory, the Contractor may make suitable changes in the moisture content to achieve the satisfactory mix. The cube specimens prepared with the changed mix content should satisfy the strength requirement. Before production of the mix, natural moisture content of the aggregate should be determined on a day-to-day basis so that the moisture content could be adjusted. The mix finally designed should neither stick to the rollers nor become too dry resulting in raveling of surface.

## **601.8 Trial Length**

601.8.1 The trial length shall be constructed at least 14 days in advance of the proposed date of commencement of work. At least 30 days prior to the construction of the trial length, the Contractor shall submit for the Engineer's approval a "Method Statement" giving detailed description of the proposed materials, plant, equipment, mix proportions, and procedure for batching, mixing; laying, compaction and other construction procedures. The Engineer shall also approve the location and length of trial construction which shall be a minimum of 100 m length laid in two days and for full width of the pavement. The trial length shall be outside the main works. The trial length shall contain the construction of at least one transverse construction joint involving hardened concrete and freshly laid Dry Lean Concrete sub-base. The construction of trial length shall be repeated till the Contractor proves his ability to satisfactorily construct the Dry Lean Concrete sub-base.





- 601.8.2 After the construction of the trial length, the in-situ density of the freshly laid material shall be determined by sand replacement method. Three density holes shall be made at locations equally spaced along a diagonal that bisects the trial length and average of these densities shall be determined. The density holes shall not be made in the strip 500 mm from the edges. The average density obtained from the three samples collected shall be the reference density and is considered as 100 percent. The field density of regular work will be compared with this reference density in accordance with Clauses 601.6.5.1 and 903.5.1.2.
- 601.8.3 The hardened concrete shall be cut over 3 m width and reversed to inspect the bottom surface for any segregation taking place. The trial length shall be constructed after making necessary changes in the gradation of the mix to eliminate segregation of the mix. The lower surface shall not have honeycombing and the aggregates shall not be held loosely at the edges.
- 601.8.4 The main work shall not start until the trial length has been approved by the Engineer. After approval has been given, the materials, mix proportions, moisture content, mixing, laying, compaction plant and construction procedures shall not be changed without the approval of the Engineer.
- 601.9 Tolerances for Surface Regularity, Level, Thickness, Density and Strength Control of quality of materials and works shall be exercised by the Engineer in accordance with Section 900.
- 601.10 Traffic**
- No heavy commercial vehicles like trucks and buses shall be permitted on the dry lean concrete sub-base. Construction vehicles at slow speed may be permitted after 7 days of its construction with the prior approval of the Engineer.
- 601.11 Measurement for Payment**
- The unit of measurement for dry lean concrete pavement shall be in cubic metre of concrete placed, based on the net plan area for the accepted thickness shown on the drawings or as directed by the Engineer.
- 601.12 Rate**
- The Contract unit rate payable for dry lean concrete sub-base shall be for carrying out the required operations including full compensation for all labour, materials and equipment, mixing, transport, placing, compacting, finishing, curing, rectification of defective surface testing and incidentals such as trial



length to complete the work as per Specifications, all royalties, fees, storage and rents where necessary and all leads and lifts.



DTS No. 48

**Providing & Laying of 1600mm dia.(FID) MS Casing Pipe by Pushing method for 1219 mm dia MS pipeline under the Ahmedabad - Mumbai B.G. Railway track between Elec pole no 264/7 and 264/8. Permission from the concerned authority i.e. Railway shall be in the scope of bidder The work shall be carried out as per the contractors own design approved by Railway based on approved GAD by Railway Authority (including all approval from Railway) including pushing.**

