

**RAJKOT MUNICIPAL CORPORATION**  
**e-TENDER No. RMC/ENGG/EZ/22-23/**

The e-Tenders are invited with two bid system by e-Tendering from the experienced contractors registered in GWSSB / State Government / Central Government / Semi Government in appropriate class for below mentioned work:

Sr No	Name of work	a) Estimated cost in Rs. b) EMD c) E-TENDER fee d) Time limit for completion of work
1	Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfer Station Near K.S. Diesels in Ward No. 6 (3 <sup>rd</sup> Attempt) <b>e-TENDER No.RMC/ENGG/EZ/22-23/</b>	a) Rs.2,29,54,121.00/- b) Rs.2,29,541.00/- c) Rs.4,500/- d) 12 Month

**Milestone Dates for e-tendering is as under**

1. Downloading of e-Tender documents	04-05-2023 To 18-05-2023 up to 17.00 Hrs.
2. Prebid Meeting @ EZ Office	09-05-2023 at 11.00 Hrs.
3. Online submission of e - Tender	18-05-2023 up to 18.00 Hrs.
4. Physical submission of EMD, Tender fee and other documents required as per Financial and Experience criteria. by Regd. Post. A.D. / Speed Post ONLY	20-05-2023 up to 18.00 Hrs.
5. Opening of online technical bid	22-05-2023 at 11.00 Hours onwards
6. Verification of submitted documents (EMD, e - Tender fee, etc.)	22-05-2023 at 11.00 Hours onwards
7. Agency to remain present in person along with original documents for verification	23-05-2023 between 11.00 to 12.00 Hours
8. Opening of Price Bid (If possible)	24-05-2023 at 11.00 Hours onwards
9. Bid Validity	180 Days
For further details, pre-qualification criteria etc. visit <a href="http://www.rmc.nprocure.com">www.rmc.nprocure.com</a>	

All bidders must submit Bid security (EMD) as above either directly deposited in ICICI Bank Account No.015305010638 (Rajkot Municipal Corporation) IFSC Code ICIC0000153 or submit at the below mentioned address in form of Demand Draft in favor of "Rajkot Municipal Corporation", Rajkot, from any Nationalized Bank or Scheduled Bank (except Co-operative Bank) in India. The receipt of professional tax paid for current year, address proof, tender appendix details and ID proof shall have to be submitted along with physical submission of required documents shall have to be done at the below mentioned address:

*Office of the CITY ENGINEER*  
Rajkot Municipal Corporation,  
Shri Zaver chand Meghani Bhawan,  
East Zone, Bhavnagar Road,  
Rajkot,-360003(Gujarat)

1. The e-tender fee will be accepted in form of Demand Draft only in favor of "Rajkot Municipal Corporation" Rajkot, from any Nationalized or Scheduled Bank (except Co-operative Bank) in India and must be delivered to above address.

**2. The prequalification requirement is as under:**

**i) Financial Criteria:**

1. An average annual turnover of seven years should not be less than 50% of tender amount.
2. Working capital should not be less than 25% of the estimated amount.
3. Bidder must have minimum "B" Class registration
4. Minimum amount of solvency should be Rs.35.00 lakhs

**ii) Experience Criteria:**

The bidder should possess following minimum experience:

1. Bidder should have completed at least one work of similar nature **40% OR** two works of **30%** of tender amount in last seven years either in government or Semi-government as a main contractor.
2. Bidder should have enough machinery and experienced personnel to supervise the work.

**Note:** Enhancement factor at 10 % per year will be applicable to arrive at average annual turnover and finalize the magnitude of work done in last seven years.

<b>Sr</b>	<b>Year</b>	<b>Enhance factor</b>
1	Current Year (2023-24)	1.00
2	Current Year - 1 (2022-23)	1.10
3	Current Year - 2 (2021-22)	1.21
4	Current Year - 3 (2020-21)	1.33
5	Current Year - 4 (2019-20)	1.46
6	Current Year - 5 (2018-19)	1.61
7	Current Year - 6 (2017-18)	1.77
8	Current Year - 7 (2016-17)	1.95

5. The contractor shall have to quote their rates including GST and other taxes and the Invoice with break-up of GST is to be submitted accordingly, failing which, such amount will be deducted from the bill of the agency and deposited accordingly.

The contractor shall have to purchase the material required for this tender work, only from the supplier having registered GST Number. RMC will not be responsible to pay any amount towards GST if the material is purchased from the unregistered supplier/not having GST Number.

6. The bidder(s) submitting the tender shall also have to submit the copy of ESIC&EPF Registration document along with the other documents, duly self-attested, failing which, the tender of such bidder(s) will be considered as non-responsive and their online price bid will not be opened.
7. The Tender of those bidder(s) those who fails to submit the required documents for verification within the stipulated date and time, will be treated as non-responsive and their Price Bid will not be opened. The physical submission of required documents received after the prescribed date and time will be out rightly rejected.
8. The bidder should not have been Black Listed, suspended, terminated, backed out, debarred & delisted by any Municipal Body / Urban Local Body / Development Authority in any State Government Body or undertaking / any department or undertaking of Government of India, since inception of the firm / Company. Such a case will be rejected out rightly. A Declaration in this regard on Rs.300/- Stamp Paper duly Notarized shall have to be submitted as per Annexure along with the tender documents. Submission of the bid document without such Notarized declaration will be rejected out rightly.
9. The bidder should provide accurate information on any litigation history or arbitration resulting from contracts completed or under execution by him over the last ten years. This should also include such cases, which are in process / progress. A consistent history of awards against the bidder may result in failure of the bid. In case the bidder has not provided such information and has come to the notice of the authority, the tender will be rejected at what so ever stage and in such case all the losses that will arise out of this issue will be recovered from the bidder and he will not have any defense for the same.
10. After opening of Technical Bid, the procedure for the pre-qualification shall be adopted and the Price Bid of only successful qualified bidder shall be opened for final evaluation of the contract. The decision of Municipal Commissioner regarding the pre-qualification shall be final and binding to all the bidders.
11. Conditional Tenders will be out rightly rejected.
12. Commissioner, Rajkot Municipal Corporation, Rajkot, reserves the right to accept / reject any or all e-tender(s) without assigning any reasons thereof.

**CITY ENGINEER**  
**Rajkot Municipal Corporation**

# RAJKOT MUNICIPAL CORPORATION

e-TENDER No. RMC/ENGG/EZ/22-23/



## TENDER DOCUMENTS

FOR

Construction of Retaining Wall, Compound Wall with Gate,  
Trimix and landscaping work at Garbage Transfer Station  
Near K.S. Diesels in Ward No. 6 (3<sup>rd</sup> ATTEMPT)

VOLUME – I

TECHNICAL BID

Municipal Commissioner

Rajkot Municipal Corporation, Shri Zavechand Meghani Bhawan, East Zone  
Bhavnagar Road, Rajkot- 360003

### ANNEXURE Notice Inviting On-Line Tender

Department Name	Rajkot Municipal Corporation Shri Zavechand Meghani Bhawan, East Zone Bhavnagar Road Rajkot-360003
Name of Project	Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfer Station Near K.S. Diesels in Ward No. 6 (3 <sup>rd</sup> ATTEMPT)
Estimated Contract Value (INR)	Rs. 2,29,54,121.00/-
Period of Completion (in Months)	12 Months
Approved Govt. Registered Class	"B" or Equivalent who have a certificate of registration with Employees Provident Fund Organization.
Bidding Type	e-Tender
Bid Call (Nos)	1
Tender Currency Type	Single
Tender Currency Settings	Indian Rupee (INR)
Joint Venture	Not Allow

#### Amount Details

Bid Document Fee	Rs. 4,500.00/-
Bid Document Fee Payable To	Rajkot Municipal Corporation
Bid Document Fee in favour of	Rajkot Municipal Corporation in Terms of DD
Bid Security / EMD (INR)	Rs. 2,29,541.00/-
Bid Security / EMD in favour of	Rajkot Municipal Corporation in Terms of F.D.R./DD

#### Tender Dates

Bid Document Downloading Start Date	04-05-2023 at 17.00 hrs
Pre-Bid Meeting in Central Zone Office	09-05-2023 at 11.00 hrs
Bid Document Downloading End Date	18-05-2023 up to 17.00 hrs.
Last Date & Time for Receipt (Submission) of Bids	18-05-2023 up to 18.00 hrs.
Bid Validity Period	One Twenty (120) calendar days
Remarks	Submissions of EMD & Tender fee will be in electronic format only through online. For Liquidation of original instrument of tender fee (in the form of DD), EMD (in the form of DD/FDR.) And other supporting Documents should be sent in original through R.P.A.D/Speed post only. So as to reach the office of tender inviting authority Rajkot Municipal Corporation Shri Zavechand Meghani Bhawan, East Zone Bhavnagar Road Rajkot-360003 before date: 20-05-2023 up to 18.00 hrs.
Price Bid Opening Date	28-04-2023 at 11.00 hrs. onwards (if Possible)

### Other Details

Officer Inviting Bids	Commissioner, RMC
Bid Opening Authority	Commissioner, RMC
Address	Rajkot Municipal Corporation Shri Zavechand Meghani Bhawan, East Zone Bhavnagar RoadRajkot-360003

### General Terms and Conditions

- (1) Bidders can download the tender document from nprocure website.
- (2) Bidders have to submit Price bid in Electronic form only on nprocure website till the Last Date & time for submission.
- (3) Offers in physical form will not be accepted in any case.
- (4) Free vendor training camp will be organized every Saturday between 4.00 to 5.00 P.M. at (n)code solutions-A Division of GNFC Ltd., Bidders are requested take benefit of the same.

Bidders who wish to participate in online tenders will have to procure / should have legally valid Digital Certificate as per Information Technology Act-2000 using they can sign their electronic bids. Bidders can procure the same from any of license certifying Authority of India or can contact (n)code solutions-A division GNFC Ltd, who are licensed Certifying Authority by Govt. of India. All bids should be digitally signed, for details regarding digital signature certificate related training involved the below mentioned address should be contacted:

(n)Code Solutions A division of GNFC  
403, GNFC Infotower, Bodakdev,  
Ahmedabad – 380 054 (India)  
Tel: +91 26857316 / 17 / 18  
Fax: +91 79 26857321  
E-mail: nprocure@gnvfc.net  
Web-site: www.rmc.gov.in  
Toll Free: 1800-233-1010(Ext. 321)

Other Terms & Conditions as per detailed tender document.

## MEMORANDUM OF WORKS IN BRIEF

Name of the work : Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfer Station Near K.S.Diesels in Ward No. 6 (3<sup>RD</sup> ATTEMPT)

(1) Estimated Cost : Rs. 2,29,54,121.00/-

(3) Earnest Money : Rs.2,29,541.00/-

(2) Validity period of : 120 days from the date of opening of price bid

Tender offered

(3) Security Deposit : 5% of Estimated Cost.

2.5% of estimated Amount in form of F.D.R. or Bank

Guarantee.

Rest 2.5% will be recovered from R. A. Bill

(4) Time allowed for completion : **12 Months**

of the work from the date of

written order to commence

## **INSTRUCTIONS TO THE TENDERER**

### **IT 1. GENERAL**

The contract documents may be secured in accordance with the Notice Inviting e-TENDER for the work called. The work shall include supply of materials necessary for construction of the work.

### **IT 2. INVITATION TO e-TENDER**

The Rajkot Municipal Corporation hereinafter referred as the Corporation will receive e-Tenders for the work of as per the specifications and schedule of prices in the e-Tender document. The e-Tenders shall be opened online as specified in the e-Tender notice in the presence of interested Tenderers or their representatives. The Corporation reserves the right to reject the lowest or any other or all e-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 e-Tender.

### **IT 3. LANGUAGE of e-Tender**

E-Tenders shall be submitted in English, and all information in the e-Tender shall also be in English, Information in any other language shall be accompanied by its translation in English. Failure to comply with this may make the e-Tender liable to rejection.

### **IT 4. QUALIFICATIONS OF TENDERERS**

- A. The Tenderers shall abide by the laws of the Union of India and of Gujarat State and legal jurisdiction of the place where the works are Located.
- B. The Tenderer shall furnish a written statement of financial and technical parameters with details and documents along with his e-Tender which contains namely as below:
  - i. The Tenderer's experience in the fields relevant to this contract.
  - ii. The Tenderer's financial capacity/resources and standing over at least 7 (Seven) years.
  - iii. The Tenderer's present commitments (Jobs on hand).
  - iv. The Tenderer's capability and qualifications of himself and his regular staff etc.
  - v. Plants and Machinery available with the Tenderer for the work.
- C. Joint venture will be not allowed.

### **IT 5.e-Tender DOCUMENTS**

The e-Tender documents and drawings shall comprehensively be referred to as e-Tender document. The several sections form in the document are the essential parts of the contract and a requirement occurring in one shall be as binding as though occurring



in all, they are to be taken as mutually, explanatory and describe and provide for complete works.

#### **IT 6. EXAMINATION BY TENDERERS**

- A. At this own expense and prior to submitting his e-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 e-Tender Documents, site & subsoil investigation.
- B. The e-Tender is invited for civil work and Mechanical/Electrical work. The Contractors are requested to quote their price offer in % below or above on the given price schedule for civil work and for Mechanical/Electrical work in the given schedule-B (Price Schedule) only. The works shall have to be completed in all respect as stated in the e-Tender document to the satisfaction of the Corporation.
- C. The following comprises in Contract Documents at a price of Rs.4,500/-.

#### **e-Tender Documents:**

##### **Volume-I : General Conditions of Contract**

- Notice inviting Tenderers
- e-TENDER declaration form
- Pre-Qualification Criteria
- Introduction
- Brief of Work
- Instructions to the Tenderer
- Additional Instructions to the Tenderer
- Special Condition for Contractor
- Form of Bid Security (Bank Guarantee)
- Form of Bank Guaranty
- Form of Contract Agreement
- Form of Performance Security (Bank Guarantee)
- Free Maintenance Guarantee Period
- Terms & Condition of Contract

#### Formats

- Annexure-I

- Annexure-II
- Annexure-III

## **Volume –II: Technical Specifications**

### **I. Part-I Civil Work**

- Material Specification
- General Technical Guide Line
- IS Code
- Item Specification
- Approved Make of Material

### **II. Part-II Electrical Work**

- Material Specification
- General Specification (Eli. Work)
- IS Code
- Approved Make of Material

### **III. Part-III Fire Fighting Work**

- Material Specification
- IS. Code
- Technical Information Furnishing by Bidder
- Approved Make of Material

## **Volume –III: Price Bid**

## **Volume – IV: Drawings**

- D. Copy of the e-TENDER Document should be completed, checked in a responsible manner, digitally signed, and submitted. Tender security Bond shall be submitted in person by the stipulate date, which shall form the e-Tender. The e-Tender is required to complete with all the pages in which entries are required to be made by the Tenderer are contained in the e-Tender documents and the Tenderer shall not take out or add to or amend the text of any of the documents except in so far as may be necessary to comply with any addenda issued pursuant to Clause IT.16 hereof.

### **IT 7. EARNEST MONEY DEPOSIT:**

- A. Each Tenderer must submit a receipt of deposit as Tender guarantee towards Earnest money amounting to Rs. 2,29,541.00/- in the form of crossed DD/FDR in favour of "Rajkot Municipal Corporation", from any Scheduled bank (except Co-operative Bank) in India acceptable to owner payable at Rajkot. The Tender Bond, shall be valid for a

period of not less than hundred and Twenty (120) days from the date the e-Tenders 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 owner 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 e-Tender not accompanied by a Tender guarantee in the form of earnest money deposited for the sum stipulated in the e-Tender Document will be summarily rejected.

- B. The Earnest Money Deposit will be refunded to the unsuccessful Tenderers after an award has been finalized.
- 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 Bonds to the Owner as stipulated in this e-Tenderdocument within ten days. (10) Days after receipt of notice of award of contract.
- D. The Earnest Money Deposit of the successful Tenderer shall be returned after the performance guarantee bond, as required, is furnished by the Contractor.
- E. No interest shall be paid by the owner on any e-Tender guarantee.
- F. Within 10 (ten) days from the date of issue of the letter accepting his tender, the successful Bidder shall furnish the required Security Deposit for performance and plus additional security if any for unbalanced bids in accordance with the condition of the contract and attend the office of the Engineer In-charge for execution of the contract documents. If he fails to furnish the Security Deposit for performance or enter into an agreement to execute the contract for the work offered to him, his EMD will be forfeited and the Bidder will be Black Listed / Debarred from tendering for further works of Rajkot Municipal Corporation for the period of three years.

#### **IT 8.PREPARATION OF e-TENDER DOCUMENTS**

Tenderers are required to note the following while preparing the e-TENDER Documents:

- A. e-TENDER shall be submitted on the e-TENDER form bound here in English. All statements shall be properly filled in. Numbers shall be stated both in words and in figures where so indicated.
- B. All entries or prices and arithmetic shall be checked before submission of the e-Tenders. If there is discrepancy between the rates quoted in figures and in words, the rates expressed in words shall be considered as binding.
- C. Each e-Tender shall be accompanied by the prescribed e-Tender security bond and other required documents and drawings. All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be stated below their signature.

- D. Variation to the contract Documents requested by the Tenderer may be affixed and duly signed and stamped. Such variations may be approved or refused by the Corporation is not obliged to give reason for his decisions.

#### **IT 9. SUBMISSION OF e-TENDER DOCUMENTS**

Tenderers are requested to submit the e-TENDER Documents on following lines.

- A. Volume containing following documents:
- I. e-TENDER security bond (Earnest Money)
  - II. Certificates as registered Contractor with Government of Gujarat or appropriate authority.
  - III. Tenderer's financial capability and standing over at least past five years.
  - IV. Tenderer's experience in the field relevant to this contract.
  - V. A list of the equipment the Tenderer possesses and that which he proposed to acquire and use for the purpose related to the work.
  - VI. Tenderer should submit All the drawings which they have received along with e-Tenders

The time limit for receipt of e-Tender shall strictly apply in all cases. The Tenderers should therefore ensure that their e-Tender is received by the competent authority The Rajkot Municipal Corporation at the required place before expiry of the time limit. No delay on account of any cause for receipt of e-Tender shall be entertained.

The e-Tender must contain the name address and residence and place of business of the person or persons submitting the e-Tender and must be digitally signed.

E-Tenders by partnership firm must be furnished with the full names and addresses of all partners and be signed by one of the members of the partnership or by a legally authorized representative holding power of attorney followed by signature and designation of the person of person signing.

E-Tenders by corporations/companies must be with the legal signed name of the Corporation/Companies by the president or by the secretary or other person or person legally authorized to bind the Corporation/Company in the matter.

#### **All pages to be initialled:**

All signatures in tender documents shall be dated as well as all the pages of the sections of tender documents shall be initialled at the lower right hand corner and signed wherever required in the tender papers by the tenderer or by a person holding power of attorney, authorizing him to sign on behalf of the tenderer before submission of tender.

#### **IT 10 TENDER VALIDITY PERIOD**

The validity period of the e-Tender submitted for this work shall be of One Twenty (120)calendar days from the date of opening of the e-Tender and that the Tenderer shall not be allowed to withdraw or modify the e-Tender offer on his own during the validity period. The Tenderer will not be allowed to withdrawn the e-Tender or make any modifications or additions in the terms and conditions on his own e-Tender. If this is done then the owner shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the earnest money deposit in full.

#### **IT 11 GENERAL PERFORMANCE DATA**

Tenderers shall present all the information which sought for in the e-Tender document in form of various schedules if given. E-Tenders may not be considered if left blank or the schedules are not properly filled in.

#### **IT 12 SIGNING OF E-TENDER DOCUMENTS**

If the e-Tender is made by an individual it shall be signed with his full name above his current address. If the e-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 e-Tender is made by a firm in partnership, it shall be signed by all the partners of the firm above their full names and current address, or by a partner holding the power of attorney for the firm, in which case a certified copy of the power of attorney shall accompany the e-Tender. A certified copy of the partnership deed, current addresses of all the partners of the firm shall also accompany the e-Tender.

If the e-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, shall accompany the e-Tender. Such limited company or corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded.

If the e-Tender is made by a group of firms, the sponsoring firm shall submit complete information pertaining to each firms in the group and state along with the bid as to which of the firms shall have the responsibility for e-Tendering and for completion of the contract documents and furnish evidence admissible in law in respect of the authority to such firms on behalf of the group of firms for e-Tendering 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 e-Tender shall be furnished along with the e-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 the signatures in the e-Tender document shall be dated.

#### **IT 13 WITHDRAWAL OF TENDERS**

If, during the tender validity period, the Tenderer withdraws his Tender, Tender security (Earnest Money) shall be forfeited and Tenderer will be debarred for next three years to quote in R.M.C.

#### **IT 14 INTERPRETATIONS OF e-TENDER DOCUMENTS**

Tenderers shall carefully examine the e-Tender document and fully inform themselves as to all the conditions and matters which may in any way affect the work or the cost thereof. If a Tenderer finds discrepancies, or omission from the specifications or other documents or should be in doubt as to their meaning, he should at once address query to the City Engineer (Special), R.M.C. The result of interpretation of the e-Tender will be issued to all Tenderers as addendum.

#### **IT 15 ERRORS AND DISCREPANCIES IN e-TENDERS**

In case of conflict between the figures and words in the rates the rate 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 e-Tender, if required will be made by an addendum. Each addendum will be made available online to all Tenderers. These shall form a part of e-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 addendum.