**The works to be carried out by bidder are as follows :**

- (1) Designing, Manufacturing MS pipe as well as MS specials in accordance of IS:5822-1994 or its latest edition in suitable lengths from MS plates (plates shall be as per IS:2062-1992 or its latest editin of Grade 'B'-Fe 410), as per IS : 3589-2001 or its latest edition including cutting, bending of plates to the required shapes, welding by Submerged Arc Welding, having joints with bevelled ends including ultrasonic and Radiographic at random including inside 100 micron epoxy coating, one coat of 25 micron of zinc rich primer confirming to specification of DGS -175, Type -A and 3 coats of 25 micron of non toxix high build black epoxy paint and Outside elastomeric polyurethane coating including hydraulic testing and tolerances for outside diameter of pipe shell. Circularity test as per IS : 3589-2001 and all other required tests, carting to the site of coating and unloading, stacking, etc. including all taxes, duties, local taxes etc. complete, as required.
  - (i) 1600 mm finished Inside Diameter (FID) 22 mm thick MS Plate (Casing Pipe)**
  - (ii) 1199 mm finished Inside Diameter (FID) 10 mm thick MS Plate (Carrier Pipe)****
- (2) Laying 1600 mm. dia. MS pipe (by Pushing method) of required length including open excavation for thrust bed necessary form work, concreting, curing, vibrating, pushing etc. complete as per contractor's own design approved by competent authority based on approved GAD by competent authority.**

**The item includes**

- (a) Providing and laying M-25 grade for cast in situ thrust bed and thrust wall with necessary excavation with shoring and strutting, formwork, curing, vibrating as per contractor's own design approved by railway.**
- (b) Laying MS pipe by Pushing Method**
- (c) Providing and fixing TMT-Fe-500 bars for thrust bed and thrust wall including supplying, cleaning, cutting, bending and placing in position, lapping, binding with 16 SWG soft iron wire irrespective of locations and levels**
- (d) Providing front shield, jointing, jacking rigs, sliding channels spacers etc. All the structural steel used will be ownership of contractor after pushing work is completed.**
- (e) Pushing with hydraulic jack without disturbance to pavement including all necessary excavation for thrust bed and thrust wall, necessary shoring and strutting required, if any, excavation within the pipe with all necessary refilling**



upto ground level after pushing works completed including carting of extra earth upto a lead of 5 Kms.

This also includes necessary labour cost for pushing and including necessary cost of hydraulic pipe and oil for hydraulic jacks including necessary depreciation cost of jack.

- (3) Lowering, laying in trench and jointing in position to correct line and level MS Pipe with inside 100 micron zinc epoxy paint and Outside elastomeric polyurethane coating etc. complete.
  - (i) 1600 mm finished Inside Diameter (FID) 22 mm thick MS Plate
- (4) Lowering, laying and jointing of 1199 mm finished Inside Diameter (FID) 10 mm thick MS Plate (Carrier Pipe) in casing pipe and in trench by open excavation as per the site requirement and as directed by the Engineer-in-charge.
- (5) Constructing RCC Valve Chamber by doing excavation, refilling and built in RCC M25 grade concrete with TMT Fe-500 reinforcement including PCC 1:2:4, RCC M25 for wall, base slab and top slab, including formwork etc. complete. Concrete work should be fair finish.
- (6) The works also includes  
Providing and laying High density Polyethelene or other similar materials spacers,  
Providing and fixing Indicator Board as per site condition and as directed and  
Providing and fixing vent pipe for 50 mm diameter as directed.

## **1. RAILWAY CROSSINGS**

### **1.1 General specifications**

Providing and supplying of MS pipe shall be as per the specifications given in DTS No. 1 above.

The water pipeline is crossing BG Ahmedabad-Mumbai Lines which require pipe pushing as below :

The length of the pipe pushing under the above crossing will be as per drawing & as per schedule of quantities beyond this the M.S. will be laid by open excavation with carrier pipe upto railway boundary crossing as per drawing and direction of Engineer in charge.

The carrier pipeline of dia. 1199 mm ID shall be installed in M.S.Pipe of 1644 mm dia. OD.

### **1.2 Railway Crossing :**



- a) At railway crossings the work shall be performed as per specifications of railway and under the supervision of railway authorities.
  - b) In case, however the minimum requirements of the governing agencies are less than those set out in the drawing or the specifications given herein, then the requirements given in the drawings and the specifications given for carrier line shall be followed.
  - c) At all crossing, pipe shall be laid straight without bends so that if necessary the pipe at a later date may be replaced without cutting the casing. The pipe shall extend at least 2 meters beyond the end of casing pipe at either end.
  - d) The method of carrying out a pipe crossing by pushing for crossing on this pipeline route shall be jointly inspected by the representative of the Company and Tenderer and railway engineer for each category of work prior to commencement of actual work.
- 1.3 The tenderer shall provide 350 mm thick brick wall at both ends of pipeline after laying of carrier pipe within M.S. pipe.
- 1.4 On both ends of casing pipe, concrete supports are to be provided as per direction of engineer in charge.

## **2. PUSHING OF M.S. PIPE**

Pushing of M.S.PIPE through railway embankment shall be done as per required length as shown in the drawing including providing and laying RCC cast in situ thrust bed and thrust wall with necessary excavation including required shoring and strutting, form work, curing, vibrating as per contractors own design including necessary reinforcement for thrust bed and thrust wall including necessary structural steel work for front shield, intermediate collar joints, spacers, jacking pits, jacking rig, sliding channel including pushing with hydraulic jack without disturbance including necessary excavation within pipe, all necessary refilling required after pushing work is over including carting of extra / surplus earth within 5 km lead, necessary labour required for pushing work including all necessary cost of hydraulic jacks, accessories and consumables. All structural steel works will be property of contractor after pushing work is completed.

**Before pushing OF M..S. PIPE and carrier pipe outer surface of both the pipes will be coated with elastomeric polyurethane coating (1000 micron) & inside of casing & carrier pipe will be painted with a coat of zinc rich epoxy primer of thickness 4 mm and inside surface of both the pipe shall be painted with high build epoxy to RDSO specification No. M & C / PCN / 111 / 88 to a dry film thickness of 250 micron.**



## Methodology

1. The methodology of pipe laying essentially consists of pushing forward the M.S. Pipe through Railway embankment by hydraulic jacks. The Pipe Pushing work is executed in the following stages for crossing of Railway :
  1. Excavation.
  2. Casting of thrust bed with strips for longitudinal/side shifting of M.S. Casing Pipe.
  3. Fabrication of Front and Rear Shield.
  4. Pushing of Pipe .
  5. Shifting of succeeding Pipe s.
  6. Completion.
2. **Excavation** : Open excavation is carried out for Pipe Pushing or ancillary works necessary for successful completion of the work beyond ROW boundary of Railway. Open excavation is done by excavator and final level of excavation is done by manual excavation. Shear keys are excavated as per drawing by manual excavation.
3. **Casting thrust bed and strips** : Pushing of M.S. casing pipe through Railway embankment shall be done as per required length as shown in the drawing including providing and laying RCC cast in situ thrust bed and thrust wall with necessary excavation including required shoring and strutting, form work, curing, vibrating as per contractors own design including necessary reinforcement for thrust bed and thrust wall including necessary structural steel work for front shield, intermediate collar joints, spacers, jacking pits, jacking rig, sliding channel including pushing with hydraulic jack without disturbance including necessary excavation within pipe, all necessary refilling required after pushing work is over including carting of extra / surplus earth within 5 km lead, necessary labour required for pushing work including all necessary cost of hydraulic jacks, accessories and consumables. All structural steel works will be property of contractor after pushing work is completed.
4. **Fabrication of Front and Rear shield** : While the above activities are in progress, fabrication of front and rear shield is taken up on the site workshop. The front shield is fitted on the first pipe through anchor bolts. It pierces through the soil under the pushing force of the jacks by cutting the soil, combined with manual excavation from inside the Pipe. The rear shield is also fitted with anchor bolts at the rear end of each pipe to prevent soil caving in at the junction of Pipe and also to facilitate intermediate jacking.
5. **Pushing of Pipe** : Pins are placed in the pockets provided in the thrust bed and hydraulic jacks of capacity 150 to 200 MT are placed in the space between the pin and rear end of Pipe. The spacer pins are then provided in front of jacks are next operated through the hydraulic system and the force generated by oil pressure pushes the casing pipe towards the embankment. After the ram of jack is exposed fully the oil pressure is released to force the ram jack inside the cylinder. Another spacer pin is provided as