#### **ADDENDA**

Addenda form part of the Contract Documents, and full consideration shall be given to all Addenda in the preparation of e-Tender. Tenderers shall verify the number of Addenda issued, if any and acknowledge the receipt of all Addenda in the e-TENDER Failure to so acknowledge may cause the e-Tender to be rejected.

- A. 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 the notice inviting e-Tenders.

#### **IT 17.TAX AND DUTIES ON MATERIALS**

All charge on account of excise duties, Central / State, sales tax, work contract tax, Goods and Service tax and other duties etc. on materials obtained for the works from any source shall be borne by the Contractors. No (P) or 'C' or 'D' form shall be supplied.

#### **IT 18 EVALUATION OF e-TENDERS**

While comparing e-Tenders, the Rajkot Municipal Corporation shall consider factors like price offer is workable with the market price, efficiency and reliability of construction method proposed, compliance with the specifications, relative quality, work done in past with Rajkot Municipal Corporation or other Government Organizations, litigation issues etc. Evaluation criteria specifically mentioned in the specification will also be taken into consideration in the evaluation of e-Tenders.

#### **IT 19 TIME REQUIRED FOR COMPLETION**

The completion period mentioned in this schedule is to be reckoned from the date of notice to proceed. Total completion period is 12 (Twelve) calendar months from the date of issue of notice to proceed and Contractor should adhere to this completion time.

#### **IT 20 POLICY FOR TENDER UNDER CONSIDERATION**

TENDER shall be termed to be under consideration from the opening of the e-Tender until such time any official announcement or award is made. While e-Tenders are under consideration, Tenderers and their representative or other interested parties are advised to refrain from contacting by any means any Corporations personnel or representatives on matters related to the e-Tenders under study.

The Corporation's representatives if necessary will obtain clarification on e-Tenders by requesting such 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 e-Tender after e-Tenders have been opened. This includes any post Tender price revision. Non-compliance with his provision shall make the Tender liable for rejection.

#### **IT 21 PRICES AND PAYMENTS**

The Tenderer must understand clearly that the prices quoted are for the total works or the part of the total works quoted for and include all costs due to materials, labour,

equipment, supervision, other services, royalties, taxes etc. and to include all extra to cover the cost. No claim 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.

Price escalation clause will not be applicable for this tender in any condition.

#### **IT 22 PAYMENT TERMS**

The terms of payment are defined in the General Conditions of Contract and Technical specifications. The Corporation shall not under any circumstances relax these 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 e-Tenders.

#### **IT 23 AWARD**

Award of the contract or the rejection of e-Tenders will be made during the Tender validity period. Schedule-B (Price Schedule) is given for Variouswork. The Contractors are requested to quote their price offer in % below or above on the given price schedule for Variouswork in the given schedule-B (Price Schedule) only.

- A. After all contract contingencies are satisfied and the Notice of Award is issued, the successful Tenderer shall execute the Contract Agreement within the time stated and shall furnish the Bond as required herein. The contract Agreement shall be executed, in form stipulated by the Owner.
- 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 Owner may annul his award and declare the e-Tender security forfeited and will take action as deemed fit.
- C. A corporation, partnership firm or other consortium 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 or other consortium acting as the Tenderer is duly authorized to do so.

#### **IT 24 SIGNING OF CONTRACT**

The successful Tenderer shall be required to execute the contract agreement within 10 days of receipt of intimation to execute the contract, failing which the Corporation will be entitled to annul the award and forfeit the Earnest Money Deposit. The person to sign the contract document shall be person as detailed in Article IT. 12 (signing of e-Tender documents).



## **IT 25 DISQUALIFICATION**

**Ae-Tender shall be disqualified and will not be taken for consideration if,**

- a) The Tender Security Deposit is not deposited in full and in the manner as specified as per Article IT. 7 i.e. Earnest Money Deposit.
- b) The e-Tender is in a language other than English or does not contain its English Translation in case of other language adopted for e-Tender preparation.
- c) The e-Tender documents are not signed by an authorized person (as per Article IT. 12 i.e. signing of e-Tender documents).
- d) The general performance data for qualification is not submitted fully (as per Article IT 11 i.e. General performance Data).
- e) Tenderer does not agree to payment terms defined as per Article IT. 22 i.e. payment terms.

**B. An e-Tender may further be disqualified if,**

- a) Price variation is proposed by the Tenderer on any principle other than those provided in the e-TENDER Documents.
- b) Completion schedule offered is not consistent with the completion schedule defined and specified in e-Tender document.
- c) The validity of e-Tender is less than that mentioned in Article IT. 10 i.e. e-Tender validity periods.
- d) Any of the page or pages of e-Tender is/are removed or replaced.
- e) Any condition which affect the cost.

## **IT 26 PERFORMANCE GUARANTEE (SECURITY DEPOSIT)**

As a contract security the Tenderer to whom the award is made shall furnish a performance guarantee (Security deposit) for the amount of 5% of the contract price to guarantee the faithful performance, completion and maintenance of the works of the contract in accordance with all conditions and terms specified herein and to the satisfaction of the Engineer-in-charge, and ensuring the discharge of all obligations arising from the execution of contract in the forms mentioned below:

- a. By a Demand Draft on the Rajkot Branch of any Scheduled Bank except co-operative bank.
- b. A fixed deposit receipt of any Schedule Bank except Cooperative Bank or Nationalized Bank duly endorsed in favour of the Rajkot Municipal Corporation, Rajkot.
- c. Irrevocable and unconditional Bank Guarantee of Equivalent amount of any Schedule Bank except Co-operative Bank.

The performance guarantee shall be delivered to the Corporation within ten (10) days of the notice of award and at least three (3) days before the contract agreement is signed unless otherwise specified by the Engineer-in-charge. Alternatively, the Contractor may at his option deposit an amount of 2.5% of the value of the contract price within ten days and the balance 2.5% to be recovered in instalments through deduction @ the rate of 10% (TEN) from the running account bills.

On due performance and completion of the contract in all respects,

**THE PERFORMANCE GUARANTEE WILL BE RETURNED TO THE CONTRACTOR WITHOUT ANY INTEREST AFTER THE DEFECT LIABILITY PERIOD IS OVER.**

#### **IT 27 STAMP DUTY**

The successful Tenderer shall have to enter into an agreement on a Non-Judicial stamp paper of amount as per Stamp Duty Act in the form of the agreement approved by the Corporation. The cost of stamp paper and adhesive stamp shall be borne by the contractor.

#### **IT 28 BRAND NAMES**

Specific reference in the specifications to any material by manufacturer's name, or catalogue shall be constructed as establishing a standard or quality and performance and not as limiting competition and the Tenderer in such cases, may at his option freely use only other product, provided that it ensures an equal of higher quality than the standard mentioned and meets Corporation approval.

#### **IT 29 NON TRANSFERABLE**

E-TENDER documents are not transferable.

#### **IT 30 COST OF e-Tendering**

The owner will not defray expense incurred by Tenderers in e-Tendering.

#### **IT 31 EFFECT OF e-Tender**

The e-Tender for the work shall remain for a period of 180 calendar days from the date of opening of the e-Tenders for this work and that the Tenderer shall not be allowed to withdraw or modify the offer in his own during the period. If any Tenderer withdraws or makes any modification or additions in the terms and conditions of his own e-

Tender, then the Corporation shall, without prejudice to any other right or remedy, be at liberty to reject the e-Tender and forfeit the earnest money in full.

#### **IT 32 CHANGE IN QUANTITY**

The Corporation reserves the right to waive any information in any e-Tender and to reject one or all e-Tenders without assigning any reasons for such rejection and also to vary the quantities of items or group as specified in the scheduled of prices as may be necessary.

#### **IT 33 NEW EQUIPMENT AND MATERIAL**

All materials, equipment and spare parts thereof shall be new, unused and originally coming from manufacturer's plant to the Corporation. The rebuilt or overhauled Equipment/materials will not be allowed to be used on works.

#### **IT 34 RIGHTS RESERVED**

The owner reserves the right to reject any or all e-Tenders, to waive any informality or irregularity in any e-Tender without assigning any reason. The owner further reserves the right to withhold issuance of the notice to proceed, even after execution of the contract agreement. No payment will be made to the successful Tenderer on account of such withholding. The owner is not obliged to give reasons for any such action.

#### **IT 35 ADDITIONAL RIGHTS RESERVED**

The Commissioner, Rajkot Municipal Corporation, reserves right to reduce the scope of work & split the e-Tender on two or more parts without assigning any reason even after the awards of contract.

#### **IT 36 MOBILIZATION ADVANCE**

No mobilization advance or advance on machinery will be given.

#### **IT 37 CONDITIONAL e-Tenders**

The scope of work is clearly mentioned in the e-Tender documents. The Contractor shall have to carry out the work in accordance with the details specifications. No condition will be accepted. The conditional e-Tender will liable to be rejected.

#### **IT 38 1% CESS & REGISTRATION:**

For the welfare of labour working under construction Industry, the agency shall have to take the registration with competent authority as per Circular No. CWA/2004/841/M-3 dated 30-01-2006 of Government of Gujarat. Rajkot Municipal Corporation will deduct 1% Cess of the value of work and will deposit the same in Government.

**IT 39 ESI REGISTRATION:**

The contractors who are liable to registered under ESI Act must possess ESI registration number at the time of filling of tender.

**IT 40 PROFESSIONAL TAX**

The bidder shall have to pay the Professional Tax up to current financial year imposed by Government of Gujarat, and also produced Enrolment Certificate for the same.

**IT 41 APPLICATION OF EMPLOYEES' PROVIDENT FUND & MISCELLANEOUS PROVISIONS ACT-1952**

The bidder shall have to follow all the rules and regulations as per "Application of employees' provident fund and miscellaneous provisions ACT-1952".

**IT 42 FILLING OF e-TENDER**

The bidder shall have to fill all the details required in on-line bidding form of e-Tender. Incomplete OR inappropriate OR wrong information filled may cause the e-Tender to be rejected.

**Add Asst Engineer  
Civil Dept.**

**Dy. Ex. Engineer  
Civil Dept. Civil Dept.**

**City Engineer**

**Rajkot Municipal Corporation**

**Signature of Contractor**

## ADDITIONAL INSTRUCTIONS TO THE TENDERER

1. Competency of Tender – No contract will be awarded except to responsible bidders capable of performing the class of works contemplated. Before the award of the contract, any bidder may be required to show that he has the necessary facilities, experience, ability and financial resources to perform the work in satisfactory manner within in the time stipulated. Contractor may be required to furnish the department with the statement as to their experience and their financial status.
  
2. Tender will be deemed to have inspected the site and to have satisfied as to the nature of all works, all existing roads, water-way and other means of communication and access to and from the site and work and the building that may be required for temporary purpose in connection with the construction , completion and maintenance of the works and must make his own inquiries as to work, yard sites and depot, and dumps and as to acquisition of such additional sites and areas as may be necessary for temporary purpose for constructing, completing and maintaining the works.
  - a. The tenders shall be received only under “ONLINE THROUGH E-tendering” No other system, namely receiving of tenders by Hand Delivery ‘or’ by Express Delivery ‘or’ in person, should be adopted under any circumstances.
    - i. Late tenders (i.e. tender received after the specified time of opening), delayed tenders (i.e. Tenders received before the time of opening but after due date and time of receipt of tenders) and post tenders offers shall not be opened and considered at all.
    - ii. The tenders received after time & the date specified in the tender notice shall not be received by the concerned office,
    - iii. Necessary records should be maintained for refusal of such tenders in the registers for receiving tenders and should be initialled by the concerned City Engineer (Special).
  
3. **Payment:-**The tender must understand clearly that the rates quoted are for completed works and include all costs due to labour, scaffolding plant, supervision, service works, power, royalties and Vat & Goods and Service Tax etc. , and to include all extras to cover the cost of night work if and when required and no claim for additional payment beyond the price/rates quoted will be entertained and the tenderer will not be entitled subsequently to make any claim on the ground of misrepresentation or on the ground that he was supplied with information given by any person (whether the member is the employee of Public Works Department or not ) . Any failure on his part to obtain all necessary information for the purpose of making his tender and filling the several prices and rates therein shall not relieve him from any risks or liabilities arising out of or consequent upon the submission of the tender.
  
4. Tender Forms – Every ‘blank’ in the form of the tender and in the schedule must be filled up by the tenderer and must return the document sent herewith.

5. Bidders can prepare and edit their offers number of times before tender submission date and time After tender submission date and time, bidder cannot edit theirsubmitted offer in any case. No written or online request in this regard shall be granted.
6. The contractor shall have to furnish Income Tax Clearance Certificate before his tender is accepted and intimate assessment number and ward under which he is assessed.
7. Copies of certificate as regards previous experience, if any, must accompany the tender.
8. Declaration showing all works on hand with the Contractor and the value of works that remains to be executed in each case must accompany the tender.
9. All pages of Schedule 'A' and 'B' and specifications should be initialled by the Contractor.
10. All corrections, erasures and overwriting should be initialed by the Contractor.
  - i. Discrepancies and adjustment of Errors any error in quantity or amount in Schedule 'B' showing items of works to be carried out shall be adjusted in accordance with the following rules.
  - ii. In the event of a discrepancy between description in words and figures quoted by a tenderer in the rates column, the description in words shall prevail.
  - iii. In the event of an error occurring in the 'amount' column of the Schedule 'B' showing items of work, as a result of wrong multiplication of the unit rate and quantity; the unit rate shall be regarded as firm and multiplication shall be amended on the basis of the rate.
  - iv. All errors in totalling in 'amount' column in carrying forward totals shall be corrected.
  - v. Any rounding of amount against "items" or in "totals" shall be ignored.
11. The tendered sum so altered shall for the purpose of the tender be substituted for the sum originally tendered and considered for acceptance.
12. i) It may please be noted that the tender will be considered as invalid, especially, if the requirements as per instruction No.1 to 10 above are not complied with before submitting the tender. Also please read carefully the face sheet and 'General Rules and Directions for the guidance of contractors of this form  
ii) Right is reserved to reject any or all tender(s) without assigning any reason(s) therefore
13. In addition to the above, the tender will also be liable to be rejected outright it-
  - i. The tenderer proposes any alteration in the work specified or in the time allowedfor carrying out the work or any condition or correction made in any code or mode or Schedule 'B' or specifications.
  - ii. Any of the page of the tender is/ are removed or replaced
  - iii. All corrections, additions or pasted slips are not initialled by the tenderer.
  - iv. Any erasure is made by him in the tender and.
  - v. The tenderer or in the case of a firm, each partner or the person holding the power of attorney thereof does not sign or signature is /are not attested by a witness on page, 15 of the tender in the space provided for the purpose.
14. The quantity of various items mentioned in the schedule-B is liable to increase or decrease. Under the circumstances, the contractor shall have to carry out the work accordingly. Rajkot Municipal Corporation will not entertain any dispute in this regard.

15. The agency has to bear the expenses for all the tests required to be carried out for this tender works.
16. The contractor shall have to get registered under ESI (Employer's State Insurance) Act and obtain ESI Registration number if the number of workers are 10 Nos. or more. Also, the agency shall have to give all the benefits to the workers as available under the ESI Act. The agency should follow all the rules and regulations of ESI Act as per prevailing norms
17. The rate of extra items which is not included in tender item is to be taken from the SOR of RMC/GWSSB/PWD R& B which is prevalent at the time of tendering. The rate of the extra items would be considered in the same percentages (more or less) as quoted by the contractor.
18. A certificate of registration as approved contractor should be attached with tender.

**Add Asst Engineer  
Civil Dept.**

**Dy. Ex. Engineer  
Civil Dept. Civil Dept.**

**City Engineer**

**Rajkot Municipal Corporation**

**Signature of Contractor**

## Special Condition for Contractor

The site for the proposed Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfer Station Near K.S. Diesels in Ward No. 6 (3<sup>RD</sup> ATTEMPT) Contractor is expected to have visited the site and gets to know about the existing structures in and around the Site.

1. Immediately after taking possession of the site, contractor is required to provide office building with following details for the Client i.e. RMC, as per the instruction of Engineer In-charge. No payment for the same shall be given. On completion of the project, this shall become the property of RMC. Office 130 sq.mt. area including toilets and passages with R.C.C. frame structure having Earth Quake Proof design.
  - a) Office space for RMC with room size of 3m x3m fully furnished with one table, 6 executive chairs, with light fixtures complete with vitrified flooring tiles and plastering, painting of the walls with acrylic paint door windows complete & with attached toilet of suitable size & all fixtures.
  - b) Internet:-LAN connectivity with each computer with broadband internet connection.
  - c) Printer:-1 nos. laser printer Model HP 1609 & 1 No. colour laser printer with scanner & copier
  - d) Furniture:-Each room shall have 2 Table with chair & 4 nos. visitor chair & 2 steel cupboard.  
No payment for all the above said items shall be made. On completion of the project, all these shall become the property of RMC.
2. Laboratory for material test shall be approved from Engineer in charge Architect prior to execute the work. And in Civil Items 10 % of Total Material Testing Should be done in GERI.
3. The client/consultant/PMC reserves the right to select the manufacturer or approved make from the list, no change to be permitted in this make during the execution of the contract.
4. The contractor has to establish his own dedicated testing laboratory fully equipped and shall have to deploy a qualified quality Control Engineer (Minimum Qualification as B.E. with 5 years Experience of Q.C. / lab operation.)
5. The water for construction, drinking and other use, shall be arranged by the contractor at his own cost. Similarly arrangement for electricity for construction / domestic use shall be arranged by the contractor and no claim of this account shall be entertained.
6. No deviation from the approved list of makes shall be permitted. In case, certain items of Equivalent is mentioned, the same shall be got approved from PMC/ Engineer in charge before ordering.
7. The contractor has to barricade the premises with steel pipes and steel sheets within week from the commencement of work.



8. The contractor should be given one soil investigation Report to RMC
9. The Contractor Should be paid Proof Checking Fees of Structure design. Proof checking Fees is 0.50% of Estimated Project cost (Rs. 2,29,54,121.00/-) Will be Paid By Agency Either Deducted in Three Equal Part From 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> R.A. Bill from Stage Wise. Proof checking Consultant is approved by engineer in charge.
10. The Agency has to carry out the maintenance of same Building Civil, Interior, Electrical, Plumbing of Redevelopment Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfer Station Near K.S. Diesels in Ward No. 6 (3<sup>RD</sup> ATTEMPT)
13. The Tenderer shall study the project information in brief. The project information in brief is meant only to give the general guidelines to the Tenderer about the project and is not for execution. The tender drawings may undergo a complete change. The Contractor shall make his own arrangements to unload, transport and stack the material in his godown at his own cost. He shall take the material into his safe custody only after inspection and verification of the quality and the quantity of the material received by the EIC/Consultant. The Contractor shall make his own independent arrangement to procure all other materials required to complete the work.
14. In the Items where the only Quote rates are asked contractor shall be binded to execute the item of any quantum of quantity. No extra rate will be paid to contractor.
15. **The rates quoted shall remain firm**, for all works done under this Contract, irrespective of any rise in cost of materials, labour, taxes and without any reference to the quantity or the location of work, till the completion of the project. **Escalation clause will not be applicable to all items mentioned in Tender including extra items.**
16. **The bill of quantities** enclosed is provisional and approximate and liable to change. The Architect and the Owner reserve the right to delete or add any item/ portion of work during the progress of work. Payments shall be effected to the Contractor only on actual quantities of work done at site at the accepted rates. The Contractor must check the quantities from the drawings before ordering/purchasing of any material and must consult the EIC. The Contractor shall be responsible for any variation in quantity of materials ordered by him. The Contractor shall not be entitled to any compensation on the grounds of variation in quantity. RMC will pay for items/ materials only for actual required quantity.
17. Tenderer have to be submitting item like Window-Door and other Movable Material to RMC after dismantling of existing Superstructure.

**1) Project Execution and Management**

The contractor shall ensure that senior planning and erection personnel from his organization are assigned exclusively for this project. They shall have minimum 5 years' experience in this type of installation and shall ensure at least one full time engineer who would be exclusively responsible for ensuring strict quality control, adherence to

specifications and ensuring top class workmanship for the air conditioning installation including electrical works and controls. The names and details of the engineers proposed to be deployed should be indicated along with their qualifications and experience.

The contractor shall arrange to have mechanized & modern facilities of transporting material to place of installation for speedy execution of work.

## **2) Performance Guarantee**

- 1.1. The contractor shall carry out the work in accordance with the Drawings, specifications, schedule of quantities and other documents forming part of the contract as well as site conditions.
- 1.2. The contractor shall be fully responsible for the performance of the selected equipment (installed by them) at the specified parameters and for the efficiency of the installation to deliver the required end result.
- 1.3. The contractor shall guarantee the air conditioning & Ventilation units as installed. The guarantee shall be submitted in the Performa given in **Annexure**.
- 1.4. Complete set of architectural drawings is available in the Architect / Consultant's office and reference may be made to same for any details or information. The contractor shall also guarantee that the performance of various equipment's -individually, shall not be less than the guaranteed capacity, also actual power consumption shall not exceed the guaranteed figure, while handing over and during the guarantee period.