above in from jack heads and the process is repeated. When the next row of pockets of thrust bed is exposed, the pins are removed from the earlier row of pockets and placed in the exposed row of pockets. Pushing is then started as described above and continued till the all pipes are pushed through. Manual excavation is carried out from inside the Pipe as required.

6. **Shifting of Succeeding pipes** : The pipe brought on the thrust bed by jacking and is aligned with the already pushed pipe. Hydraulic jacks are placed in rear shield region and also in the pockets of the rear end of pipe. The jacks in the rear shield region are operated to push further the already pushed pipe , holding in the process the pipe on the thrust bed firmly, against the jacks provided in the row of pockets. After the ram of jacks in rear shield is exposed, the oil pressure is released to close these jacks and pushing of rear is started with the help of jacks provided in the pockets. This is called “Intermediate Jacking”. The process of jacking is continued till the entire of pipe is pushed. One by one pipe pushed by jacking as per above method.
7. **Completion** : After completion of pushing the pipe joint should be filled up properly to make joints of each pipe leak proof.

## 8. **Scope of Work**

- 8.1 Contractor is responsible for the design and preparation of drawings of the entire MS pushing work including thrust bed and thrust wall and preparation of entire scheme of work and shall have to be got **approved from the authority**. All necessary arrangements of plants, equipments as required shall be made by the Tenderer/s.
- 8.2 The item of MS pipe pushing and pushing includes boring collecting necessary soil data testing the same for the design of temporary work / thrust bed / box pushing, nothing extra shall be payable on this account beyond the rate quoted in the tender.
- 8.3 The item also includes excavation in all type of soils including moorum under water which may or may not require pumping out for the dive pit, receipting pit and making good the Canal land after completion of work, for the thrust bed as well as disposal of excavated earth in the nearby Canal line within a lead of 1000m including dressing etc. as directed by the Engineer-in-charge. The working area may be water logged during monsoon or any untimely rains. Contractor should take special note of this while preparing the programme schedule for this work. No extra shall be paid for bailing out / pumping out the water to prevent water logging.
- 8.4 The item includes casting of thrust bed including its foundation as approved by Engineer-in-charge. It also includes manufacturing and fabrication of front end frame / cutting shield / rear shield / any other special strengthening and modifications required to the shields as per the requirement of site conditions along with intermediate jacking stations as required.



- 8.5 For the purpose of measurement of the pushed length of pipe for the finished length in final position will be measured. This will not include the length of front near shield or any other temporary fixtures fitted to MS pipe to facilities the packing operation. The overall length for the purpose of payment will be from top edge of MS Pipe on one side to the bottom edge of bottom slab on other side, measured horizontally.
- 8.6 The item also includes providing thrust wall / bed and other temporary works as required with all labour and materials includes cement, steel of all types etc. required for temporary work as well as the MS Pipe will be arranged by the contractor at his own cost.
- 8.7 The item includes making the joints of pipe water tight by grouting and applying epoxy compound around joints.
- 8.8 All the existing underground and overhead services such as pipelines, cable lines, telephone line etc. which may interfere shall be relocated or removed at a suitable place before or during the progress of work as directed by the Engineer in charge. No extra payment will be made for this.