## **3) Bye – Laws and Regulations**

The installation shall be in conformity with the bye-laws, regulations and standards of the local authorities concerned; in so far these become applicable to the installation. But if these specifications and drawings call for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then these specifications and drawings shall take precedence over the said regulations and standards. However, if the drawings and specifications require something which violates the bye-laws and regulations, then the bye-laws and regulations shall govern the requirement of this installation.

## **4) Fees and Permits**

The contractor shall obtain all permits / licenses and pay for any and all fees required for the inspection, approval and commissioning of their installation if required.

## **5) Tender Drawings**

The Architect drawings listed in this Tender, which may be issued with the tenders, are diagrammatic and indicate arrangement of various systems and the extent of work covered in the contract. These drawings indicate the points of supply and of termination of services and broadly suggest the feasible scheme and routes to be followed.

Contractor shall visit site prior to start-up of work to ensure that the layouts meet and match the structural openings and paths for smooth execution.

All such changes shall however be subjected to the Architect / Consultant approval.

**These drawings are not working drawings.**

Under no circumstances shall dimensions be scaled from these drawings. The Architectural / Interiors drawings and details shall be examined for exact location of equipment, controls.

If required, the contractor shall follow the tender drawings in preparation of his shopdrawings, and for subsequent installation work. All works of execution should only commence after receipt of the signed & stamped approval of the consultant / client.

Maximum headroom shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Architect / Consultant / Owner's site representative any discrepancies and obtain clarification. Any changes found essential to coordinate installation of their work with other services and trades, shall be made with prior approval of the Architect / Consultant / Owners site representative without additional cost to the Owner. The data given in the drawings and specifications is as exact as could be procured, but its accuracy is not guaranteed.

**6) Technical Data**

Each tenderer shall submit along with his tender, the technical data, list of makes and data sheets for all items / equipment's offered by them. **Failure to furnish complete technical data with tenders may result in summary rejection of the tender.**

**Add Asst Engineer  
Civil Dept.**

**Dy. Ex. Engineer  
Civil Dept.**

**City Engineer  
Civil Dept.**

**Rajkot Municipal Corporation**

**Signature of Contractor**

### Form of Bid Security (Bank Guarantee)

WHEREAS, \_\_\_\_\_ [Name of Bidder] (hereinafter called "the Bidder") has submitted his bid dated \_\_\_\_\_ [Date] for the construction of' \_\_\_\_\_ [Name of Contract] (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We \_\_\_\_\_ [Name of Bank] of \_\_\_\_\_ [Name of Country] having our registered office at \_\_\_\_\_ (hereinafter called "the Bank) are bound as principal obligator unto \_\_\_\_\_

[Name of Employer] (hereinafter called "the Employer") and unconditionally and irrevocably guarantee the payment to the sum of \_\_\_\_\_ for which payment well and truly to be made to the said Employer the Bank binds himself, his successors and assigns by these presents.

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

#### **THE CONDITIONS of this obligation are:**

- 1) If the bidder withdraws his Bid during the period of bid validity specified in the Form of Bid:  
Or
- 2) If the Bidder refuses to accept the correction of errors in his Bid;  
Or
- 3) If the Bidder, having been notified of the acceptance of his Bid by the Employer during the period of Bid validity;
  - a. fails or refuses to execute the Form of Contract Agreement in accordance with the' Instructions to Bidders, if required;  
Or
  - b. fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders;

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

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

DATE \_\_\_\_\_ SIGNATURE OF THE BANK

WITNESS \_\_\_\_\_ SEAL

(Signature, Name, and Address)

## FORM OF CONTRACT AGREEMENT

### AGREEMENT

THIS AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_  
between of \_\_\_\_\_  
\_\_\_\_ (hereinafter called "the Employer") of the one part and \_\_\_\_\_ of  
(here in after called "the Contractor" of the other part.

WHEREAS the Employer is desirous that certain Works should be executed by the Contractor,  
viz.,

and has accepted a Bid by the Contractor for the execution and completion of such Works and  
the remedying of any defects therein at a cost of

Rs. \_\_\_\_\_ and

\_\_\_\_\_.

NOW THIS AGREEMENT WITNESSETH as follows:

In this Agreement, words and expressions shall have the same meanings as are respectively  
assigned to them in the Conditions of Contract hereinafter referred to.

The following documents shall be deemed to form and be read and construed as part of this  
Agreement, viz:

- a) The Contract Agreement.
- b) The Letter of Acceptance.
- c) The Employer's Requirements.
- d) The Bid.
- e) The Conditions of Contract
- f) The Technical Specifications
- g) The Bid Drawings;
- h) The Price Bid.
- i) The Contractor's Proposal
- j) Minutes of Pre bid meeting
- k) Amendments, Corrigendum, Addenda etc.

In consideration of the payments to be made by the Employer to the Contractor as  
hereinafter mentioned, the Contractor hereby covenants with the Employer to execute  
and complete the Works and remedy any defects therein in conformity in all respects  
with the provisions of the Contract. The Employer hereby covenants to pay the  
Contractor in consideration of the execution and completion of the Work and the  
remedying of defects therein the Contract Price or such other sum as may become

payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed the day and year first before written. The Common Seal of

\_\_\_\_\_ was

Hereup to affixed in presence of:

\_\_\_\_\_ or \_\_\_\_\_

Signed, sealed and delivered by the said \_\_\_\_\_

In the presence of: \_\_\_\_\_

Binding Signature of Employer \_\_\_\_\_

**Binding Signature of Contractor** \_\_\_\_\_

## TERMS & CONDITIONS OF CONTRACT

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GC-5	Interpretation of Contract Document
GC-6	Contractor to understand himself fully
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GC-93	Health and Sanitary arrangements for workers
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**GC-01      DEFINITIONS AND INTERPRETATIONS:**

- 1.0 In the contract (as hereinafter defined) the following words and expressions shall, unless repugnant to the subject or context thereof, have the following means assigned to them.
- 1.1 The "Owner / Corporation" shall mean Rajkot Municipal Corporation and shall include its Municipal Commissioner or other Officers authorized by the Corporation and also include owner's successors and assignees.
- 1.2 The "Contractor" shall mean the person or the persons, firm or Company whose e-Tender has been accepted by the Owner and includes the Contractor's legal representative, his successors and permitted assignees.
- 1.3 **DELETED**
- 1.4 The "Engineer-In-Charge" shall mean the person designated as such by the owner from time to time and shall include those who are expressly authorized by the Corporation to act for and on its behalf for all functions pertaining to the operation of this contract.
- 1.5 Engineer-In-Charge's Representative shall mean any resident Engineer or Assistant to the Engineer-In-Charge appointed from time to time by the owner to perform duties set forth in the E-TENDER Document whose authority shall be notified in writing to the Contractor by the Engineer-In-Charge.
- 1.6 "E-TENDER" – the offer or proposal of the Tenderer submitted in the prescribed form setting for the prices for the work to be performed, and the details thereof.
- 1.7 "Contract Price" shall mean total money payable to the Contractor under the contract.
- 1.8 "Addenda" shall mean the written or graphic notices issued prior to submission of e-Tender which modify or interpret the contract documents.
- 1.9 "Contract Time" – the time specified for the completion of work.
- 1.10 "Contract" shall mean agreement between the parties for the execution of works including therein all contract documents.
- 1.11 "Contract Document" shall mean collectively the e-Tender documents, designs, drawings, specifications, agreed variations, if any and such other documents constituting the e-Tender and acceptance thereof.
- 1.12 "The Sub-Contractor" shall mean 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

representative successors and permitted assignee of such person, firm or company.

- 1.13 The "Specifications" shall mean all directions, the various Technical Specifications, provisions and requirements attached to the contract which pertains to the method and manner of performing the work, to the quantities and qualities 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 Standard Institute Specification relative to the particular work or part thereof, so far as they are not contrary to the E-TENDER specifications and in absence of any other Country applied in Indian as a matter of standard engineering practice and approved in writing by the Engineer-In-Charge with or without modification.
- 1.14 The "Drawings" shall include maps, plans, tracings, or prints thereof with any modification approved in writing by the Engineer-In-Charge and as 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.
- 1.15 The "Work" shall mean the works to be executed in accordance with the contract 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 materials, equipment and labour required for or relative or incidental to or in connection with the commencement, performance and completion of any work and / or incorporation in the work.
- 1.16 The "Permanent Work" shall mean 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.
- 1.17 The "Temporary Work" shall mean all temporary works of every kind required in or about the execution, completion and maintenance of the work.
- 1.18 "Site" shall mean the land and other places, on, under, in or through which the permanent works are to be carried out and any other lands or places provided by the Corporation for the purpose of the contract together with any other places designated in the contract as forming part of the site.
- 1.19 The "Construction Equipment" shall mean all appliances / equipment of whatever nature required in or for execution, completion or maintenance of works or temporary works (as herein before defined) but does not include materials or other things intended to form or forming part of the permanent work.

- 1.20 "Notice in writing or written Notice" shall mean a notice written, typed or in printed form delivered personally or sent by Registered Post to the last known private or business address or Registered Office of the Contractor or Email or SMS on theCell phone of the contractor and shall be deemed to have been received in the ordinary course of post it would have been delivered.
- 1.21 The "Alteration / variation order" shall mean an order given in writing by the Engineer-In- Charge to effect additions or deletions from or alterations in the work.
- 1.22 "Final Test Certificate" shall mean the final test certificate issued by the owner within the provisions of the contract.
- 1.23 The "Completion Certificate" shall mean the certificate to be issued by the Engineer-In-Charge when the work has been completed and tested to his satisfaction.
- 1.24 The "Final Certificate" shall mean the final certificate issued by the Engineer-In-Charge after the period of defects liability is over and the work is finally accepted by the owner.
- 1.25 "Defects Liability Period" shall mean the specified period between the issue of Completion Certificate and the issue of final certificate during which the Contractor is responsible for rectifying all defects that may appear in the works.
- 1.26 "Approved" shall mean approved in writing including subsequent confirmation in writing of previous verbal approval and "Approval" means approved in writing including as aforesaid.
- 1.27 "Letter of Acceptance" shall mean an intimation by a letter to Tenderer that his e-Tender has been accepted in accordance with the provisions contained therein.
- 1.28 "Order" and "Instructions" 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.
- 1.29 "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 supply of non-perishable materials to be incorporated in the work.
- 1.30 "Security Deposit" shall mean the deposit to be held by the owner as security for the due performance of the contractual obligations.
- 1.31 The "Appointing Authority" for the purpose of Arbitration shall be the Municipal Commissioner, Rajkot Municipal Corporation.
- 1.32. "Retention Money" shall mean the money retained from R.A. Bills for the due completion of the "LET WORKS".
- 1.33 Unless otherwise specifically stated, the masculine gender shall include the feminine and neuter genders and vice-versa and the singular shall include the plural and vice-versa.

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

The work is to be carried out in CITY AREA. Non-availability of access roads shall in no case be the cause to condone delay in the execution of the work and no claim or extra compensation will be paid.

**GC-03 SCOPE OF WORK:**

The scope of work is defined broadly in the special conditions of contract and specifications. The Contractor shall provide all necessary materials, equipment and labour etc. for the execution and maintenance of the work. All material that goes with the work shall be approved by the Engineer-In-Charge prior to procurement and use.

**Power Supply:**

The Contractor shall make his own arrangement for power supply during installation.

**Land for Contractor's Field Office, Godown Etc.:**

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

**GC-04 RULING LANGUAGE:**

The language according to which the contract shall be construed and interpreted shall be English. All entries in the contract document and all correspondence between the contractor and the Corporation or the Engineer-In-Charge shall be in English/Gujarati. All dimensions for the materials shall be given in metric units only.

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

1. The provision of the General Conditions of Contract and Special Conditions of Contract shall prevail over those of any other 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 decision. The Engineer-In-Charge's decision in such case shall be final and binding to the Contractor.
2. Works shown upon the drawings but not described in the specifications or described in the specifications without showing on the drawings shall be taken as described in the specifications and shown on the drawings.
3. The headings and the marginal notes to the clause of these General Conditions of Contract or to the specifications or to any other part of e-Tender documents are solely for the purpose of giving a concise indication and not a summary of contents thereof. They shall never be deemed to be

part thereof or be used in the interpretation or construction of the contract.

4. Unless otherwise states specifically, in this contract documents the singular shall include the plural and vice-versa wherever the context so requires. Works imparting persons shall include relevant Corporations / Body of individual / firm of partnership.
5. Notwithstanding the sub-division of the documents into separate section and volumes every part of each 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 General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, then, unless a different intention appears, the provisions of the special conditions of contract shall be deemed to override the provision of General Conditions of contract the extent of each repugnancy of variance.
7. The materials, design, and workmanship shall satisfy the relevant ISS, and codes referred to. If additional requirements are shown in the specifications, the same shall be satisfied over and above ISS and other codes.
8. If the specifications mention that the Contractor shall perform certain work or provide certain facilities, it shall mean that the Contractor shall do so at his own cost.

9. **Contractor to Collect His Own Information**

The details given in the e-Tender are arranged making necessary investigations for framing an estimate. However, when the work is being executed, changes in soil conditions are likely to be met with in view of the formation of soil, strata in Rajkot District. It is, therefore, desirable that the Contractor makes his own investigations or additional investigations as may be required for correctly assessing the cost of different items of work and submit his e-Tender accordingly. Any change in description or quantity of an item 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 e-Tendered rates.

He is deemed to have known the scope, nature and magnitude of the work and the requirements of materials and labour involved and as to whatever work he has to complete in accordance with the contract. The Contractor is expected to visit the site and surroundings to satisfy himself as 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 communications whether by land, air or water and as to possible interruptions thereto and the access and gross from the site, to have examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the site for disposal of surplus materials, the

available accommodation and make such enquiries as may be necessary for executing and completing the work, to have local enquiries as to the sub-soil, subsoil water and variation thereof, storms, prevailing winds, climatic conditions and all other similar matters, effecting work. He is expected to be familiar with his liability for payment of Government taxes, customs and excise duty and other charges etc. in contract with the execution of this contract.

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

The Contractor by e-Tendering shall be deemed to have satisfied himself, as to all considerations and circumstances affecting the e-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 understood 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, however, obtained.

**GC-07      ERRORS IN SUBMISSIONS:**

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-In-Charge or not.

**GC-08      SUFFICIENCY OF e-TENDER:**

The Contractor shall be deemed to have satisfied himself before e-Tendering as to the correctness of the e-Tender rates which rates shall, except as otherwise provides for, cover all the Contractor's liabilities and obligations set forth or implied in the contract for the proper execution of the work for compliance with requirements of Article GC-19 thereof.

**GC-09      DISCREPANCIES:**

The drawings and specifications are to be considered as mutually explanatory of each other, detailed drawings being followed in preference to small-scale drawings and figured dimensions in preference to scale and special conditions in preference to General Conditions. The special directions or dimensions given in the specifications shall supercede 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 dimensions 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 work executed under this contract or as extra there upon, the same shall be explained by the Engineer-In-Charge and his explanation shall be subject to the final decision of the Municipal Corporation in case reference be made to it, be binding upon the Contractor and the Contractor shall execute the work according to such explanation and without addition or to deduction from the contract price 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 the said specifications. In cases where no particular specifications are given for any article to be used under the contract, the relevant specifications of the Indian Standard Institution shall apply.

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

1.            A sum of 5% of the accepted value of the e-Tender shall be deposited by the Tenderer (hereinafter called the contractor when e-Tender is accepted) as security deposit with the owner for the faithful performance, completion and maintenance of the works in accordance with the contract documents and to the satisfaction of the Engineer-In-Charge and assuring the payment of all obligations arising from the execution of the contract. This shall be deposited in one of the forms mentioned below:

- a.    By a Demand Draft on the Rajkot Branch of any Scheduled Bank except co-operative bank.
- b.    A Fixed Deposit Receipt of a Schedule Bank duly endorsed in favour of the "**RAJKOT MUNICIPAL CORPORATION**", Rajkot.
- c.    Irrevocable and unconditional Bank Guarantee of Equivalent amount of any Schedule Bank except Co-operative Bank.
- d.    The Contractor may pay 2.5% of the value of works as initial security deposit and the balance 2.5% shall be recovered in instalments through deductions at the rate of 10 (ten) percent of the value of each Running Account Bill till the total security execution exceeds the accepted value of e-Tender because of allotment of further work, further recoveries towards security deposit shall be effected at 10% of the R A Bills to make up the five percent security deposit of the revised value of contract. Alternatively, the Contractor may at his option deposit the full amount of 5 percent of security deposit within ten days of receipt by him of the notification accepting the e-Tender in the form as aforesaid.

2.            If the Contractor, sub-contractor or their employees shall break, deface or destroy any property belonging to the owner or other agency during the execution of the contract, the same shall be made good by the contractor at his own expense and in default thereof, the Engineer-In-Charge may cause the same to be made good by other agencies and recover expense from the Contractor (for which the certificate of the Engineer-In-Charge shall be final). This expense can be recovered from the security deposit if recovery from other sources is not possible. The amount as reduced in security deposit will be made good by deduction from the next R A. Bill of the Contractor.

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

The Engineer-In-Charge shall have full power and authority to inspect the work at any time wherever in progress either on the site or at the Contractor's or any other manufacturer's workshop or factories wherever situated and the Contractor shall afford to Engineer-In-Charge every facility



and assistance to carry out such inspection, Contractor or his authorized representative shall, at all time during the usual working hours and all times when 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 ten (10) days' notice in writing to the Engineer-In-Charge before covering up or otherwise placing beyond reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of the above, the same shall be uncovered at Contractor's expenses for carrying out such inspection or measurement. The material shall be dispatched from Contractor's store on site of work before obtaining approval in writing of the Engineer-In-Charge. Contractor shall provide at all times during the progress of work and maintenance period of proper means of access with ladders, gangways, etc. and make necessary arrangement 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 24 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 issue of Completion Certificate connected in any way with the equipment or materials supplied by him or in the workmanship shall be rectified or replaced by Contractor at his own expense as desired by Engineer-In-Charge or in default Engineer-In-Charge may cause the same to be made good by other agency and deduct expenses of which the certificate of Engineer-In-Charge shall be final from any sums that may then or any time thereafter become due to Contractor or from his security deposit or the proceeds of sale thereof or of a sufficient portion thereof.
2. From the commencement to completion of work Contractor shall take full responsibility for the care of the work including all temporary works and in case any damages, occur from any cause whatsoever he shall at his own cost, repair and make good the same so that on completion, work shall be in good order and in conformity, in every respect, with the requirements of contract and as per the instructions of the Engineer-In-Charge.
3. If at any time before the work is taken over, the Engineer-In-Charge
  - a) Decide that any work done or materials used by the Contractor are defective or not in accordance with the contract or that work or any portion thereof is defective or do not fulfil the requirements of contract (all such materials being herein after called defects in this clause) he shall, as soon as reasonably practicably, give notice to Contractor in writing of the said defect specifying particulars of the same then Contractor shall at his own expense 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 stops as may in all circumstances be responsible to make good such defects. The expenditure so incurred by owner will be recovered from the amount due to Contractor. The decision of Engineer-In-Charge with regard 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 INSTRUCTIONS:**

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 the 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 and effectively although the same had accompanied or had been mentioned or referred to in the 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, he shall nevertheless carry it out and any disagreement as to the nature of the work and the rate to be paid to thereof shall be resolved.

The time of completion of works shall, in the event of any deviations being ordered resulting in additional cost or reduction in cost over the contract sum, be extended or reduced reasonably 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 the essence of the contract. The contract period shall commence from the date of notice of intimation to proceed. The Tenderer at the time of submitting his e-Tender shall indicate in the construction schedule his programme of execution of work commencement with the total time specified. The Contractor shall provide the Engineer-In-Charge a detailed programme of time schedule for execution of the works in accordance with the specifications and the completion date. The entire programme to be finalized by the Contractor, has to conform to the execution period mentioned along with the Bill of Quantities in the e-Tender documents. The Engineer-In-Charge upon scrutiny of such submitted programme by Contractor, shall examine suitability of it to the requirement of contract and suggest modifications, if found necessary.

**GC-15      SUB-LETTING OF WORK:**

No part of the contract nor any share of interest thereon shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm or Corporation whosoever except

as provided for in the succeeding sub-clause, without the consent in writing of the owner.

**GC-16**

**SUB-CONTRACTS FOR TEMPORARY WORKS ETC:**

The owner may give written consent to sub-contractors for execution of any part of the works at the site, being entered upon the contractor provided each individual contract is submitted to the Engineer-In-Charge before being entered into and is approved by him. List of subcontractors to be supplied.

Notwithstanding any subletting with such approval as aforesaid and notwithstanding the Engineer-In-Charge shall have received of any sub-contractors, the Contractor shall be and shall remain solely responsible for the quality and proper and expeditious execution of the works and the performance of all the conditions of contract in all respects as if such subletting or subcontracting had not taken place and as if such works had been done directly by the Contractor.

**GC-17**

**TIME FOR COMPLETION:**

The work covered under this contract shall be commenced from the date the 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 GC-18 "Extension of Time", the Contractor shall pay liquidated damages for the delay.

The general time schedule for construction is given in the e-Tender document. Contractor shall prepare a detailed weekly or monthly construction programme in consultation with the Engineer-In-Charge soon after the agreement and the work shall be strictly executed accordingly.

The time for construction includes, the time required for testing, rectifications, if any, retesting and completion of the work in all respects to the entire satisfaction of the Engineer-In-Charge except the items which are not coming in the way to commission the project.