8.9 The contractor can be asked to remove any buried foundation or overhead of obstruction at his own cost.

***Terms of Payment of quoted rate for item no. 1 :***

1. On approval of GAD by authority	-	5%
2. On casting thrust bed & thrust wall	-	10%
3. During pushing of M.S. pipe on pro-rata basis	-	70%
4. On Completion of work	-	15%



## **10.0 GENERAL PERFORMANCE DATA**

THE TENDERERS SHALL SUBMIT ALL DETAILS ASKED IN THIS SECTION

IF NEEDED, MORE PAGES CAN BE USED BUT THE FORMAT GIVEN SHALL BE STRICTLY FOLLOWED

ATTACH ALL NECESSARY SUPPORTING DOCUMENTS AS ASKED FOR IN VARIOUS SECTIONS AND SUBSECTIONS OF THE TENDER DOCUMENT



#### **10.1 DECLARATION BY THE TENDERER**

I/We hereby declare that I /We have examined the site :Labour work for Conveying Lowering and Laying of 1016 mm & 813 mm outer dia. M.S. water supply Pipe line from Valak frenchwell-1 and franchwell-2 to Sarthana Water works, Surat and connection with existing transmission pipeline..

. and persued in detail and examined closely the specifications and its intents and contents of the tender documents before quoting my / our rates.

I/We agree to be bound by and comply with all articles of the tender and the contract documents that shall be executed with The Surat Municipal Corporation.

I/We have also inspected the site location and satisfied myself / ourselves regarding the quality, quantity, availability and transport facilities for construction materials such as earth, stone, sand, cement, and equipments etc. through the network of available roads and path ways required for the work.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



## **10.2 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.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:



**10.3 DETAILS OF PROPRIETOR / PARTNERS OF THE FIRM**

[1]

Affix passport Size Photograph here
-------------------------------------

-----  
Specimen signature of the Contractor  
Name and address

[2]

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

Specimen signature, name and addresses of all the partners in case of partnership agency.

- |     | 1  | 2 | 3 | 4 |
|-----|--|---|---|---|
| [3] | Submit certified copy of registered partnership deed in case of Partnership Firm.  |   |   |   |
| [4] | Submit certified copy of the power of Attorney of the signing authority.   |   |   |   |
| [5] | Attach complete organizational chart of the firm.  |   |   |   |
| [6] | In case of Government royalty applicable to Tenderer, it is compulsory to submit a receipt of royalty payment with tender.   |   |   |   |
| [7] | The Photograph and specimen signature of Contractor will be cross-checked, whenever Contractor receives payment in account section of The Surat Municipal Corporation.   |   |   |   |
| [8] | The specimen signature of Contractor will be cross checked by Account Department of the State Municipal Corporation in case of representative of Contractor along with letter of authority of person who signed an agreement receives payment. |   |   |   |
| [9] | In case of octroi applicable to the goods of supplier / Tenderer, the Tenderer / supplier has to submit attested copies of all octroi receipts.  |   |   |   |

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:



NAME AND ADDRESS:

DATE:



#### 10.4 DETAILS OF TECHNICAL PERSONNEL WHO SHALL BE IMMEDIATELY DEPUTED FOR THIS WORK

Name of Tenderer:

Sr. No	Designation	Name	Length of Service in the firm	Qualifications	Professional experience and details of work carried out*	Remarks
1	2	3	4	5	6	7
1	Project Manager					
2	Senior Site Engineers(Civil)					
3	Assistant Site Engineers (Civil)					
4	Clerk of Works					
5	Others					

Signature of Tenderer

Name and address

Date

- Indicate here in details like, the name of the project, the capacity on which the individual worked and for what length of time, etc.



**10.5 TENDERER'S PROPOSED COMPLETION SCHEDULE IN THE FORM OF BAR/PERT/CPM CHART OR ANY OTHER METHOD AS APPROVED BY THE SURAT MUNICIPAL CORPORATION.**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:





**10.6 REQUEST FOR REFUND OF EMD**

Date:

To  
The Chairman  
Surat Smart City Development Limited  
Surat Municipal Corporation  
Surat

Sir,

I/We have tendered for the work of \_\_\_\_\_

\_\_\_\_\_ and have paid Earnest Money Deposit Amounting  
to Rs. \_\_\_\_\_ drawn by \_\_\_\_\_. The receipt  
No. \_\_\_\_\_ Dated \_\_\_\_\_ issued  
by the Corporation is attached herewith.

In case my / our tender is not accepted, kindly arrange to refund the amount of Earnest Money Deposit  
paid by me / us as per the details referred above.

Advance stamped Receipt duly signed on Revenue Stamp of Rs. 1.00 is also enclosed herewith.  
Signature of Contractor

\_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Encl: As Sated.



**10.7 ADVANCE STAMP RECEIPT**

Received with thanks the sum of Rs. \_\_\_\_\_ (In words \_\_\_\_\_) Only from The Surat Municipal Corporation being the refund of Earnest Money Deposit placed by me / us vide SMC's Receipt No. \_\_\_\_\_ dated \_\_\_\_\_ along with the tender paper for the \_\_\_\_\_

Date: \_\_\_\_\_ (Revenue Stamp)

\_\_\_\_\_  
(Signature of the Tenderer)

f.w.c. in the Accountant

2. For remarks whether the \_\_\_\_\_ deposit amounting to Rs. \_\_\_\_\_ placed on \_\_\_\_\_ by Shri /M/s. \_\_\_\_\_ in connection with the work of \_\_\_\_\_ stands in full in the name of the aforesaid party (R.No. \_\_\_\_\_ Dated \_\_\_\_\_)

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

F.W.Cs.to DEPUTY GENERAL MANAGER (WATER) SURAT SMART CITY DEVELOPMENT LTD.

To deposit of Rs. \_\_\_\_\_ Place on \_\_\_\_\_ by Shri / M/s. \_\_\_\_\_ stands in full in the name of the aforesaid party.

Accountant

Submitted,

For favour of sanction of refund Rs. \_\_\_\_\_ being the amount of \_\_\_\_\_ deposit placed on \_\_\_\_\_ vide Receipt No. \_\_\_\_\_ by Shri \_\_\_\_\_ / Ms. \_\_\_\_\_ in connection with the work of \_\_\_\_\_

\_\_\_\_\_ as the tender of the above party has been accepted / had not been accepted and the concerned Contractor has paid security deposit of Rs. \_\_\_\_\_

for the above referred work on dated \_\_\_\_\_. The party has also executed an agreement for the above work. The above deposit stands in full in the name of the said party as certified by the Accountant on \_\_\_\_\_. The expenditure will be debited on B.H.G. Tender Deposit Account.

Sanctioned Accordingly,

Assistant Engineer / Jr. Engineer

Dy. Engineer,

Deputy General Manager (Water)

General Manager (Water-Energy)



## 10.8 MEMORANDUM

I/ We, \_\_\_\_\_ the undersigned do hereby tender for carrying out the work described in the schedule subject to the conditions mentioned in various part and sub sections of the tender documents.

1	Name of work	Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.
2	Estimated Cost	Rs. 14,57,84,135.60
3	Earnest Money Deposit	Rs. 15,00,000/-
4	Security Deposit	Four Percent (4%) of tendered Amount
5	Percentage to be retained from running Account Bills	Five Percent (5%)
6	Time allowed for the completion of work from the date as mentioned in the final work order	21 (Twenty One) Months Excl. Monsoon
7	The progress of work should confirm to	10% of the work in 25% of the time
		40% of the work in 50% of the time
		70% of the work in 75% of the time
		100% of the work in 100% of the time
8	Penalty for delay	0.2% (Zero point two percent) of the contract price per day Maximum up to 10% (Ten Percent) of the Contract Amount.
9	Defect Liability Period	12 months (Twelve months)
10	Amount of water charges	As per clause No. GC-93