Monsoon Period From 1<sup>st</sup> July to 30<sup>th</sup> September Shall Be Considered as non-Working Period hence Excluded in time limit.

**GC-18**

**EXTENSION OF TIME:**

Time shall be considered as the essence of the contract. If, however, the failure of the Contractor to complete the work as per the stipulated dates referred to above arises from delays on the part of Corporation in supplying the materials or equipment, it has undertaken to supply under the contract or from delays on the quantity of work to be done under the contract, or force majeure an appropriate extension of time will be given by the Corporation. The Contractor shall request for such extension within one month of the cause of such delay and in any case before expiry of the contract period.

**GC-19      CONTRACT AGREEMENT:**

The successful Tenderer shall enter into and execute the contract agreement within 10 (ten) days of the notice of award, in the form shown in e-Tender documents with such modifications as may be necessary in the opinion of the Corporation. It shall be incumbent on the Contractor to pay the stamp duty and the legal charges for the preparation of the contract agreement.

**GC-20      LIQUIDATED DAMAGES:**

If the Contractor fails to complete the work or designated part thereof within the stipulated completion date for the work or for the part, he shall pay liquidated damages at 0.1 (zero point one) percent of contract value for per day of delay subject to maximum of 10% of the contract value or as decided by Municipal Commissioner.

The Contractor shall complete one-sixth quantum of work within one fourth period, four-tenth quantum of work within one-half period and eight-tenth quantum of work within three-fourth period, failing which, the Contractor shall be liable to pay liquidated damages an amount as specified above, or as decided by Municipal Commissioner.

The amount of liquidated damages shall, however, be subjected to a maximum of 10 percent of the contract value.

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

Whenever any claim against the Contractor for the payment of a sum of money out of or under the contract arises, the Corporation 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 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 recession notice in writing 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 labour and to supply materials to carry out the balance work debiting Contractor with the cost of labour 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% of 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 thereof as shall be unexecuted out of his hand and give it to another Contractor to complete, the same. in this case the excess expenditure incurred than what would have been paid to the original Contractor, if the whole work had been executed by him, shall be borne 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 for the excess expenditure, the certificate of the Engineer-In-Charge shall be final and conclusive.

In the event any of the above courses being adopted by the owner, the Contractor shall have no claims for compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any agreements or made any advance on account of or with a view to the execution of the work or the performance of the contract.

In purchase the Contractor shall not be entitled to recover or be paid any 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 the powers as stated in a, b, c, above vested in him under the proceeding clause, he may, if he so desires, take possession of all or any tools and plant, materials and stores in or upon the works 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.

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 in the event of the Contractor failing to comply with any such notice, the Engineer-In-Charge may remove them at the Contractor's expenses or sell them by auction or private sale on account of the Contractor and his risks in all respects without any further notice as to the date, time or place of the sale and the certificate of Engineer-In-Charge as to the expense 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.

If at any time from the commencement of the work, the owner shall for any reasons whatsoever not require the whole work or part thereof as specified in the e-Tender to be carried out, the Engineer-In-Charge shall give notice in writing of the fact to the Contractor, who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of full amount of the work not having been carried out. He also shall not have any claim for compensation by reasons of any alterations having been made in original specifications, drawings, designs and instructions 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 owner 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 or business concern, such approval as aforesaid shall, likewise be obtained before Contractor enters into an 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 contravention of subletting clause hereof and the same action may be taken and the same consequence shall ensure as provided in the subletting clause.

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

Without prejudice to any of the rights 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      MEMBERS 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 obligation of the owner under the contract, or answerable for any default or omission in the observance or performance of any 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, promise or guarantees given or alleged to have been given to him by any person.

**GC-27      CONTRACTOR'S OFFICE AT SITE:**

The Contractor shall provide and maintain an office at the site for the accommodation of his agent and staff and such office shall remain open at

all reasonable hours to receive information, notices or other communications.

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

The Contractor on award of the work shall name and depute a qualified Engineer having experience of carrying out work of similar nature, whom equipment, 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, competent sub-agents, foreman and loading hands including those specially qualified by previous experience to supervise the type of works comprised in the contract in such manner as will ensure work of the best quality and expeditious 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-contractors, if any, shall provide competent and efficient supervision over the work entrusted to them.

If and whenever any of the Contractor's or sub-contractor's agents, sub-agents, assistants, foreman or other employees shall, in the opinion of the Engineer-In-Charge, be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties or that in the 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 such person or persons from employment thereon. Any person or persons so removed shall not again be re-employed 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 expense 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 after approval of Engineer-In-Charge and shall bear all costs in connection therewith?

The Contractor shall be responsible for the proper behaviour of all the staff, foreman, workmen and others and shall exercise proper control over them and in particular and without prejudice to the said generality, 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 or of the properties or occupiers of land and properties in the neighbourhood 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 ground whatsoever. The decision of the Engineer-In-Charge upon any matter arising under this claim shall be final.

**GC-29**

**TERMINATION OF SUB-CONTRACT BY OWNER :**

If any sub-contractor engaged upon the works at the site execute any work which in the opinion of Engineer-In-Charge is not accordance with the contract documents, the owner may by written notice to the Contractor request him to terminate such sub-contract and the Contractor upon the receipt of such notice shall terminate such sub contracts and the latter 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

- i) Fail to carry out works in conformity with the contract documents, or
- ii) Fail to carry out the works in accordance with the time schedule, or
- iii) Substantially suspend work or the works for a period of seven days without authority from Engineer-In-Charge, or
- iv) Fail to carry out and execute the work to the satisfaction of the Engineer-In-Charge, or
- v) Fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or
- vi) Commit breach of any other provisions of the contract on his part to be performed or observed or persists in any of the above mentioned breaches of the contract for seven days after notice in writing shall have been given to the Contractor by the Engineer-In-Charge requiring such breach to be remedied, or
- vii) Abandon the work, or
- viii) During the continuance of the contract becomes bankrupt, make any arrangement or compromise with his creditors, or permit any execution to be levied or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction 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 stores therein and to revoke the Contractor's license to use the same and to complete the works by his agents, other Contractor or workmen, to relate the same upon any terms 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 authorize the use of any materials, temporary works, constructional plant, and stores as aforesaid with making payments or



allowance to the Contractor for the said materials other than such as may be certified in writing 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 loss or damage thereto. If the owner shall be reason of his taking possession of the works or of the work being got completed by other Contractor incurred excess expenditure 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 constructional plant, materials etc., consist constructed by or belonging to and to 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 conditions, it shall be the responsibility of the Contractor executing the work, to work in close co-operation and co-ordination with other Contractors or their authorized representatives and the Contractor will put a joint scheme with the concurrence of other contractors or their authorized representatives 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 bylaws of any local or duly constituted authorities or public bodies which may be applicable from time to time to works or any temporary works. The Contractor s 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 levelling, 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 of all contents therein.

**GC-34**      **RIGHTS OF VARIOUS INTERESTS:**

The owner reserves the right to distribute the work between more than one Contractor. Contractor shall co-operate and afford reasonable opportunity to other Contractors for access to the works, for the carriage and storage of materials and execution of their works. Whenever the work being done by 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 the Engineer-In-Charge to secure the completion of various portions of the work in general harmony.

**GC-35**      **PRICE ADJUSTMENTS:**

**No adjustment in price shall be allowed and no price escalation will be allowed.**

**GC-36**      **TERMS OF PAYMENT:**

The payment of bills shall be made progressively according to the rules and practices followed by the 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 a bill by the Contractor in prescribed form of an amount according to the value of the work performed less the price of materials supplied by owner aggregate of previous progressive payments and as required by Clause GC-37 (Retention of Money) herein. All such progressive payments shall be regarded as payments 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-81 (measurement of work in progress).

**GC-37**      **RETENTION MONEY:**

Pursuance to clause GC-36 (Terms of Payment) any on at money due to the Contractor for work done, Corporation will hold as Retention money five (5) percent of the value of work. 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 Corporation and a completion certificate issued by the Corporation in pursuant to Clause-GC 79 (Completion Certificate).

**GC-38**      **PAYMENTS DUE FROM THE CONTRACTOR:**

All costs, damages or expenses, for which under the contract, Contractor is liable to the Corporation, may be deducted by the Corporation from any money due or becoming due to the Contractor under the contract or from

any other contract with the Corporation or may be recovered by action at law or otherwise from the Contractor.

**GC-39      CONTINGENT FEE:**

i) The Contractor warrants that he has not employed a person to solicit or secure the contract upon any agreement for a commission, percentage, and brokerage contingent fee. Breach of this warranty shall give the Corporation the right to cancel the contract or to take any drastic measure as the Corporation may deem fit. The warranty does not apply to commissions' payable by the Contractor to establish commercial or selling agent for the purpose of securing business.

ii) No officer, employer or agent of the Corporation shall be admitted to any share or part of this contract or to any benefit that may rise there from.

**GC-40      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 in writing by the Engineer-In-Charge in accordance with the contract, or shall contravene the provisions of the contract, the 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 14 (fourteen) days of receipt, it shall be lawful for the Corporation, without prejudice to any other rights the Corporation may have under the contract, to terminate the contract for all or part of the works and black list / debar from the works of RMC work for the period of three years, and make any other arrangements it shall deem necessary to complete the work outstanding under the contract at the time of termination. In this event, the performance Bond shall immediately become due and payable to the Corporation. The value of the work done on the date of termination and not paid for shall be kept as deposit for adjustment of excess expenditure incurred in getting the remaining work completed and the Corporation shall have free use of any works which the Contractor may have at the site at the time of termination of the contract.

If Contractor fails to carry out the work in timely manner as mentioned in GC-20, Rajkot Municipal Corporation may give notice in writing to the Contractor to expedite the progress of work, so that the work can be completed as per time schedule. If Contractor fails to expedite the progress of work within 14 days, Rajkot Municipal Corporation may terminate the contract and put the Contractor in Black List for three years and the remaining work will be executed through other agency at the risk and cost of the Contractor.

**GC-41      DEFAULT OF CONTRACTOR:**

(i) The Corporation may upon written notice of default to the Contractor terminate the contract circumstances detailed as under:

a) If in the opinion of the 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 Corporation to the Contractor.

b) If in the opinion of the Corporation, the Contractor fails to comply with any of the other provisions of this contract.

ii) In the event, the Corporation terminates the contract in whole or in part as provided in Article GC-50 (Termination of the Contract) the Corporation reserves the right to purchase upon such terms and in such manner as it may be deemed appropriate, plant similar to one which is not supplied by the Contractor and the Contractor will be liable to the Corporation for any additional costs for such similar plant and / or for liquidated damages for delay until such time as may be required for the final completion of works.

iii) If this contract is terminated as provided in this paragraph GC-30 (Power of Entry) (1) the Corporation in addition to any other rights provided in this clause, may require the Contractor to transfer title and deliver to the Corporation.

a) Any completed works

b) Such partially completed information and contract rights as the Contractor has specifically produced or acquired for the performance of the contract so terminated.

iv) In the event, the Corporation does not terminate the contract as provided in the paragraph GC-50 (Termination of Contract) the Contractor shall continue performance of the contract, in which case, he shall be liable to the Corporation for liquidated damages for delay until the works are completed and accepted.

**GC-42**

**BANKRUPTCY:**

If the Contractor shall become bankrupt or insolvent or has a receiving order made against him, or compound with his creditors, or being the Corporation commence to be wound up not being a member voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a receiver for the benefit of his creditors or any of them, the Corporation 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-41 (Default of Contractor) as though the last mentioned notice had been the notice referred to in such article or (b) to give such receiver, liquidator or other

persons in whom the contract may become vested the option of carrying out 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 Corporation terminates the contract in accordance with this article, the performance bond shall immediately become due and payable on demand to Corporation.

**GC-43**      **OWNERSHIP:**

Works hand over pursuant to the contract shall become the property of the 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 sum to which he may become entitled in respect thereof pursuant to Clause GC-36 (Terms of Payment).

**GC-44**      **DECLARATION AGAINST WAIVER:**

The condemnation by the Corporation of any breach or breaches by the Contractor or an authorized sub-contractor of any of the stipulations and conditions contained in the contract, shall in no way prejudice or affect or be construed as a waiver of the Corporation's rights, powers and remedies under the contract in respect of any breach or breaches.

**GC-45**      **LAWS GOVERNING THE CONTRACT:**

This contract shall be construed according to and subject to the laws of India and the State of Gujarat and under the jurisdiction of the Courts of Gujarat at Rajkot.

**GC-46**      **OVER PAYMENT AND UNDER PAYMENT:**

Whenever any claim for the payment of a sum to the Corporation arises out of or under this contract against the Contractor, the same may be deducted by the 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 Corporation (which may be available with the Corporation), or from his retention money or he shall pay the claim on demand. The Corporation reserves the right to carry out post payment audit and technical examinations of the final bill including all supporting vouchers, abstracts etc. The Corporation further reserves the right to enforce recovery of any 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-49 (Arbitration) of this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award. If as a result of such audit and technical examinations 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 Corporation from the Contractor as prescribed above. If any under payment is discovered by the Corporation, the amount due to the Contractor under this contract, may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the Contractor.

**GC-47**      **SETTLEMENT OF DISPUTES:**

Except as otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Engineer-In-Charge subject to a written appeal by the Contractor to the Engineer-In-Charge and those decisions shall be final and binding on the parties hereto. Any disputes or differences 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 disputed issues shall be settled as provided in Article GC-48 (Disputes or differences to be referred to) and Article No.GC-49 (Arbitration).

**GC-48**      **DISPUTES OF DIFFERENCES TO BE REFERRED TO:**

If at any time, any question, disputes or differences of any kind whatsoever shall arise 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 or difference as to any decision, opinion, instruction, direction, certificate or evaluation of the Engineer-In-Charge. The question, dispute or differences shall be settled by the Municipal Commissioner, Rajkot Municipal Corporation, who shall state his decision in writing and give notice of same to the Engineer-In-Charge and to the Contractor. Such decision shall be final and binding upon both parties. The contract and work on contract if not already breached or abandoned shall proceed normally unless and until the same shall be revised (or uphold) by any arbitration proceedings as hereinafter provided. Such decisions shall be final and binding on the Engineer-In-Charge and the Contractor unless the Contractor shall require the matter to be referred to an Arbitration panel as hereinafter provided.

**GC-49**      **ARBITRATION:**

In case of any dispute arising during the course of execution, the matter should be referred to Municipal Commissioner who will be sole Arbitrator whose decisions will be final and binding to the Contractor.

**GC-50**      **TERMINATION OF THE CONTRACT:**

i) If the Contractor finds it impracticable to continue operation owing to force majeure reasons or for any reasons beyond his control and/or the

Corporation find it impossible to continue operation, then prompt notification in writing shall be given by the party affected to the other.

ii) If the delay or difficulties so caused cannot be expected to cease or become unavoidable or if operations cannot be resumed within two (2) months then either 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-In-Charge and for any other legitimate expenses due to him.

b) If the Corporation 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 two (2) months period including any financial commitment made for the proper performance of the contract and which are not reasonably defrayed by payments under (a) above.

c) The Corporation shall also release all bonds and guarantees at its disposal except in cases where the total amount of payment made to the Contractor exceeds the final amount due to him in which case the Contractor shall refund the excess amount within thirty (30) days after the termination and the Corporation thereafter shall release all bonds and guarantees. Should the Contractor fail to refund the amounts received in excess within the said period such amounts shall be deducted from the bonds or guarantees provided.

iii) On 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 Corporation with respect to completion safeguarding of storing materials procured for the performance of the contract and the salvage and resale thereof.

**GC-51**      **SPECIAL RISKS:**

If during the contract, there shall be an 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 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 endeavours 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.

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, cyclones, epidemics, quarantine restrictions, lockouts, strikes, freight embargoes and provided that the Contractor shall within 10 (ten) days from the beginning of such delay notify the Engineer-In-Charge in writing, of the cause of delay, the Corporation shall verify the facts and grant such extension as the facts justify.

**GC-52 CHANGE IN CONSTITUTION:**

Where the Contractor is a partnership firm, the prior approval in writing of the owner shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or 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 contract.

**GC-53 SUB-CONTRACTUAL RELATIONS:**

All works performed for the contract by a sub-contractor shall be pursuant to an appropriate agreement between the Contractor and the sub-contractor, which shall contain provision to –

- a) Protect and preserve the rights of the Corporation and the Engineer-In-Charge with respect to the works to be performed under the subcontracting party will not prejudice such rights.
- b) Require that such work be performed in accordance with the requirements of contract documents.
- c) Require under such contract to 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 comply in accordance with the contract documents for like claims by the Contractor upon the 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 of such insurance held by the Corporation as trustee and,
- e) Obligate each sub-contractor specifically to consent to the provisions of this Article.

**GC-54 PATENTS AND ROYALTIES:**

- 1 Contractor, if licensed under any patent covering equipment, machinery, materials or composition of matter to be used or supplied or methods



and process to be practiced or employed in the performance of this contract agrees to pay all royalties and license fees, which may be due with respect thereto. If any equipment, machinery, materials, composition matters, to be used or supplied or methods practiced or employed in the performance of this contract, is covered by a patent under which Contractor is not licensed, then the Contractor before supplying / using the equipment, machinery, materials, compositions, methods of process shall obtain such license and pay such royalties and license fees as may be necessary for performance of this contract. In the event Contractor fails to pay such royalty or to obtain any such license, any suit for infringement of such patents which is brought against the Contractor or the owner as a result of such failure will be defended by the Contractor at his own expenses and the Contractor will pay any damages and costs awarded in such suit. The Contractor shall promptly notify the owner if the Contractor has acquired knowledge of any plant under which a suit for infringement could be reasonably brought because of the use by the owner of any equipment machinery, materials, process methods to be supplied in hereunder. Contractor agrees to and does hereby grant to owner together with the right to extend the same to any of the subsidiaries of the owner an irrevocable royalty fee license to use in any Country, any invention made by the Contractor or his employees in or as a result of the performance of work under contract.

- 2 With respect to any sub-contract entered into by Contractor pursuant to the provisions of the relevant clause hereof, the Contractor shall obtain from the sub-contractor an understanding to provide the owner with the same patent protection that contracts is required to provide under the provisions of the clause.
- 3 The Contractor shall indemnify and save harmless the owner from any loss on account of claims against owner for the contributory infringement of patent rights arising out of and based upon the claim that the use by the Corporation of the process included in the design prepared by the Contractor and used in the operation of the plant infringes on any patent rights.

**GC-55    LIEN:**

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 pay and discharge the same and deduct the amount as paid from any money which may be due or become due and payable to the Contractor. If any lien or claims remaining unsettled after all payments are made, 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 costs and reasonable expenses.

**GC-56      EXECUTION OF WORK:**

The whole work shall be carried out in strict conformity with the provisions of the contract document, 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, and proper manner with best workmanship using materials of best quality in strict accordance with the specifications to the entire satisfaction of the Engineer-In-Charge.

**GC-57      WORK IN MONSOON:**

When the work continues in monsoon if required, 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 construction period, the Contractor shall keep the site free from water at his own cost. However, monsoon period from 1st July to 30th September will be excluded from time limit.

**GC-58      WORK ON SUNDAYS AND HOLIDAYS:**

No work except curing shall be carried out on Sunday and holidays. However, if the exigencies of the work need continuation of work on Sundays and Holidays, written permission of the Engineer-In-Charge shall be obtained in advance.

**GC-59      GENERAL CONDITIONS FOR CONSTRUCTION WORK:**

Working hours shall be eight every day. The overtime work in two shifts could be carried out with the written permission of the Engineer-In-Charge but no compensation shall be paid for the same. The rate quoted shall include this. The Contractor shall plan his work in such a way that his labourers do not remain idle. The owner will not be responsible for idle labour of the Contractor. The Contractor shall submit to the owner progress report every week. The details and perform of the report will be as per mutual agreement.

**GC-60      DRAWINGS TO BE SUPPLIED BY THE OWNER:**

The drawings attached with the e-Tender documents shall be for general guidance of the Contractor to enable him to visualize the type of work contemplated and scope of work involved. Detail working drawings according to which the work is to be done shall be prepared by the Contractor for executing the work.

**GC-61**

**DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR: (N.A.)**

Where drawings, data are to be furnished by the Contractor they shall be as enumerated in special conditions of contract and shall be furnished within the specified time. Where approval of drawings has been specified it shall be 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 those 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 within three (3 weeks of the receipt of the same by the Engineer-In-Charge.

**GC-62**

**SETTING OUT WORK:**

The Contractor shall set out the work on the site handed over 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 or 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 and other materials and labourers required for proper setting out of the work. The Contractor shall provide fix and be responsible for the maintenance of all stakes, templates, level markets, profiles and similar other things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequences for such removal or disturbance. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, and distance marks and centre line marks either existing or face lines and cross lines shall be marked by small

masonry pillars. Each pillar shall have distance mark at the centre for setting up

the theodolite. The work shall not be started unless the setting out is checked and approved by Engineer-In-Charge in writing but such approval shall not relieve the Contractor of his responsibilities about the correctness of setting out. The Contractor shall provide all materials, labour and other facilities necessary for checking at his own cost. Pillars bearing geodetic marks on site shall be protected by the Contractor. On completion of the work, the Contractor shall submit the geodetic documents according to which the work has been carried out.

**GC-63      RESPONSIBILITIES OF CONTRACTOR FOR CORRECTNESS OF THE WORK:**

The Contractor shall be entirely and exclusively responsible for the correctness of every part of the work and shall rectify completely any errors therein at his own cost when so instructed by Engineer-In-Charge. If any error has crept in the work due to non-observance of this clause, the Contractor will be responsible for the error and bear the cost of corrective work.

**1.      Materials to be supplied by the Contractor:**

Contractor shall procure and provide all the material required for the execution and maintenance of work including M S rods; all tools, tackles, construction plant and equipment except, the materials to be supplied by the owner detailed in the contract Documents. Owner shall make recommendations for procurement of materials 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 of the DGS& D list.

2. If however, the Engineer-In-Charge feels that the work is likely to be delayed due to Contractor's inability to procure 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-64      MATERIALS TO BE SUPPLIED BY THE OWNER:**

1 If the contract provided certain materials or stores to be supplied by the owner, such materials and stores transported by the Contractor at his cost from owner's stores or Railway Station. The cost 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 the work, the Contractor has to account for the full quantity of materials supplied to him.

2 The value of store materials supplied by owner 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 owner,

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 unused at the time of completion of work or termination of contracts shall be returned to owner's store or any other place as directed by the Engineer-In-Charge in perfectly good condition at Contractor's cost. When materials are supplied free of cost for use in work and surplus and unaccounted balance thereof are not returned to the owner, recovery in respect of such balance will be effected at double the applicable issue rate of the material or the market rates whichever is higher.

**GC-65**      **CONDITIONS OF ISSUE OF MATERIALS BY THE OWNER: (N.A.)**

The materials specified to be issued by the owner to the Contractor shall be issued by the owner at his store and all expenses for it carting site shall be borne by the Contractor will be issued during working hours and as per rules of owner from time to time.

Contractor shall bear all expenses for storage and safe custody at site of materials issued to him before use in work.

Material shall be issued by the owner in standard / non-standard sizes as obtained from manufacturer.

Contractor shall construct suitable godowns at site for storing the materials to protect the same from damage due to rain, dampness, fire, theft etc. The Contractor should take the delivery of the materials issued by the owner after satisfying him-self that they are in good condition. 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.

For delay in supply or for non-supply of materials to be supplied by the owner, on account of natural calamities, act of enemies, other difficulties beyond the control of the owner, the owner carries no responsibilities. In no case the Contractor shall be entitled to claim any compensation for loss suffered by him on this account.

None of the materials issued to the contractor, shall be used by the Contractor for manufacturing items which can be obtained from the

manufacturers. The materials issued by the owner shall be used for the work only and no other purpose.

Contractor shall be required to execute indemnity bond in the prescribed form for the safe custody and account of materials issued by the owner.

Contractor shall furnish sufficiently in advance a statement of his requirements of quantities of materials to be supplied by the owner 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.

A daily account of materials issued by the owner shall be maintained by the contractor showing receipt, consumption and balance on 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.

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 materials at owner's store at his own cost.

**GC-66**      **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 owner either by issue from owner's stock or purchase made under orders or permits or licenses issued materials as trustees for owner, and use such materials not disposed them off without the permission of owner and unserviceable materials that may be left with him after completion of the contract or at its termination for any reason whatsoever on his being paid or credited such price 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 of breach of the aforesaid condition, the Contractor shall in terms of license or permits and/or for criminal breach of trust be liable to compensate owner at double the 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 to be determined by the Engineer-In-Charge at his decision shall be final and conclusive.

**GC-67**      **MATERIALS OBTAINED FROM DISMANTLING:**

If the Contractor, in the course of execution of work, is called upon to dismantle any part of work for reasons other than on account of bad or imperfect work, the materials obtained from dismantling will be property of the owner and will be disposed off as per instructions of Engineer-In-Charge in the best interest of the owner.

**GC-68**      **ARTICLE OF VALUE OF TREASURE FOUND DURING CONSTRUCTION:**

All gold, silver and other minerals of any description and all precious stones, coins, treasures, relics, antiques 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 the Engineer-In-Charge and shall hand over the same to the owner.

**GC-69      DISCREPANCIES BETWEEN INSTRUCTIONS:**

If there is any discrepancy between various stipulations of the contract documents or instructions to the Contractor or his authorized representative or if any doubt arises as to the meaning of such stipulation or instructions, the Contractor shall immediately refer in writing to the Engineer-In-Charge and shall hand over the same to the owner.

**GC-70      ALTERATIONS IN SPECIFICATIONS & DESIGNS & EXTRA WORK:**

The Architect / Engineer-In-Charge shall have power to make any alterations in, omission from, addition to substitution for, the schedule of rates, the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of work and the Contractor shall be bound to carry out such altered / extra / new items of work in accordance with any instructions which may be given to him in writing signed by Engineer-In-Charge and such alteration omissions, additions or substitutions, shall not invalidate contract and any altered, additional or substituted work shall be carried out by the Contractor on the same conditions (Above/ Below) of contract. The time of completion may be extended by Architect as may be considered just and reasonable by him. The rates for such additional, altered or substitute work shall be worked out as under.

a) If the rates for additional, altered or substitutes work are specified in the contract for work, the Contractor is bound to carry out such work at the same rates as specified in the contract.

b) If the rates for additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates of similar items of work in the contract work. The opinion of Engineer-In-Charge as to whether the rates can be reasonably so derived the items of contract will be final and binding to the Contractors.

c) If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) above, the rate shall be paid as per S.O.R. of RMC/ R&B / CPWD/GWSSB at Same Tender Condition.

d) If the rates of altered, additional or substitute work cannot be determined as specified in (a) or (b) or (c) above, the Contractor shall within seven days of the receipt of order to carry out the work inform the Architect / Engineer-In-Charge of the rate which he intends to charge for such work supported by rate analysis and the Architect / Engineer-In-Charge will determine the rate on the basis of prevailing market rates of materials, labour cost at schedule of labour plus 15% there on as Contractor's supervision overheads and profit. The opinion of Architect / Engineer-In-Charge as to the market rates of materials and the quantity of labour involved per unit of measurement will be final and binding on Contractor. But under no circumstances, the Contractor suspends work or the plea of non-settlement of items falling under this clause.

**GC-71      ACTION WHEN NO SPECIFICAITONS ARE ISSUED:**

In case of any class of work for which no specifications is supplied by the owner in the e-Tender documents, such work shall be carried out in accordance with relevant latest ISS and if ISS do not cover the same, the work shall be carried out as per General Technical Specification for building work; and if not covered in then it is to be with standard Engineering Practice subject to the approval of Engineer-In-Charge.

**GC-72      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.

**GC-73      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 setting out for taking measurement of work etc.

**GC-74      STS FOR QUALITY OF WORK:**

1. All workmanship shall be of the best kind described in the contract documents and in accordance with the instructions of Engineer-In-Charge and shall be subjected from time to time to such tests at Contractor's cost as the Engineer-In-Charge may direct at the place of manufacture of fabrication or on the site or at any such place. Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing of any work of workmanship as may be selected and required by Engineer-In-Charge.
2. All tests necessary in connection with the execution of work as decided by Engineer-In-Charge shall be carried out at an approved laboratory at Contractor's cost.



3. Contractor shall furnish the 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 sufficiently in advance to permit tests and examination thereof. All materials furnished and finished goods applied in work shall be exactly as per the approved samples.

**GC-75**

**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 with unsound, imperfect or unskilled workmanship or otherwise not in accordance with the contract, the Contractor shall, on demand in writing from Engineer-In-Charge or his authorized representative specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work, so specified. In the event of failure to do so within a period to be specified by the Engineer-In-Charge in his aforesaid demand, Contractor shall be liable to pay compensation at the rate of half a percent of the estimated cost of work for every work 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 others 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-76**

**SUSPENSION 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 one month) as ordered and shall not after receiving such written notice 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 he applies for the same provided the suspension was not consequent upon any default or failure on the part of the Contractor.

**GC-77**

**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 owner has the right to carry out such parts of work as the owner may designate whether by purchasing materials and engaging labour or by the agency of another Contractor. In such case the owner shall deduct from the amount which

otherwise might become due to Contractor, the cost of such work and materials with then (10) percent added to cover all departmental charges and should the total amount thereof exceed the amount due to contract, Contractor shall pay the difference to owner.

**GC-78      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 contract. If such prior possession or use by Engineer-In-Charge delays the process of work, equitable adjustment in the time of completion will be made and the contract shall be deemed to be modified accordingly.

**GC-79      COMPLETION CERTIFICATE:**

As soon as the work has been completed in accordance with contract (except in minor respects that do not affect their use for the purpose for which they are intended and except for maintenance thereof) as per General Conditions of Contract the Engineer-In-Charge shall issue a certificate (hereinafter called completion certificate) in which shall certify the date on which work has been completed and has passed the said tests and owner shall be deemed to have taken over work on the date so certified. If work has been divided in various groups in contract, owner 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.

In order that Contractor could get a completion certificate, he shall make good will all speed any defect arising from the defective materials supplied by Contractor of workmanship or any act or omission of Contractor that may have been discovered or developed after the work or groups 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 the time specified, owner may proceed to do work at Contractor's (Agency, or Firm) risk and expenses and deduct from the final bill such amount as may be decided by owner. 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 contract for completion of work, owner 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 afforded reasonable opportunity for completion of that work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completion of that work for the issue of completion certificate.

**GC-80**

**SCHEDULE OF RATES:**

1. The rates quoted by the Contractor shall remain firm till the completion of the work and shall not be subject to escalation. Schedule of rates shall be deemed to include and cover all costs, expenses and liabilities of every description and risks of every kind to be taken in executing, completing and handing over the work to owner by Contractor. The contractor shall be deemed to have known the nature, scope, magnitude and the extent of work and materials required though contract documents 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 the work. The opinion of Engineer-In-Charge as to the item of work which are necessary and reasonable for completion of the work shall be final and binding on Contractor although the same may be not shown on drawings or described specifically in contract documents.
2. The Schedule of Rates shall be deemed to include and cover the cost of all constructional plant, temporary work, materials, labour and all other matters in connection with each item in Schedule of Rates and the execution of work or any portion thereof finished 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 fees for the articles and processes, protected by letters patent or otherwise incorporated in or used in connection with work, also all royalties, rents and other payments in connection with obtaining material of whatsoever kind for 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 or use on the works of any such articles, processes or materials. Other Municipal or local Board charges if levied on material, equipment or 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 or of any Local Body whatsoever will be granted or obtained and all such expenses shall be deemed to have been included in and covered by Schedule of Rates. Contractor shall also obtain and pay for all permits or other privileges necessary to complete the work.
5. The Schedule of Rates shall be deemed to include and cover risk on account of delay and interference with Contractor's conduct of work which may occur from any cause including orders of owner in the exercise of his powers and on 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 reasons of work or any part of them being modified, altered, extended, diminished or omitted.

**GC-81 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-In-Charge or his authorized representative and signed by the 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 measures for every 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 the Contractor.
2. Contractor will submit a bill in approved Performa in quadruplicate 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.

**GC-82 RUNNING ACCOUNT PAYMENTS TO BE REGARDED AS ADVANCES:**

1. All running account payments 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 rejected or to be considered as an admission of the due performance of contract or any part thereof.
2. Five (5) percent of the gross R A Bill amount shall be retained from each bill as retention amount and the same will be paid with the final bill.

**GC-83 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 the necessary particulars as above, within the time above specified shall be an absolute waiver thereof. No omission by owner to reject any such claim and no delay in dealing therewith shall waiver by owner or any rights in respect thereof.

**GC-84 PAYMENT OF CONTRACTOR'S BILL:**

1. The price to be paid by the owner to Contractor for the work to be done and for the performance of all the obligations undertaken 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 10 % of Contract Value till the work is completed and a certificate of completion given. 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 shall be made after necessary deductions as stipulated elsewhere in the contract documents for materials, security deposit etc. The payment shall be released to the Contractor within one (1) month of submission of the bill duly pre-occupied on proper revenue stamp. Payment due to Contractor shall be made by the owner by crossed Account 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 persons.

**GC-85**      **FINAL BILL:**

The final bill shall be submitted by Contractor within one (1) month of the date of physical completion of work, otherwise the Engineer-In-Charge's certificate of the measurement and of total amount payable for work shall be final and binding on all parties.

**GC-86**      **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 e-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 person having authority to give effectual receipt for the Company.

**GC-87**      **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.

The Engineer-In-Charge shall normally issue to Contractor the Completion Certificate within one (1) month after receiving an application thereof from Contractor after verifying, from the completion documents and satisfying himself that work has been completed in accordance with and as set out in

the construction and erection drawings and the contract documents. Contractor after obtaining the Completion Certificate is eligible to present the final bill for work executed by him under the terms of contract.

- 2 Within one month 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 (i) scaffolding, surplus materials and rubbish is cleaned off site completely, (ii) until work shall have been measured by the Engineer-In-Charge whose measurement shall be binding and conclusive and, (iii) 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 Contractor 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 expense 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:
  - a) Technical documents according to which the work has been carried out.
  - b) Three sets of construction drawings showing therein the modifications and corrections made during the course of execution signed by the Engineer-In-Charge.
  - c) Completion Certificate for "Embedded" or "Covered" up work.
  - d) Certificate of final levels as set out for various works.
  - e) Certificate of test performed for various work.
  - f) Material appropriation statement for the materials issued by owner for work and list of surplus materials returned to owner's store duly supported by necessary documents.
- 1 Upon expiry of the period of defect liability and subject to Engineer-In-Charge being satisfied that work has been duly maintained by Contractor during the defect liability period of fixed originally or as extended subsequently and that Contractor has in all respects made up any subsidence and performed all his obligations under contract, the Engineer-In-Charge (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.
- 2 **Final Certificate only evidence of completion:** Except the final certificate, no other certificate of payment against a certificate or on general account shall be taken to be an admission by owner of the due performance of contract or any part thereof of occupancy or validity or any claim by the Contractor.

**GC-88**

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**TAXES, DUTIES, ETC. :**

Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes including Sales Tax, Duties, service tax, GST etc., now or hereinafter 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 hereinafter imposed by the Central or State Government authorities with respect to or covered by the wages, salaries or other compensation paid to the persons employed by Contractor. If the Contractor is not liable to Sales Tax assessment, a certificate to that effect from the Competent Authority shall be produced without which final payment to the Contractor shall not be made No.P, 'C' and 'D' Form shall be supplied by the owner, and the Contractor shall be required to pay full tax 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 laws and regulations and requirement. Contractor also agrees to defend, indemnify the hold harmless the owner from any liability or penalty which may be imposed by Central, State or local authority by reasons of any violation by Contractor or sub-Contractor of such laws, regulations or requirements and also from all claims, suits or proceedings that may be brought against owner arising under, growing out of or by reasons or work provided for by this Contract by third parties or by Central or State Government authority or any administrative Sub-Division thereof.

The Sales Tax on work contract will be borne by Contractor.

**GC-89      INSURANCE:**

Contractor shall at his own expenses carry and maintain the reputable Insurance Companies to the satisfaction of owner as follows:

1. Contractor agrees to and uses hereby accept full and exclusive liability for compliance with all obligations imposed by the Employer's State Insurance Act, 1948 and Contractor further agrees to defend, indemnify and hold owner hardness from any liability or penalty which may be imposed by the Central or State Government or local authority by reasons of any assorted violation by Contractor or Sub-Contractor or the Employees State Insurance Act, 1948 and also from all claims, suits or proceedings that may be brought against owner arising under,

Growing out of or by reasons of the work provided for by this contract whether brought by employees of Contractor by third parties or by Central or State Government authority or any administrative Sub-division thereof.

Contractor agrees to fill in with the Employees State Insurance Corporation, the declaration form and all forms which may be required in respect of Contractor's or sub-Contractor's employees whose aggregate remuneration is Rs.400/-p.m. or less and who are employed in work provided for or those covered by ESI from time to time under the agreement. The Contractor shall deduct and secure the agreement of the sub-Contractor to deduct the employee's contribution as per the first

schedule of the Employees State Insurance Act from wages. Contractor shall remit and secure the agreement of sub-contractor to remit to the State Bank of Indian Employees State Insurance Accounts, the employee's contribution as required by the Act. Contractor agrees to maintain all cards and records as required under the Act in respect of employees and payments and Contractor shall secure the agreements of the sub-contractors to maintain in such records, any expenses incurred for the contributions, making contributions or maintaining records shall be to Contractors or sub-contractors own account. owner shall retain such sum as may be necessary from the contract value until Contractor shall furnish satisfactory proof that all contribution as required by the Employees State Insurance Act, 1948 have been paid.

2. Workman's compensation and employee's liability insurance: Insurance shall be effected for all Contractors employees engaged in the performance of this contract. If any part of work is sublet, Contractor shall require the sub-Contractor to provide workman's compensation and employer's liability insurance, which may be required by owner.
3. Other Insurance required under law of regulations or by owner Contractor shall also carry and maintain any and all other insurance which may be required under any law or regulation from time to time. He shall also carry and maintain any other insurance, which may be required by owner.

**GC-90      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 or being procured by owner or of other agencies within the premises of all work of owner, if such loss or damage is due to fault and / or the negligence of wilful act or omission of Contractor, his employees, agent, representatives or sub-Contractors.
2. Contractor shall indemnify and keep owner harmless of all claims for damage to properties other than property arising under by reasons of this agreement, such claims result from the fault and / or negligence or willful act or omission of Contractor, his employees, agent's representative or sub-contractor.

**GC-91      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 under the 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 laws, rules or regulations having force of laws, including but not limited to claims against the owner under the workman compensation Act, 1923, the Employee's Provident Funds Act, 1952 and / or the contract labour (Abolition and Regulations) Act, 1970.
2. PAYMENTS OF CLAIMS AND DAMAGES : If owner has to pay any money in respect of such claims or demands aforesaid, the amount so 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, owner be obliged to pay compensation to workmen employed by Contractor the amount of compensation so paid, and without prejudice to the rights of owner under Section-(12) Sub-section-(2) of the said Act, owner shall be at liberty to recover such amount from any surplus due to on to become due to the Contractor or from the security deposit. Owner will not be bound to contest any claim made under Section-(12) Subsection-(2) of the said act except on written request of Contractor and giving full security for all costs consequent upon the contesting of such claim.

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

**GC-92 IMPLEMENTATION OF APPRENTICE ACT 1954:**

Contractor shall comply with the provisions of the apprentice Act 1954 and the orders issued there under from time to time. If he fails to do so, it will be a breach of contract.

**GC-93 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 than provides unitary arrangements of all labour directly or indirectly employed on the work of this contract.

**GC-94 SAFETY CODE:**

**General:** Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with owner's rules passed for therein.

**1.0 First Aid and Industrial Injuries:**

1.1 Contractor shall maintain First-Aid facilities for its employees and those of his Sub-contractors.

1.2 Contractor shall make outside arrangements for ambulance service and for the treatment of industrial injuries. Name of those providing these services shall be 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 and personal injury requiring the attention of a physician shall be furnished to owner.

**2.0 General Rules:**

2.1 Carrying and striking, matches, lighters inside the project area and smoking within the job site are strictly prohibited. Violators of smoking rules shall be discharged immediately. Within the operation area, no hot work shall be permitted, without valid as, safety, fire permits. The Contractor shall also be held liable and responsible for all apses of his sub-Contractors/ employees in this regard.

**3.0 Contractor's Barricades:**

Contractor shall erect and maintain barricades without any extra cost, required in connection with his operation to guard or protect during the entire phase of the operation of this contract for i) Excavation ii) Hoisting areas iii) Areas adjudged hazardous by Contractor's OR Owner's inspectors. iv) Owner's existing property liable to be damaged by Contractor's operations, in the opinion of Engineer-In-Charge / Site Engineer.

Contractor's employees and those of his sub-contractors shall become acquainted with owner's barricading practices and shall respect the provisions thereof.

Barricades and hazardous areas adjacent to but not located in normal routes of travel shall be marked by red lantern at night.

**4.0 Scaffolding:**

4.1 Suitable scaffoldings shall be provided for workman for all work that cannot safely be done from ladders. When ladders used, an extreme door shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and handholds shall be provided on the ladder and the same shall be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical).

4.2 Scaffolding or staging, more than 3.6M.(12') above the ground or floor, swing or suspended from an overhead support or erected with stationary support shall have a guardrail properly attached, bolted, braced and otherwise fixed at least 1.0 M(3') high above the floor or platform or scaffolding or staging and extending along the entire length of the outside end thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or stagings shall be so fastened as prevented from swaying from the building or structure.

4.3 Working platforms, gangways, and stairways should be so constructed that they should not sag unduly or inadequately and if the height of the platform or the gangway of the stairway is more than 3.6 (12') above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in 4.2 above.

4.4 Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1.0M (3'.0").

4.5 Safe means of access shall be provided to all working platforms and other working places. Every ladders shall be securely fixed. No portable single ladder shall be over 9.0M (30') in length while the width between the side rails in run ladders shall in no case be less than 30cms (12 inches) for ladder up to and including 3.0M (10'), in longer ladders this width would be increased at least 6mm (1/4") for each addition 30c.m. (1.0) of length. Uniform step spacing shall not exceed 30cms. (12"). Adequate precautions shall be taken to prevent danger from electrical equipment. No material so many of the side of work shall be so stacked or placed as to caused danger or inconvenience to any person or public. The Contractor shall also provide all necessary all necessary fencing and light to project the workers and staff from accidents, and shall be bound to bear the expenses of defence of every suit action or other proceedings at law that may be brought by any persons for injury sustained downing to neglect of the above precautions and to pay damages and costs which may be awarded in any such suit or action or proceeding to any such person, or which, may be with the consent of the Contractor be paid to compromise any claim by any such person.

**5.0 Excavation:**

All trenches 1.2M (4') or more in depth, shall at all time be supplied with at least one ladder. Ladders shall be extended bottom of the trench to at least 3" above the surface of the ground. The side of the trench which are 1.5M (5') or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of side to collapse. The excavated materials shall not be placed within 1.5M (5') of the trench or half of the trench depth whichever is more. Cuttings shall be done from top to bottom. Under no circumstances, undermining or undercutting be done.

**6.0 Demolition:**

Before any demolition work is commenced and also during the progress of the work all roads and open area adjacent to the worksites shall either be closed or suitably protected. No electric cable or apparatus which is liable to be a source of dangers shall remain electricity charged. All practical steps shall be taken to prevent danger to person self-played from risk of fire or explosion or flooding. No floor or other part of the buildings shall be so overloaded with debris or material at least to render it unsafe.

**7.0 Safety Equipment:**

All necessary personal safety equipment as considered necessary by the Engineer-In-Charge should be made available for the use of person employed on the site and maintain Edina condition suitable for immediate use, and the Contractor should take adequate steps to ensure proper use of equipment by

those concerned. Workers employed on mixing asphaltic materials, cement and line mortars shall be provided with protective footwear and protective gloves.

#### **8.0 Risky Place:**

When the work is done near any place where there is a risk of drowning, all necessary safety equipments shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work.

#### **9.0 Hoisting Equipment:**

- 9.1 Use of hoisting machines and tackle including their attachments, and storage and supports shall conform to the following standards or conditions.
- 9.2 These shall be of good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good condition and in good working order.
- 9.3 Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.
- 9.4 Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in-charge of any hoisting machine including any scaffolding.
- 9.5 In case of every hoisting machine and of every chaining hook, shackle, swivel and pulley block used in hoisting or lowering or as a means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
- 9.6 In case of departmental machine, the safe work load shall be notified by the Engineer-In-Charge, as regards Contractor's machine, the Contractor shall notify the safety working load of the machine to the Engineer-In-Charge. Whenever the Contractor brings any machinery to site of work he should get it verified by the Engineer-In-Charge concerned.

#### **10.0 Electrical Equipment:**

Motors, gears, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards, hoisting appliances should be provided with such means which will reduce to the minimum the risk of accidental descent of the load, adequate precautions shall be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparels such as gloves, and boots as may be necessary shall be provided. The

workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

**11.0 Maintenance of Safety Devices:**

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

**12.0 Display of Safety Instructions:**

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

**13.0 Enforcement of Safety Regulations:**

To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangement made by the Contractor shall be open to inspection by the Welfare Officer, Engineer-In-Charge or Safety Engineer of the owner or the representative's.

**14.0 No Exemption:**

14.1 Notwithstanding the above clause 1.0 to 13.0 there is nothing to exempt the Contractor from the operations of any other Act or Rules in force in the Republic of India.

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

**GC-95 ACCIDENTS:**

It shall be Contractor's responsibility to protect against accidents on the works. No electric cable or apparatus which is liable to be a source of danger shall remain electricity charged.

He shall indemnify the owner against any claim for damage or for injury to person or property resulting from, and in the course of work and also under the provisions 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 Contractor shall be promptly reported to the Engineer-In-Charge, stating clearly and in sufficient details the facts and circumstances of the accidents and the action taken. In all cases, the Contractor shall indemnify the owner

against all loss or damage resulting directly or indirectly from the Contractor's failure to report in the manner aforesaid. This includes penalties or fines, if any, payable by the owner 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 Workman's Compensation Act VIII of 1923 including all modification thereof, the Engineer-In-Charge may retain out of money due and payable to the Contractor such sum of sums of money as may in the opinion of Engineer-In-Charge be sufficient to meet such liability. On receipt of award from the Labour Commissioner in regard to quantum of compensation, the difference in amount will be adjusted.

**Add Asst Engineer  
Civil Dept.**

**Dy. Ex. Engineer  
Civil Dept.**

**City Engineer  
Civil Dept.**

**Rajkot Municipal Corporation**

**Signature of Contractor**

**ANNEXURE – 1**  
**Application Form (1)**

**General Information**

All individual firms and each partner of a consortium applying for qualification are requested to complete the information in this form. Nationality information to be provided for all owners or applicants who are partnerships or individually-owned firms.

Where the Applicant proposes to use named subcontractors for critical components of the works, or for work contents in excess of 10 percent of the value of the whole works the following information should also be supplied for the specialist subcontractor(s).

To  
The City Engineer (Special)  
PLACE:  
-----Division:  
DATE:

Details regarding my our partners our Company (in the case of limited Company) Names, address (es), telephone numbers(s) income tax etc. are as under:

1.	Name of Firm	
2.	Head office address	
3.	Telephone(s)	Contact
4.	Fax	Telex

5. E-Mailadd. (s.).

6.	Place of incorporation/registration	Year of incorporation/ registration
	<b>Nationality of owners</b>	
	<b>Name</b>	<b>Nationality</b>
1.		
2.		
3.		
4.		
5.		





### Application Form (1A)

<b>1</b>	Name of the Organization :	
<b>2</b>	Address with telephone Numbers	
<b>3</b>	Year of Establishment	
<b>4</b>	Constitution of the Firm (Whether Company/ Firm/ Proprietary)	
<b>5</b>	Name of the Directors/ Partners/Proprietor	
<b>6</b>	Whether registered with the Registrar of companies/ Registrar of Firms. If so, mention number and date.	
<b>7</b>	a)Name and address of Bankers	
	b) Enclose Solvency Certificate from the Bankers.	
<b>8</b>	Whether registered for sales tax purposes. If so, mention number and date. Enclose copies of sales tax returns for the last two years.	
<b>9</b>	Whether an assesses of Income Tax. If so, mention permanent account number. Enclose copies of Income tax return filed for the last two years.	
<b>10</b>	Enclose copies of audited Balance Sheet and Profit & Loss Account (audited) for the last three years.	
<b>11</b>	If you are registered in the panel of other organizations/ Statutory bodies, such as CPWD, PWD, MES, Banks etc., furnish their names, category and date of registration. Furnish copies of such registration.	
<b>12</b>	What are your fields of activities? Mention the fields on preference basis	

<b>13</b>	Whether willing to work Anywhere in India or mention the places where you are willing to work	
<b>14</b>	i) Detailed description and value of works done / orders executed for the last Seven (7) years.	
	ii) Works in progress	
<b>15</b>	Specify the maximum value of work executed and in which year.	
<b>16</b>	Furnish the names of three responsible persons who will be in a position to certify about the quality as well as past performance of your organization	
<b>17</b>	Details PF Organisation, Rajkot. Enclose relevant certificate copies	
<b>18</b>	Details Professional Tax Organisation, RMC, Rajkot. Enclose relevant certificate copies	

SIGNATURE OF CONTRACTOR

DATE SEAL

**ANNEXURE -2**  
**PERFORMANCE BOND**  
**(See clause no. 1)**

(The date of this bond must not be prior to the date of the instrument in connection with which it is given)

Principal (Contractor)

Surety (Bank)

Sum of bond (express in words and figures)

Contract No. and date of Contract

KNOW ALL MEN BY THESE PRESENT, THAT WE, THE PRINCIPALS AND SURETY

Above named are held firmly bound unto the ..... hereinafter called the Employer in the amount stated for payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents subject to the provisions of which the aforesaid Contractor on demand and without demand on a claim being made by the Employer.

THE CONDITION OF THIS OBLIGATION IS SUCH: That whereas the principals have entered in to a contract with the Employer numbered and dated as shown above and hereto Attached for the execution of work

.....  
.....

..... NOW THEREFORE, if the Principal shall well and truly perform and fulfill at the undertakings, covenants, terms, conditions and agreements of said contract during the original terms of the said Contract and any extensions thereof that may be granted by the Employer with or without notice to the surety and during the life or any guarantee required under the contract and shall also well and truly perform and fulfil all the Undertakings, covenants terms, conditions and agreements of any all duty and unduly authorised modifications of said Contract that may hereafter be made, notice of which modifications to the surety being hereby waived or shall pay over, make good and reimburse to the Employer all loss and damages which the employer may sustain by reason of failure or default on the part of said Principal so to do.

We ..... further agree that the guarantee herein

contained shall remain in full force and effect during the period that would be taken for the validity of the said Contract, and that it shall continue to be enforceable till all the dues of the employer under or by virtue of the Contract have been fully paid and its claims satisfied or discharge till the Employer certifies that the terms and conditions and accordingly discharge the guarantee. Unless a demand or claim under the guarantee is made on using writing on or before the..... we shall be discharged from all liability under this guarantee thereafter.

In Witness Where of, the above bounded 90 parties have executed this instrument under their several seals on the date indicated above the name and corporate seal each corporate party being here to affixed and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body. In the presence of witness Principal

- 1.....as to .....(Seal)
  - 2.....as to .....(Seal)
  - 3.....as to .....(Seal)
  - 4.....as to .....(Seal)
- by..... affix Corporate Seal

Attested Corporate surety

Business address \_\_\_\_\_

Affix by .....corporate Seal

Title

For and on behalf of the Employer

**APPENDIX-1**

**LIST OF ALL WORK ALREADY COMPLETED BY THE MAIN TENDERER**

<b>Sr. No.</b>	<b>Name of Work</b>	<b>Name &amp; address of client with contact number</b>	<b>Cost on Completion</b>	<b>Time taken in months to complete the work</b>	<b>Date of award</b>	<b>Whether Project Under Litigation (Yes / No.) &amp; reasons thereof</b>
1	2(a)	2(b)	3	4	5	6

**Note: Necessary certificate from office concerned shall be attached with the tender**

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX-1 (a)**

**DETAIL LIST OF SIMILLAR TYPE WORK ALREADY COMPLETED BY THE MAIN TENDERER**

<b>Proj. No. As per Appendix-1</b>	<b>Repeat Name of Work</b>	<b>Repeat Name &amp; address of client with contact number</b>	<b>Civil Work Detail</b>	<b>Electrical Work Detail</b>	<b>H.V.A.C. Work Detail</b>
1	2(a)	2(b)	3	4	5

**Note: Necessary certificate from office concerned shall be attached with the tender**

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX-2**

**Information of sub-contractors**

<b>Sr.No</b>	<b>Details</b>	
1.	Name	
2.	Registration class if any	
4.	Experience in Project Related field.	N/A
5.	Other experience	
6.	Nos of Employee in organization:	

<b>Sr. No.</b>	<b>Work Carried out by the sub contractor</b>	<b>Value of workRs. In Million</b>	<b>Name of client</b>	<b>Contact No of client</b>

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX-2 (a)**

**NAME, EXPERIENCE AND DETAILS OF CAPACITY OF SUBCONTRACTOR**

<b>Name of Sub-contractor</b>	<b>Details of the works to be given if bidders will be awarded the work</b>	<b>Experience in Years for the work to be given</b>	<b>Registration or Rating if any</b>	<b>Average Annual Turnover of Last Three Years</b>

**N.A.**

**Note: Please give required details in "Information of sub contractor Table"**

SIGNATURE OF CONTRACTOR  
DATE SEAL



**APPENDIX-3**

**LIST OF PLANT AND MACHINERY IN GOOD WORKING ORDER AVAILABLE WITH TENDERER**

<b>Sr. No.</b>	<b>Plant or Machinery</b>	<b>Location</b>	<b>Age of Machinery</b>	<b>Make</b>	<b>Capacity</b>	<b>Approximate Value</b>	<b>Remark</b>
1	2(a)	2(b)	3	4	5	6	7

SIGNATURE OF CONTRACTOR  
DATE SEAL

**APPENDIX – 4**  
**EACH MEMBER OF THE CONSORTIUM SHOULD GIVE ALL THE DETAILS FOR EACH OF THE**  
**FOLLOWING APPENDICES.**

<b>Sr.No.</b>	<b>Name of the Consortium Member</b>	<b>Role of the Member</b>	<b>Equity Stake in Project.</b>

SIGNATURE OF CONTRACTOR  
DATE SEAL

**APPENDIX – 5**

**Bidder's Financial Capacity**

Name of Bank	Amount of Loan	Certificate of bank	Pending outstanding amount	Pending in quarter

**Documentation Used**

All applicants have to submit audited annual reports/ financial reports. Firms that do not publish financial statements, such as partnerships, submit specially prepared statements. A qualified external auditor should certify such statements. Annual reports include the auditor's certification. Cash flow statements should be submitted if available, though cash flow statements are not routinely prepared in all countries. Cash flow statements are used to judge a firm's liquidity and its debt-service obligations. Financial statements are normally required for last three consecutive years so that year-to-year changes in the data can be reviewed. In scoring, however, only the average value over the last Five years is used.

SIGNATURE OF CONTRACTOR  
DATE SEAL

**APPENDIX – 5(a)**  
**Financial Resources in on-going projects**

<b>Sr.No</b>	<b>Description of ongoing Projects</b>	<b>Total cost of work/contract</b>	<b>Members contribution (%)</b>	<b>Funds required to be contributed.</b>
1	2	3	4	5

**FINANCIAL INFORMATION**

<b>Annual Turnover in Rs. Lacs</b>			
<b>Year</b>	<b>Civil Engineering Projects</b>	<b>Other Projects</b>	<b>Total</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

SIGNATURE OF CONTRACTOR  
 DATE SEAL

**APPENDIX – 6**  
**Bidder's Available Credit in Bank**

**Name of the Bank:**

**(with address, phone and Fax Nos.)**

Sr. No.	Year	Working Capital limit		Interest rate charged by Bank.
		Sanctioned	Drawn.	
1	2017-18			
2	2018-19			
3	2019-20			
4	2020-21			
5	2021-22			

**Note:**

The latest credit facilities available from banks with certified copies to be submitted.  
The details should be given both for fund base as well as non-fund base working capital with bank.

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX – 7**

**Available Bid Capacity**

<b>Year</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>
Value of works executed in Rs. Crores							

The available bid capacity will be worked out as follows.

**Available bid capacity = (A x N x 2) – B, where**

**A =** Average value of Civil engineering works executed of last five years (Updated to present price level by applying enhancement factor)

**B =** Value at 31-12-2022, Price level of existing commitments and ongoing works to be completed during the next two years.

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

The statement showing the value of existing contracts and commitments and ongoing works as well as stipulated period of completion remaining for each of the works listed should be countersigned by the engineer-in-charge.

SIGNATURE OF CONTRACTOR

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**APPENDIX – 8**

**Key Technical personnel & Project Manager Competence and qualification  
(Experience in Year)**

<b>Team</b>	<b>Name of person</b>	<b>Qualification</b>	<b>Experience in Years (In Required status)</b>
<b>Project Manager</b>			
<b>Civil Engineer</b>			
<b>Electrical Engineer</b>			
<b>Head Surveyor</b>			
<b>Procurement Engineer</b>			

**Note:** Please give required details in curriculum vitae (Appendix O1) for each team members

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX – 9**  
**Key Technical Personnel & Project Manager Competence and qualification CURRICULUM**  
**VITAE**

<b>Sr. No.</b>	<b>Detail</b>	
1	Name	
2	Age	
3	Qualifications	
4	Experience in Project Related field.	
5	Other experience	
6	Employment Record	

<b>Sr. No.</b>	<b>Period From To</b>	<b>Organization</b>	<b>Status</b>

SIGNATURE OF CONTRACTOR  
DATE SEAL



**APPENDIX – 10**

**Available Key Technical personnel & Project Manager Competence and qualification  
for particular this project, (Main bidders)**

**(Fill Form as per P.Q.)**

<b>Team Designation Incl. Reliever</b>	<b>Name of person &amp; Photograph</b>	<b>Qualification</b>	<b>Experience in Years (In Required status)</b>

**APPENDIX – 10(a)**

**List of Machinery / Plants Available for Work**

<b>Sr. No.</b>	<b>Plant or Machinery</b>	<b>Location</b>	<b>Age of Machinery</b>	<b>Make</b>	<b>Capacity</b>	<b>Approximate Value</b>	<b>Remark</b>
1	2(a)	2(b)	3	4	5	6	7

SIGNATURE OF CONTRACTOR

DATE SEAL

**APPENDIX – 11**  
**Financial Criteria**

<b>Sr. No.</b>	<b>Description</b>	<b>Main Bidders</b>	<b>Total</b>
<b>1</b>	Basic Capital		
<b>2</b>	Total Asset		
<b>3</b>	Total Liabilities		
<b>4</b>	Current Assets		
<b>5</b>	Profit (Before Taxation)		
<b>6</b>	Loss		
<b>7</b>	Name of the Banker along with the certificate of access for credit Facilities.		

SIGNATURE OF CONTRACTOR  
DATE SEAL

**APPENDIX – 12**  
**APPLICABILITY OF PROVIDENT FUND AND MISCELLANEOUS PROVISIONS ACT 1952**

Successful bidder i.e. the agency whose tender is accepted by the RMC shall have to comply the necessary formalities under the employees provident fund and Miscellaneous Provisions Act, 1952 as Contributory Provident Fund Scheme is applicable to labourers engaged in construction activity and shall have to submit proofs regarding deduction of provident fund and other dues and depositing the same with government department under the act and the scheme regularly on monthly basis failing which no running / final bill payment will be made by the RMC to the contractor in any circumstances.

**A certificate to the above effect has to be given by the contractor as under.**

**Declaration  
Of  
Depositing Provident Fund contribution**

This to certify that we have deducted the employees' P.F. and deposited the same along with employer's contribution towards provident fund on labour charges / wages paid by us to the labourers engaged for the work of \_\_\_\_\_ with \_\_\_\_\_ Provident Fund Authority under our Provident Fund Code No.

We produce herewith the copies of the challans for the provident fund deduction and contribution deposited as mentioned above.

SIGNATURE OF CONTRACTOR

DATE SEAL

APPENDIX – 13

LIST OF BUILDING PROJECT WORKS  
COMPLETED DURING THE LAST SEVEN YEARS.

Sr. No.	Year of Construction work	Name of Project	Name of owner & Contact person of the project, address, phone no. fax no.	Total cost of the work	Total value of work done Rs.	Date of starting work	Date of Actual completion of work
1		2	3	4	5	6	7
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							

**Note:** Certificate from the owners in support of above works may be enclosed with this statement.

SIGNATURE OF CONTRACTOR  
DATE SEAL

APPENDIX – 14

DETAILS OF ONGOING PROJECT AS ON 28-02-2023

Sr. No	Name of project	Value of remaining work on 28-2-2023 Rs. in lakhs.	Start date	Likely date of completion	Name, address, telephone, fax no. of project authority and contact person.

SIGNATURE OF CONTRACTOR  
DATE SEAL

**APPENDIX – 15**  
**METHOD STATEMENT AND WORK PLAN**

The Bidder shall have to provide a brief write up to be enclosed with the “Technical Bids “covering his approach and methodology to handle the project construction activities including his details work plan. The brief shall include the following aspects.

<b>Sr. No.</b>	<b>Component</b>	
1	Methodology	
2	Construction equipment availability and plan of deployment.	
3	PERT/ Construction chart/ Bar chart	
4	Manpower Resource	

SIGNATURE OF CONTRACTOR

DATE SEAL

### **SPECIAL NOTE**

Clause: 1

No contractor shall employ any child having age up to 14 years, as it is prohibited by child labour regulation act-1986. Hon. Supreme Court has given certain guide lines and as per guide lines, if employment of detected on the site work the employer is contractor shall have to deposit Rs. 20,000/- (Rupees twenty thousand only) in the welfare fund.

If the employer refuses to deposit then action will be taken for contempt of court of Supreme Court judgment and prosecuted by concern authority. Because of the breach of any provision child prohibition and Regulation Act – 1986 by the contractor and for the Corporation has to pay any amount then the Municipal Corporation shall recover the said amount from the contractor.

Clause: 2

All necessary testing charges shall be borne by Bidder.

**Signature of Contractor**

**DECLARATION**

I / We hereby declare that I / we have visited the site and fully acquainted myself/ ourselves with the local situations regarding materials, labour and other factors pertaining to the work before submitting this tender.

I / We hereby declare that I / we have carefully studied all the terms and conditions of contract, specifications mentioned in the tender documents and I / We do agree for compliance with the same strictly.

I/We shall execute the contract agreement with the RMC after award of work and before start of work.

**Signature of Contractor**



**CERTIFICATE**

I/We certify that I/We have inspected the location of the proposed work before quoting my/our rates.

I/We have also inspected the quarries and borrow areas and satisfied myself/ourselves regarding the quality, quantity, availability and transport facilities for earth, stone, bricks, and, cement etc. through the network of available roads and path ways required for the work.

**Signature of Contractor**

# RAJKOT MUNICIPAL CORPORATION

e-Tender No. RMC/ENGG/EZ/22-23/



**TENDER DOCUMENTS**

**FOR**

**Construction of Retaining Wall, Compound Wall with Gate,  
Trimix and landscaping work at Garbage Transfer Station  
Near K.S. Diesels in Ward No. 6 (3<sup>rd</sup> ATTEMPT)**

**VOLUME – II**

**TECHNICAL SPECIFICATIONS**

**Municipal Commissioner**

Rajkot Municipal Corporation. ShriZavechandMeghaniBhawan, East Zone, Bhavnagar  
Road , Rajkot – 360 003

# **Specifications for Civil & Plumbing Works**

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#### **GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORKS GENERAL:**

1. In the specifications "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 specifications wherever a dispute arises in the absence of specific mention of a particular point of aspect the provisions on these particular points, 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)	0.01	meter
(ii)	Areas	0.01	Sq.Mt.
(iii)	Cubic Contents	0.01	Cu.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 note 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 specific, it shall mean "all leads"
7. Lift shall be measured from plinth level.
8. Up to "floor two level" means actual height of floor (Maxi 4 M) up to 3 Mt. above plinth level.
9. Definite particulars covered in the items of work, though not mentioned or elucidated in its specifications shall be deemed to be included therein.
10. Reference to specifications of materials as made in the detailed specification of the items of works is in the form of a designation containing them under the specification of the material and prefix 'M' e.g. 'M-5',
11. Approval to 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.
12. The contract rate of the item of work shall be for the work completed in all aspects.
13. No collection of materials shall be made before it is got approved from the Engineer-in-charge.
14. 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
15. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
16. 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 or overloading of the various components of the structure.
17. All works shall be carried out in a workmanlike manner as per the best techniques for the particular item.
18. All tools, templates, machinery and equipment 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 the work.
19. 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 or after completion of the structure.
20. 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

speedy construction and Completion of work to the required 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.

21. All installations pertaining to water supply and fixtures there of as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the contractor.
22. The contractor shall be responsible for observing the rules and regulations imposed under the "Minor Minerals Act", and such of the laws and rules prescribed by Government from time to time.
23. All necessary safety measures and precautions {including those laid down in the various relevant Indian Standards) shall be taken to ensure the safety of men. Materials and machinery on the works as also of the work itself.
24. The testing charges of all materials shall be borne by the Contractor.
25. Approval to any of the executed items for the work does not in any relieve the contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications

**GENERALSTANDARD TECHNICAL SPECIFICATIONS**

Sr. No. of the item in the Schedule 'B' of tender	Sr. No, of applicable Specification	Sr. No. of the item in the Schedule 'B' of tender	Sr. No. of applicable Specification	Sr. No. of the item in the Schedule 'B' of tender	Sr. No. of applicable specification
1		25		49	
2		26		50	
3		27		51	
4		28		52	
5		29		53	
6		30		54	
7		31		55	
8		32		56	
9		33		57	
10		34		58	
11		35		59	
12		36		60	
13		37		61	
14		38		62	
15		39		63	
16		40		64	
17		41		65	
18		42		66	
19		43		67	
20		44		68	
21		45		69	
22		46		70	
23		47		71	
24		48		72	



Sr. No. of the item in the Schedule 'B' of tender	Sr. No, of applicable Specification	Sr. No. of the item in the Schedule 'B' of tender	Sr. No. of applicable Specification	Sr. No. of the item in the Schedule 'B' of tender	Sr. No. of applicable specification
73		99		125	
74		100		126	
75		101		127	
76		102		128	
77		103		129	
78		104		130	
79		105		131	
80		106		132	
81		107		133	
82		108		134	
83		109		135	
84		110		136	
85		111		137	
86		112		138	
87		113		139	
88		114		140	
89		115		141	
90		116		142	
91		117		143	
92		118		144	
93		119		145	
94		120		146	
95		121		147	
96		122		148	
97		123		149	
98		124		150	

## **SPECIFICATIONS OF MATERIALS**

### **M-1. Water**

- 1.1.** Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar of 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 standard specified in I.S. 456-1978.
- 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 charge in time of setting by 30 minutes or more or decrease of more than 10 per cent 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 will generally 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 earned out:
  - (1) 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 are the un burnt lime stone.
  - (2) 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 J.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 1624-1974 to show the acceptability of materials.

### **M-3. Cement**

- 3.1.** Cement shall be ordinary Portland cement 53 grade as per I.S.269-1976

### **M-4. White Cement**

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

### **M-5. Coloured Cement**

- 5.1. Coloured cement shall be with white or grey Portland cement as specified in the item of the work.
- 5.2. The pigments used for coloured cement shall be of approved quality and shall not exceed 10% of cement used in the mix. The mixture of pigment and cement shall be properly ground to have a uniform colour and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.
- 5.3. The pigment shall have the property such that it is neither affected by the cement nor detrimental to it.

**M-6 Sand**

- 6.1. Sand shall be natural sand, clean, well graded, hard, 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 percent of silt as determined by field test, if necessary the sand shall be washed to make it clean.
- 6.2. 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 sand shall be as under.

I.S. Designation	Sieve passing	Percentage by weight Designation	I.S. Sieve Percentage by weight passing Sieve
4.75 mm	100	600 micron	30 - 100
2.36 mm	90 to 100	300 micron	50 - 70
1.18 mm	70 to 100	150 micron	0 - 50

**6.3. Fine Sand :**

The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under.

I.S. Designation	Percentage by weight Sieve passing	I.S. Designation	Percentage by weight Sieve passing
4.75 mm	100	600 micron	40 - 85
2.36 mm	100	300 micron	5 - 50
1.18 mm	75 to 100	150 micron	0 - 10

**M-7. Stone Dust**

- 7.1. This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as determined by field test using measuring cylinder. The method of determining silt contents by field test is given as under :
- 7.2. A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up to 100 mm. mark. The clean water shall be added up to 150 mm. mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.
- 7.3. The height of silt, visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust. The stone dust containing more than 8% silt shall be washed so as to bring the content within the allowable limit.

7.4. The fineness modules of stone dust shall not be less than 1.80

**M-8. Stone Grit**

8.1. 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 flakey elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970. Unless special stone of particular quarries is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious effect with cement.

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

I.S. sieve	Percentage by weight	I.S. Sieve designation	Percentage by weight
12,50 mm	100 %	4.75 mm	0-20%
1000 mm	85 - 100%	2.36 mm	0-25%

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

8.4. The necessary tests for grit shall be carried out as per the requirements of I.S. 2386- ( parts-I to VIII) 1963, as per instructions of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

**M-9. Cinder**

9.1. Cinder is will burnt furnace residue which has been fused or sintered into lumps of varying sizes.

9.2. Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound, clean and free from clay, dirt, ash or other deleterious matter.

9.3. The average grading for cinder aggregates shall be as mentioned below.

I.S. Designation	Percentage by weight Sieve passing	I.S. Designation	Percentage by weight Sieve passing
20 mm	100	4.75 mm	70
10 mm	86	2.36 mm	52

**M-10. Lime Mortar**

10.1. Lime : Lime shall conform to specification M-2, Water : Water shall conform to specification M-1 and Sand: Sand shall conform to specification M-6.

**10.2. Proportion of Mix:**

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

**10.3. Preparation of mortar;**

10.3.1. 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 a 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.

**10.4. Storage:**

10.4.1. Mortar shall always be kept damp, protected from sun and rain till used up, covering it by

tarpaulin or open sheds.

**10.5. Use:**

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

**M-11. Cement Mortar**

**11.1.** Water shall conform to specification M-1, Cement : Cement shall conform to specifications M-3 and Sand : Sand shall conform to M-6

**11.2. Proportion of Mix**

**11.2.1.** Cement and sand shall be mixed to specified proportion, sand being measured by measuring boxes, the proportion of cement will 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.

**11.3. Proportion of Mortar :**

**11.3.1.** 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

**11.3.2.** 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-12. Stone Coarse Aggregate For Nominal Mix Concrete**

**12.1.** 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

**12.2.** 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 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.

I S. Sieve Designation	Percentage passing for single Sized aggregates of Nominal size			I S. Sieve Designation	Percentage passing for single Sized aggregates of Nominal size		
	40 mm	20 mm	16 mm		40 mm	20 mm	16 mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10 mm	05	0.20	0.30
40 mm	85-100	100	-	4.75 mm	-	0.5	0.5
20 mm	0.20	85-100	100	2.35 mm	-	-	-
16 mm		85-100					

**Note :** This percentage may be varied some what by the Engineer-in-charge when considered

necessary for obtaining better density and strength of concrete.

- 12.3.** 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 456~197f shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean. .

**M-13. Black Trap or Equivalent Hard Stone Coarse**

- 13.1.** 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.
- 13.2.** 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 with cement
- 13.3.** The necessary tests indicated in I S. 383-1970 and I.S.456-1978 shall have to be carried out to ensure the acceptability of the material.
- 13.4.** If aggregate is covered with dust it shall be washed with water to make it clean.

**M-14. Brick Bats Aggregate**

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

**M-15. Bricks**

- 15.1.** The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and 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 thrown on the ground from a height of 600 mm.
- 15.2.** The size of modular bricks shall be 190 mm.x 90 mm.x 90 mm.
- 15.3.** The size of the conventional bricks shall be as under :  
( 9" x 4.3/8" x 2,3/4" ) 225 x 110 x 75 mm.
- 15.4.** 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  $\pm 1/8"$  ( 3.0 mm.) Width  $\pm 1/16"$  ( 1.50 mm. ) Height  $\pm 1/16"$  ( 1.50 mm. )
- 15.5.** The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more the 20 percent 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-15A. Fly ash Lime Bricks**

- 15A.1.** The bricks shall be sound, compact and uniform in shape. The bricks shall be free from visible cracks, warp age and organic matter. 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 have smooth rectangular faces with sharp and square corner and shall be of uniform colour.

- The bricks shall not break when thrown on the ground from a height of 600 mm
- 15A.2 The bricks shall be machine moulded and made from suitable Fly ash, Bottom ash, sand, lime and additives
- The fly ash shall conform to grade 1 or Grade 2 of IS 3812 : 1981.
  - The bottom ash used as replacement of sand shall not have more than 12 percent loss on ignition when tested according to IS 1727 : 1967.
  - Deleterious materials, such as clay and silt in sand, shall preferably be less than 5 percent.
  - Lime shall conform to Class C hydrated lime of IS 712 : 1984.
  - Any suitable additive considered not detrimental to the durability of the bricks may be used.
- 15A.3 The Fly ash lime bricks shall be of Class 7.5 depending upon their average compressive strength. The average compressive strength shall be between 7.5 N/mm<sup>2</sup> to 10 N/mm<sup>2</sup> when tested as described in IS 3495 (Part 1) : 1976. The compressive strength of any individual brick shall not fall below the minimum average compressive strength specified by more than 20 percent.
- 15A.4 The drying shrinkage of the bricks when tested by the method prescribed in IS 4139 : 1989, being the average of three units, shall not exceed 0.15 percent.
- 15A.5 The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 3) : 1976, shall have the rating of efflorescence not more than 'moderate'.
- 15A.6 The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 2) : 1976, after immersion in cold water for 24 hours, shall have average water absorption not more than 20 percent by mass.
- 15A.7.** The size of modular bricks shall be 190 mm x 90 mm x 90 mm.
- 15A.8.** The size of the conventional bricks shall be as under :  
( 9" x 4.3/8" x 2,3/4" ) 225 x 110 x 75 mm.
- 15.4.** 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  $\pm$  3.0 mm. Width  $\pm$  2.0 mm. Height  $\pm$  2.0 mm.

#### **M-16. Stone**

- 16.1.** 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 only from the approved quarry and shall be hard sound, durable and free from defects like cavities, cracks, sand holes, flaws injurious veins, patches of loose or soft materials etc., and weathered portions and other structural defects Or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight. When tested in accordance with I.S. 1124-1974. The minimum crushing strength of stone shall be 200 Kg/.Sq. Cm. unless otherwise, specified
- 16.2.** The samples of the stone to be used shall be got approved before the work is started
- 16.3.** 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 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface

#### **M-17. Laterite Stone**

- 17.1.** Laterite stone shall be obtained from the approved quarry it shall be compacted in texture sound, durable and free from soft patch. It shall have minimum crushing strength of 100 Kg/Sq. Cm. in its dry condition. It shall not absorb water more than 20% of its own

weight, when immersed for 24 hours in water. After quarrying, the stone shall be allowed to weather for some time before using in work.

- 17.2. The stone shall be dressed into regular rectangular blocks so that all faces are free from waviness and unevenness, and the edges true and square
- 17.3. Those types of stone in which white clay occurs should not be used
- 17.4. Special corner stones shall be provided where so directed.

**M-18. Mild Steel Bars**

18.1. Mild steel bars reinforcement for R.C C. work shall conform to I.S. 432 (Part -II) 1966 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-1978.

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

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

1. 6 mm	0.22 Kg/Rmt.	8.	20 mm.	2.47 Kg/Rmt
2. 8 mm.	0.39 Kg/Rmt.	9	22 mm.	2.98 Kg/Rmt.
3. 10 mm.	0.62 Kg/Rmt.	10.	25 mm.	3.85 Kg/Rmt.
4. 12 mm.	0.89 Kg/Rmt.	11.	28 mm.	4.83 Kg/Rmt.
5. 14 mm	1.21 Kg/Rmt.	12.	32 mm.	6.31 Kg/Rmt.
6. 16 mm	1.58 Kg/Rmt	13.	36 mm.	7.99 Kg/Rmt. *
7. 18 mm.	2.00 Kg/Rmt.	14.	40 mm.	9.86 Kg/Rmt.

**M-19. High Yield Strength Steel Deformed Bars**

19.1. High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I.S. 1786-1966 and I.S. 1139-1966 respectively.

19.2. Other provisions and requirements shall conform to specification No. M-18 for Mild Steel Bars.

**M-20. High Tensile Steel Wires**

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

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

20.3. 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 Carborudum.

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

**M-21. Mild Steel Binding Wire**

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

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

**M-22. Structural Steel**



- 22.1.** All structural Steel shall conform to I S. 226-1985: 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. River bars shall conform to I.S. 1148-1973.
- 22.2.** When the steel is supplied by the Contractor test certificate of the manufacturers shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

**M-23. Galvanised Iron Sheets**

- 23.1.** The galvanised iron sheets shall be plain or corrugated sheets of gauges as specified in item The G.I. Sheets shall conform to I.S.277-1977. The sheets shall be undamaged in carnage and handling either by rubbing off of zinc coating or otherwise. They shall have clean and bright surface and shall be free from dents, bends, holes, rust or white powdery deposit.
- 23.2.** The length and width of G.I. sheets shall be as directed as per site condition.

**M-23.A :G.I. Valleys gutter, ridges**

- 23.A.1.**The G.I. ridges and hips shall be of plain galvanised sheets Class - 3 of the thickness as specified in item. These shall be 600 mm. in width and properly bent up to shape without damage to the sheets in process of bending.
- 23.A.2.**Valleys gutters and flashings shall also be of galvanised sheet of thickness as specified in itemValleys Shall be 900 mm. wide overall and flashing shall be 380 mm. wide overall They shall be bent to therequired shape without damage to the sheet in the process of bending.

**M-24. Asbestos Cement Sheets**

- 24.1.** Asbestos cement sheets plain, corrugated of semi-corrugated shall conform to I.S.459-1970 Thethickness of the sheets shall be as specified in the item. The sheets shall be free from all defects such ascracks, holes, deformities chipped edges or otherwise damaged.
- 24.2. Ridges &Hips :**
- 24.2.1.** Ridges and hips shall be of same thickness as that of A.C. sheets. The types, of ridges shall be suitable for the type of sheets and location.
- 24.2.2.** Other accessories to be used in roof such as flashing pieces eaves filler pieces, valley gutters, north light, and ventilator curves, barge boards etc, shall be of standard manufacture and shall be suitable for the type of sheets and location.

**M-25. Manglore Pattern Roof Tiles**

- 25.1.** The mangalore pattern tiles shall conform to I S 654-1972 for Class AA or Class A type as specified in item. Samples of the tiles to be provided shall be got approved from the Engineer-m-charge. Necessary tests shall be carried out as directed.

**M-26. Shuttering**

- 26.1.** 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 bullies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used
- 26.2.** The form work shall be sufficiently strong and shall have camber so that it assumes correct shape after deposition of the concrete and shall b-j able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it.

The shuttering shall have smooth and even surface and its joints shall permit leakage of cement grout

- 26.3. 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 form work shall be got inspected by and got approved from the Engineer-in-charge, before the reinforcement bars are placed in position
- 26.4. The props shall consist of bulgies having 100 mm minimum diameter measured at mid length and 80 mm. at thin end 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.
- 26.5. Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete
- 26.6. The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted
- 26.7. As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8. 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.
- 26.9. The shuttering for beams and slabs shall have camber of 4 mm per meter ( 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- 27. Expansion Joints - Premoulded filler**

- 27.1. The item provides for expansion joints in R.C.C. frame structures for internal joints, as well as exposed joints, with the use of premoulded bituminous joint filler.
- 27.2. Premoulded bituminous joints filler i.e. performed strip of expansion joints filler shall not get deformed, or broken by twisting bending or other handling when exposed to atmospheric condition. Pieces of joints filler that have been damaged shall be rejected
- 27.3. Thickness of the per-moulded joints filler shall be 25 mm. unless otherwise specified.
- 27.4. Premoulded bituminous joints filler shall conform to I S 1838-1961

**M-28. Expansion joints-Copper strips & hold .fasts**

- 28.1. The item provide for expansion joints in R.C.C. frame structure for internal joints, as well as exposed joints, with the use of premoulded bituminous joints filler.
- 28.2. Copper sheet shall be of 1.25 mm. width and or 1 25 mm. width and the " U " shape in the middle. Copper strip shall have holdfast of 3 m.m diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm or as shown in the drawing or as directed. The width of each flange ( horizontal side ) of the copper plate to be embedded in the concrete work shall be 25 mm depth of "U" to be provided in the expansion joint, in the copper plate shall be of 25 mm.

**M-29. Teak wood**

- 29.1.** The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.
- 29.2.** Teak wood shall generally be free from large, loose dead or cluster knots, flaws, shakes, warps, twists, bends or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. It shall be free from rot decay, harmful fungi and other defects of harmful nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting using any adhesive materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.
- 29.3.** All scantlings, planks etc., shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.
- 29.4.** The tolerances-in the dimensions shall be allowed at the rate of 1.5 mm. per face to be planed.
- 29.5. First class teak wood**
- 29.5.1.** Firstclass teak wood shall have no individual hard and-sound knots, more than 6 sq. cm. in size and the aggregate area of such knots shall not be more than 1% of area of piece, The timber shall be closed grained.
- 29.6. Second Class Teak Wood:**
- 29.6.1.** Noindividual hard and sound knots shall be more than 15 sq. cms. in size and aggregates area of such knots shall be not exceed 2% of the area of piece.

**M-29A. A Non-teak wood:**

- 29A.1**The non-teak wood shall be chemically treated, seasoned as per I.S. Specifications and of good quality. The type of wood shall be got approved before collecting the same on site Fabrication of wooden members shall be started only after approval.
- 29A.2**For this purpose wood of Bio, Kalai, Sires. Saded, Behda, Jamun, Sisoo will be used for door where as only Kalai. Sires, Halda.Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.
- 29A.3**The non-teak wood shall be free from large loose dead of cluster knots, flows, shakes, warps, bends or any other defects, It shall be uniform in substance and of straight fibers as far as possible It shall be free fro rots, decay, harmful fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be saw in straight lines and planes in the direction of grain and of uniform thickness. The department will use the Agency to produce certificate from Forest Department in event of dispute and the decision of the Department shall be final and binding to the contractor. The tolerance in the dimension shall be allowed at 1.5 mm. per face to be planed.

**M-30. Wooden flush door shutters ( solid core )**

- 30.1.** The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S.2202 ( part - I ) 1980. The timber shall be free from decay and insect attack Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275

- 30.2.** The face-panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The<sup>1</sup> hopping, rebating, opening of glazing, venation etc., shall be provided if specified in the drawing.
- 30.3.** All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.
- 30.4.** The shutters shall be tested for-
- (1) End immersion test:** The test shall be carried out as per I.S.2202 ( part-1 ) 1980 There shall be no delamination at the end of the test.
- (2) Knife Test :** The face panel when tested in accordance with I.S 1659-1979 shall pass the test.
- (3) Glue adhesion test :** The flush door shall be tested for glue adhesive test in accordance with IS2202 ( part -I ) 1980.The shutters shall be considered to have passed the test,if no delamination occurs in the glue lines in the plywood and if no single determination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner Delamination at the knots, knot hole and other permissible wood defectects shall not be considered in assessing the sample.
- 30.5.** The tolerance in size of scud core type flush door shall-be as under :In Nominal thickness  $\pm 1.2$  mm. In Nominal height  $\pm 3$ m
- 30.6.** The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm when measured at any points.

**M-31. Aluminum doors, windows, ventilators**

- 31.1.** Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEA-WP of I.S. 733-1975 and also to I S. Designation WVG-WP of I.S 1285-1975 The section shall be as specified in the drawing and design. The fabrication shall be done as directed
- 31.2.** The hinges shall be cast or extruded aluminum hinges of same type as in window but of larger size.
- 31.3.** The hinges shall normally be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified design A suitable lock for the door Operable either from outside or inside shall be provided. In double shutter door, the first closing shutter shall have concealed aluminum alloy bolt at top and bottom.

**M-32. Rolling Shutters**

- 32.1.** The rolling shutters shall conform to I.S.6248-1979 Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 m .width not less than 1.25 mm. thick and 80 mm wide for shutters 3.5 m. in width and above unless otherwise specified.
- 32.2.** Guide channels shall be of mild steel deep channel section and of rolled pressed or built up ( fabricated ) joint less construction The thickness of sheet used shall not be less than 3 15 mm.
- 32.3.** Hood covers shall be made of M S. Sheets not less than 0.90 mm. thick. For shutters having width 3.5 Meter and above, the thickness of M.S. sheet for the hood cover shall

be not less than 1 25 mm.

- 32.4.** The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire of strip of adequate strength to balance the shutters in all position. The spring pipe shaft etc .shall be supported on strong M S of malleable C I. brackets. The brackets shall be fixed on or under the lintel as specified with-raw! plugs and screws bolts etc.
- 32.5.** The rolling shutters shall be of self rolling up to 8 Sq. m. clear area without ball bearing and up to 12 Sq.m. clear area with ball bearing. If the rolling shutters are of larger, then gear operated type shutters shall be used.
- 32.6.** The locking arrangement shall be provided at the bottom of shutter at both ends The shutters shall be opened from outside.
- 32.7.** The Shutters shall be completed with door suspension shafts, locking arrangements, pulling hooks, handles and other accessories.

**M-33. Collapsible Steel Gate**

- 33.1.** The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball-bearings shall be provided in every double channel Unless otherwise specified the particulars of collapsible gate shall be as under.
- (a) Pickets : These shall be of 20 mm. M.S. channels of heavy sections unless otherwise shown on drawings. The distance centre to centre of pickets shall be 12 cms .with an opening or 10 Cms
- (b) Pivoted M.S. flats shall be 20 mm x6 mm
- (c) Top and bottom guides shall be from tee of flat iron of approved size.
- (d) The fittings like stoppers fixing, locking cleats, brass handles and cast iron rollers shall be of approved design and size

**M-34. Welded Steel Wire Fabric**

- 34.1** Welded steel wire fabric for general purpose shall be manufactured form cold drawn steel wire "as drawn" or galvenised steel conforming to I.S. 226-1975 with longitudinal and transverse wire securely connected at every intersection by a process of electrical resistance welding and conforming to I.S.4948-1974. it shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof The type of mesh shall be oblong or square as directed The mesh sizes and sizes if wire for square 3b well as oblong welded steel wire fabric shall be as directed The steel wire fabric in panels shall be in one whole piece in each panel as far as stock sizes permit.

**M-35 Expanded Metal Sheets**

- 35.1.** The expanded metal sheets shall he free from flaws joints broken strands laminations and other harmful surface defects. Expanded metal steel sheet shall confirm to IS-412-1975. except that blank sheets need not be with guaranteed mechanical properties The size of the diamond mesh of expanded metal and dimensions of strands (width and thickness) shall be as specified. The tolerance on nominalweight of expanded metal sheets shall be of  $\pm 10$  percent.
- 35.2.** Expanded metal in panels shall be in one whole piece in each panel as far as stock sizes permit. The expanded metal sheets shall be coated with suitable protective coating to prevent corrosion.

**M-36. Mild Steel Wire (Wire Gauze Jali )**

- 36.1.** Mild steel wire may be galvanized as indicated. All finished steel wire shall be well

cleanly drawn to the dimensions and size of wire as specified in item. The wire shall be sound free from splits surface flaws, rough jagged and imperfect edges and other harmful surface defects and shall conform to I.S. 280-1978.

**M-37. Plywood**

**37.1.** The plywood for general purpose shall conform I.S. 303-17-1975.

Plywood is made by cementing together than boards or starts of wood into panels. There are always an odd number of layers, 3,5,7,9, ply etc. The piles are placed so that grain of each layer is at right angles to the grain in the adjacent level.

**37.2.** The chief advantages of plywood a single board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and greater resistance to cracking and splitting with charge in moisture content.

**37.3.** Usually synthetic resins are used to gluing, phenolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degree C to 140 degree C and a pressure of 11 to 14 Kg/Sq. Cm on the wood. The time of heating may be anything from 2 to 60 minutes depending upon thickness

**37.4.** When water glue are used the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive the finished plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.

**37.5.** According to I.S. 303-1975 the plywood for general purpose shall be of the grades namely BWR, WWR and CWR depending up to the adhesives used for bonding the veneers and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the two faces each face being of three kinds namely A, Band C After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.

**37.6.** Thickness of plywood Boards.

**TABLE**

Board	Thickness	Board	Thickness	Board	Thickness	Board	Thickness
3 ply.	3 mm.	5 ply.	5 mm.	7 ply.	9 mm.	9 ply.	16 mm
	4 mm.		6 mm.		13 mm.		19 mm.
	5 mm.		7 mm.		16 mm.	11 ply.	19 mm.
	6 mm.		8 mm.	9 ply.	13 mm.		25 mm.

**M-38. Glass**

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

**38.2. Sheet Glass**

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

**38.2.2.** For panes larger than 600 mm x 600 mm and up to 800 mm x 800 mm the glass weighing not less than 8.75 Kg/Sq m shall be used For bigger panes up to 900 mm x 900 mm. glass weighing not less than 8.75 Kg/Sq. m shall be used. For bigger panes up to 900 mm x

900 mm. glass weighting not less than 11.25 Kg/Sq. m. shall be used

**38.2.3.** Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I.S. 1761-1960. Sheet glass of the specified colours shall be used, if so shown, on detailed drawings or so specified. For important buildings and for panes with any dimension over 900 mm plate glass of specified thickness shall be used

**38.3. Plate Glass:**

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

**38.4. Obscured Glass:**

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

**38.5. Wired Glass:**

**38.5.1.** Glass shall be with wire netting embedded in a sheet of plate glass. Electrically welded 13 mm Georgian square mesh shall be used. Thickness of glass shall not be less than 6 mm. Wired glass shall be of type and thickness as specified

**M-39. Acrylic Sheets**

**39.1.** Acrylic sheets shall be of thickness as specified in the item and of an specified shape and size as the case may be. Panels may be flat or curved. It should be light in weight. It shall be colourless or coloured or opaque as specified in the item. Colourless sheet shall be as transparent as the finest optical glass. Its light transmission rate shall be about 95%. Transparency shall not be affected for the sheets of larger thickness, it shall be extremely resistant to sunlight, weather and low temperatures.

**39.2** It shall not show any significant yellowing or change in physical properties or loss of light transmission over a longer period of use. The sheet shall be impact resistant also. Sheets should be of such quality that they can be cut, bent, jointed as desired. Solution for the joints shall be used as per the requirement of manufacturer.

**M-40. Particle board**

**40.1.** The particle boards used for face panels shall be of best quality free from any defects. The particle boards shall be made with phenol-formaldehyde adhesive. The particle boards shall conform to IS 3087-1905 "Specification for wood particle board for general purpose". The size and the thickness shall be as indicated.

**M-41. Expanded polystyrene or framed styrofoam slabs**

**41.1.** The expanded polystyrene ceiling boards and tiles shall be of approved make and shall be of sizes, thickness, finish and colour as indicated. It shall be of high density and suitable for use as insulating material. The insulating material shall be like slabs of Thermocole etc.

**M-42. Resin bonded fiber glass.**

**42.1.** The resin bonded fiber glass tiles or rolls shall be of approved make and shall be of sizes, thickness, and finish as indicated.

**42.2.** For test of Mineral wool thermal insulation [Blanket IS 3144-1965 shall be followed

**42.3.** Insulation wool blankets shall be with the following coverings on one or both sides as indicated

(1) Bituminous Hessian Kraft paper suitable for use in position where moisture has to be

excluded.

- (2) Hessian cloth or Kraft paper for keeping out dust
- (3) G.I wire netting, suitable for surfaces to be plaster over

**M-43. Fixtures and fastenings**

**43.1. General:**

**43.1.1.** The fixtures and fastenings, that is butt hinges tee and strap hinges sliding door bolts, tower bolts, door latch, bath-room latch, handles door stoppers, casement window fasteners, casementstays and ventilators catch shall be made of the metal as specified in the item or its specification.

**43.1.2.** They shall be of iron, brass, aluminum chromium plated iron, chromium plated brass, copper oxidized iron, copperoxidized brass or anodized aluminum as specified

**43.1.3.** The fixtures shall be heavy medium or light type. The fixtures and fastenings shall be smooth finished and shall be such as will ensue ease of operations.

**43.1.4.** The samples of fixtures and fastenings shall be got approved as regards, quality and shape before providing them in position

**43.1.5.** Brass and anodizedaluminum fixtures and fastenings shall be bright finished

**43.2. Holdfasts:**

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

**43.3. Butt hinges:**

**43.3.1.** Railway standard heavy type butt hinges shall be used when so specified

**43.3.2.** Tee and strap hinges shall be manufactured from M S Sheet

**43.4. Siding door bolts (Aldrops):**

**43.4.1.** The aldrops as specified in the item shall be used and shall be got approved.

**43.5. Tower bolts (Barrel Type):**

**43.5.1.** Tower bolts as specified in the item shall be used and shall be got approved

**43.6. Door Latch:**

**43.6.1.** The size of door latch shall be taken as the length of latch.

**43.7. Bathroom Latch:**

**43.7.1.** Bathroom latch shall be similar to tower bolt.

**43.8. Handle:**

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

**43.9. Door Catch:**

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

**43.10. Door Stoppers:**

**43.10.1.** Door catch shall be fixed at a height to about 900 mm from the floor level such that one part of the catch is fitted on the inside of the shutter and the other part is fixed in the wall with necessary wooden plug arrangements for appropriate fixity The catch shall be fixed 20 mm inside the face of the door for easy operation of catch.

**43.11. Wooden Door Stop with hinges:**

**43.11.1.** Wooden door stop of size 100 mm x GO mm x 40 mm shall be fixed on the door frame with a hinges of 75 mm. size and at a height of 900 mm. from the floor level the wooden door stop shall be provided with 3 coats of approved oil paint

**43.12. Casement Window Fastener:**

**43.12.1.** Casement window fastener for single leaf window shutter shall be left or right handed



as directed

**43.13. Casement stays (Straight Red Stay):**

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

**43.14. Ventilator Catch:**

**43.14.1.** The pattern and shape of the catch shall be as approved

**43.15. Pivot:**

**43.15.1.** The base and socket plate shall be made from minimum 3 mm. thick plate: and projected pivot shall not be less than 12 mm 'diameter and 12 mm. length and shall be firmly riveted to the base plate in case of iron pivot and in single piece plate in the case of brass pivot.

**M-44. Paints:**

**44.1. (A) Oil paints :**

**44.1.1.** Oil paints shall be of the specified colour 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 stainer will be allowed In such a case the contractor shall ensure that the shade of the paint so allowed shall be uniform.

**44.1.2.** All the paints shall meet with the following general requirements

- (i) Paint shall not show excessive setting in a freshly opened full can and shall easily be ready spread with a paddle to a smooth homogeneous state. The paint shall show no curdling, 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

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

**44.2. (B) Enamel paints:**

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

**M-45. French Polish**

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

(i) Denatured spirit of approved quality (ii) Chandras (iii) Pigment.

**45.2.** The French polish so prepared shall conform to I S : 348-1 9C8.

**M-46. Marble chips for marble mosaic terrazzo**

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

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

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

**M-47. Flooring Tiles**

**47.1. (A) Plain Cement tiles;**

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

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

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

**47.1.4.** The size of tiles generally be square shapes 24.85 Cm x24.85 Cm. or 25 Cm x 25 Cm The thickness of tiles shall be 20 mm.

**47.1.5.** Tolerance of length and breadth shall be plus or minus one millimeter Tolerance on thickness shall be plus 5mm.

**47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S 1237-1980.

**47.2. (B) Plain Coloured Tiles:**

**47.2.1.** The tiles shall have the same specification as for plain cement tiles as per (A) above expect that they shall have a plain wearing surface wherein pigments are used. They shall conform it I.S. 1237-1980.

**47.2,2.** The pigments used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for colouring tiles shall have permanent colour and shall not contain materials detrimental to concrete

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

**47.3. (C) Marble mosaic tiles:**

**47.3.1.** These tiles have same specification as per plain cement tiles except the requirements as stated below

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

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

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

**47.3.5.** The tiles shall be prepared form cement conforming to Indian Standards or coloured port land cement generally depending upon the colour of tiles to be used or as directed.

**47.4. (D) Chequered Tiles :**

- 47.4.1. Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below
- 47.4.2. The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The centre to centre distance of chequer shall not be less than 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm
- 47.4.3. The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered tiles shall be plain coloured or mosaic as specified. The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site
- 47.4.4. Tiles shall conform to relevant I.S 1237-980.

**47.5.(E) Chequered Tiles For Stair Cases :**

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

- (1) The length of a tile including nosing shall be 300 mm (2) The minimum thickness shall be 28 mm (3) The nosing shall have also the same wearing layer as at the top. (4) The nosing edge shall be rounded (5) The front portion of the tile for a minimum length of 75 mm. from and including the nosing shall have grooves running parallel to nosing and at centers not exceeding 25 mm. Beyond that the tiles shall have normal chequer pattern.

**M-48. Rough Kotah Stone**

- 48.1. The Kotah stones shall be hard even, sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green Brown coloured shall not be allowed for use. They shall be without any soft veins, cracks or flaws.
- 48.2. The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm. x 450 mm as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified
- 48.3. The edges of stones shall be chisel dressed on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be  $\pm 3$  mm
- 48.4. The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stones shall be true, square and free from chipping and surface shall be true and plain
- 48.5. When machine cut edges are specified, the exposed and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform

**M-49. Polished Kotah Stone**

- 49.1. Polished kotah stone shall have the same specification as per rough kotah stone except as mentioned below
- 49.2. The stones shall have machine polished surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. The stones to be used for dado, skirting, sink, veneering, sills steps etc. where machine polishing after the stones are fixed in situ is not possible shall be double polished

**M-50. Dholpur Stone Slab**

- 50.1. Dholpur stone slab shall be of best quality as approved by the Engineer-in-charge. The stone slab shall be without any veins, cracks, and flaws. The stone slab shall be even sound and durable regular in shape and of uniform colour
- 50.2. The size of the stone shall be as specified in the item or detailed drawing or as approved by the Engineer-in-charge. The thickness of the stone shall be as specified in the item of work with the permissible tolerance of plus or minus 2 mm. The provision in respect of polishing as for polished kotah stone shall apply to polished Dholpur stone also. All angles and edges of the face of the stone slab shall be fine chiseled or polished

as specified in the item of work and all the four edges shall be machine cut All angles and edges of the stone slab shall be true and plane

**50.3.** The sample of stone shall be got approved by the Engineer-in-charge for a particular work It shall be ensured' that the stones to be used in a particular work shall not differ much in shade or tint from the approved sample

**M-51. Marble Slab**

**51.1.** Marble slab shall be white or of other and of best quality as approved by the Engineer-in-charge

**51.2.** Slabs shall be hard, close, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfect plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar

**51.3.** Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 460 mm x450 mm and preferably 600 mm 'x 600 mm. However, smaller sizes will be allowed to be used of the extent of maintaining required pattern.

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

**51.5.** Except as above the marble slabs shall conform to I.S. 1130-1969

**M-52. Granite Stone slab**

**52.1.** Granite shall be of approved colour and quality. The stone shall be hard, even sound and regular in shape and generally uniform in colour. It shall be without any soft veins, cracks or flaws

**52.2.** The thickness of the stone shall be specified in items.

**52.3.** All exposed faces shall be double polished to tender truly smooth and even reflecting surface. The exposed edges and corners shall be rounded off as directed The exposed edges shall be machine cut and shall have uniform thickness.

**M-53. P.V.C. Flooring**

**53.1.** P.V.C. sheets for P.V.C., floor covering shall be of homogenous flexible type conforming to I S 3462-1966. The P.V.C. covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odour.

**53.2.** Thickness of flexible type covering tiles shall be as specified in the description of the item

**53.3.** The flexible type shall be backed with Hessian or other woven fabric The following tolerances shall be applicable on the nominal dimensions of the rolls or tiles :

(a) Thickness  $\pm 0.15$  mm.

(b) Length or Width

(1) 300 mm. Square tiles  $\pm 0.20$  mm. (3) 900 mm Square tiles  $\pm 0.60$  mm.

(2) 600 mm. Square tiles  $\pm 0.40$  mm. (4) Sheets and roll  $\pm 0.10$

percent.

**53.4. Adhesive:**

**53.4.1.** The adhesive for PVC flooring shall be of the type and make recommended by the manufactures of PVC sheets/tiles.

**M-54. Facing Tiles**

- 54.1.** The facing tiles (burnt clay facing bricks) shall be free from cracks, and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled faces. The texture of the finished surface that will be exposed when in place shall conform to an approved sample consisting not less than for stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by ram and greater durability than common bricks. The tiles shall conform to I.S. 2691-1972.
- 54.2.** The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog which shall conform to I.S. 11077-1976.
- 54.3.** The permissible tolerance in dimensions specified above shall be as follows:

Size	Tolerance for	
	1st Class Brick	2nd Class Brick
19 cm.	± 6 mm.	± 10 mm.
9 cm.	± 3 mm.	± 7 mm.
4 cm.	± 1.5 mm.	± 3 mm.

The tolerance for distortion or warpage of face or edges of individual brick from a plane surface and from a straight line respectively shall be as follows:

Facing dimensions	Permissible tolerance
Max. below 19 cms.	Max. 2.5 mm.
-do- above 19 cms.	Max. 3.0 mm.

- 54.5.** The average compressive strength obtained as a sample of five tiles when tested in accordance with the procedure laid as per I S 1077-1976 shall be not less than 175 Kg/Sq Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg / Sq.Cm.
- 54.6.** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing. The absorption for each individual bricks shall not exceed 25 percent.
- 54.7.** The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than "Slightly effloresced"

**M-55. White glazed tiles**

- 55.1.** The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape they shall be free from cracks, crazing spots chipper) edges and corners. The glazing shall be of uniform shade.
- 55.2.** The tiles shall be nominal size of 150 mm x 150 mm unless otherwise, specified. The maximum variation the stated sizes other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. 1977-19/0

**M-56. Galvanised iron pipes and fittings**

- 56.1.** Galvanised iron pipes shall be of the medium type and of required diameter and shall comply with I.S. 1239-1979. The specified diameter of the pipes shall refer to the inside diameter of the bore. Clamps, screw and all galvanised iron fittings shall be of the standard 'R' or equivalent make

**M-57. Bib cock and stop cock**

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

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

**57.3.** The minimum finished weight of bib cock and stop cock shall be as given below

Diameter	Bid cock	Stop cock	Diameter	Bid cock	Stop cock
8 mm	0.25 kg.	0.25 kg.	15 mm	0.40 kg.	0.40 kg.
10 mm	0.30 kg.	0.35 kg.	20 mm	0.75 kg.	0.75 kg.

**M-58. Gun metal wheel valve**

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

**M-59. White glazed porcelain wash basin**

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

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

**M-60. European type water closet/with low flushing**

**60.1.** The European type water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to I.S. 2556-1973 and I.S. 771-1979

**60.2.** 'S' trap shall be provided as required with water seal not than 50 mm. The solid plastic seat and cover shall be of best Indian make conforming to I.S 2548-1980. They shall be made of moulded synthetic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

**M-61. Orrissa type water closet**

**61.1.** The Specification of Orrissa type white glazed water closet of first quality shall conform to I.S. 2256(Part-III) -1981 and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 mm x 400 mm with raised footrest.

**M-62. Indian type water closet**

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

**M-62A. A. Foot Rests**

**62.A.1.** A pair of whit glazed earthen ware rectangular foot to minimum size 250 mm.x 130 mm. x 20 mm shall be provided with the water closet.

**M-63. Glazed Earthen Ware Sink**

**63.1.** The glazed earthen-ware sink shall be of specified size, colour and quality. They sink shall conform, to I.S. 771 part – II – 1979. The brackets for sinks shall conform to I.S 775-1970

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

**M-64. Glazed earthen-ware Lipped type flat back urinal/corner type urinal**

**64.1.** The lipped type urinal shall be fiat back or corner type as specified in the item and shall conform to I.S 771-1979. It shall be of best Indian make and size as specified and approved by the Engineer-in-charge. The flat back of corner type urinal must be of 1st quality free from any defects, cracks etc.

**M-65. Low level Enamel flushing tank**

**65.1.** The low level enamel flushing tank shall be of 15 liters capacity. It shall conform of I S 774-1971. The flushing cistern shall be of best quality and free from any defects. The flushing tank shall have outlet 32 mm. diameter. The outlet shall be connected with W.C. pan by lead pipe or P.V.C. pipe as specified. The flushing tank shall be provided with inlet and outlet for fixing G.I. inlet pipes and over-flow pipes. The flushing cistern shall be provided with chromium plated handle for flushing The flushing tank shall be provided with bracket of cast iron so that it can be fixed on wall at specified height. The brackets shall conform to I.S. 775-1970.

**M-66. Cast iron flushing cistern.**

**66.1.** The cast iron flushing cistern shall be of 15 liters capacity. It shall conform to I.S. 774-1971. The flushing cistern shall be of best quality free from any defects. The flushing cistern shall have outlet of 32 mm diameter. The lead pipe shall conform to I.S 404 (Part-I) - 1962; For fixing G.I. inlet pipes and overflow pipe 20 mm. dia. inlet and

outlet shall be provided The flushing cistern shall be provided with galvanised iron chain and pull of sufficient length and shall be