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:  
NAME AND ADDRESS:

DATE:



## **11.0 Drawings**

11.1 Alignment of pipeline

11.2 Sarthana- Simada Khadi Crossing

11.3 GAD of Pipe Pushing at Ahmedabad-Mumbai Railway Line

**SURAT MUNICIPAL CORPORATION**  
**HYDRAULIC DEPARTMENT**  
**SURAT SMRAT CITY DEVELOPMENT LIMITED (SSCDL)**

**TENDER NOTICE NO.(ON LINE)**

**GM(Water-Energy)/SSCDL/HYD/ABD(1-B)/01/2016-17**

.....

**NAME OF WORK:- Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal & Khatodara under Smart City Mission.**

<b>VOLUME : III</b> <b>PRICE BID</b> <b>WORK NO.01</b>
--

<b>LAST DATE OF ONLINE SUBMISSION OF TENDER:</b> <b>(i.e NECESSARY DOCUMENTS, CERTIFICATES, ETC.)</b>	<b>Dt. 23.02.2017</b> up to 18:00 hrs. (On line)
--	---

<b>LAST DATE OF SUBMISSION OF TENDER FEE &amp; E.M.D</b> <b>IN HARD COPY</b>	<b>: On or Before Dt. 04.03.2017</b> up to 17:00 hrs.
---	--

<b><i>(BY SPEED POST / RPAD THROUGH POSTAL AUTHORITY ONLY)</i></b>
--

**To be Submitted to**  
**The Chief Accountant,**  
Accounts Department,  
**SURAT MUNICIPAL CORPORATION**  
Muglisara, Surat-390 003.

**INDEX**

<b>SR. NO.</b>	<b>PARTICULARS</b>	<b>PAGE NO.</b>
12	General	3
13	Schedule A	4
14	Schedule B	5
15	Price Quotation Sheet	6
16	Memorandum	7

## 12.0 GENERAL

- 1 The Schedule of quantities and Rates are to be read for the purpose of pricing in conjunction with instructions to tenderers, technical specifications, drawings and conditions for contract.
- 2 The price quoted in the summary of costs, sheets of schedule of quantities and rates shall be of all inclusive value for the work described including all cost and expenses which may be required for the execution of the work described together with all general risks, liabilities and obligations set further or implied in the documents on which the tender is based.
- 3 The quantities furnished are approximate. In the event of actual quantities varying from those furnished herein or items deleted or added the percentage (Plus / minus) quoted for the entire work shall remain firm and no extra claims in this respect will be entertained. The payment shall be made based on the actual quantities in the complete work.
- 4 Percentage (Plus / Minus) quoted by tenderer shall be firm even if the contract is split.
- 5 Percentage (Plus/Minus) and the total amount entertained in the summary of cost, sheet of schedule quantities and rates shall be **given on-line**.
- 6 Detailed specifications of items of work are described in the Technical Specifications. It gives guidelines to the reference of relevant clauses of specification and mode of measurement. Tenderer shall read this in conjunction with other technical specifications and quote rates accordingly.
- 7 The Quality Assurance Plan provided shall be strictly followed.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:

NAME AND ADDRESS:

DATE:

### 13.0 SCHEDULE A

Schedule showing the materials, if any, to be supplied by the Municipal Corporation from any of the storage of the Municipal Corporation for the work contracted to be executed and the rates at which they are charged for.

Sr.No	Particulars	Rate at which the materials will be charged to the Contractor			Place of Delivery
		Unit	Rs.	Ps.	
	Cement	-	-	-	
	Reinforcement Steel	-	-	-	
	M.S. PIPE	-	-	-	

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:

NAME AND ADDRESS:

DATE:



**14.0 SCHEDULE B**

**Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission.**

I/We,.....the undersigned, hereby tender for carrying out the work described in the schedule subjected to the conditions mentioned in various sections and subsections of this tender document.

Should this tender be accepted, I/We hereby agree to abide by and to fulfill all the terms and provisions of specifications and conditions of contract and default thereof of forfeit and pay to Municipal Corporation the sum of money mentioned in the said condition.

**The Earnest Money Deposited by me / us with tender may be forfeited to The SURAT MUNICIPAL CORPORATION, if I /We do not deposit security deposit in accordance with the relevant clause of the conditions of contract, otherwise the said sum of Rs. 15,00,000/- shall be retained by the Municipal Corporation as any account of such security as, aforesaid.**

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:

NAME AND ADDRESS:

DATE:

**15. NAME OF WORK :**

**Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhathena, Magob, Dumbhal & Khatodara under Smart City Mission.**

**ESTIMATED COST : Rs. 14,57,84,135.60**

(Rupees Fourteen Crores Fifty Seven lakhs Eighty Four Thousand One hundred thirty Five & Sixty Paisa Only)

**TENDERER'S BID FOR EXECUTION OF WORK:**

PERCENTAGE HIGHER / BELOW OF **Rs. 14,57,84,135.60**

IN FIGURES : \_\_\_\_\_

IN WORDS : \_\_\_\_\_

7 TENDER AMOUNT (IN FIGURES): Rs.

8 TENDER AMOUNT (in WORDS): Rs.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

SIGNATURE OF WITNESS:

NAME AND ADDRESS:

DATE:

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

## 16.0 MEMORANDUM

I/ We, \_\_\_\_\_ the undersigned do hereby tender for carrying out the work described in the schedule subject to the conditions mentioned in various part and sub sections of the tender documents.

1	Name of work and site location	<b>Labour Work For Laying Of Different Size Of Spirally Submerged Arc Welded MS Pipe with providing required different valves for Proposed Sarthana WTP to Proposed various UGSR at Bhatena, Magob, Dumbhal &amp; Khatodara under Smart City Mission.</b>
2	Last date of down load of tender	<b>13/02/2017 to 23/02/2017</b> up to 17.00 hrs.
3	Last date of submission of, Tender Fees, EMD and in Hard Copy	On or before <b>04/03/2017 up to 17.00 hours</b> to the office of <b>“The Chief Accountant, SURAT MUNICIPAL CORPORATION, Surat”</b> .
4	Tender Validity Period	120 days (One hundred Twenty Days)
5	Estimated Cost	<b>Rs. 14,57,84,135.60</b> (Rupees Fourteen Crores Fifty Seven lakhs Eighty Four Thousand One hundred thirty Five & Sixty Paisa Only)
6	Earnest Money Deposit	<b>Rs. 15,00,000/-</b> (Rupees Fifteen Lakhs Only) as per clause No. IT-07
7	Security Deposit	<b>4% (four)</b> of the Contract Amount (as per Cl No. GC-10 of the tender)
8	Time allowed for the completion of work from the date as mentioned in the final work order	21 (Twenty One) months Excl. Monsoon
9	The progress of work should confirm to	10% of the work in 25% of the time 40% of the work in 50% of the time 70% of the work in 75% of the time 100% of the work in 100% of the time
10	Penalty for delay	0.2% (Zero point two percent) of the contract price per day Maximum up to 10% (Ten Percent) of the Contract Amount.
11	Retention Money Deposit	Five (5%) percent of work done and to be deducted from R.A.bill as per GC-36.
12	Defect Liability Period	12 months (Twelve months)
13	Amount of water charges	As per clause No. GC-91
14	Construction Cess	Tenderers shall also note that as per the provisions of government, 01 % (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.

DEPUTY GENERAL MANAGER (WATER)  
SURAT SMART CITY DEVELOPMENT LTD.  
SURAT MUNICIPAL CORPORATION,  
SURAT.

SIGNATURE AND SEAL OF THE CONTRATOR:

NAME AND ADDRESS:

DATE: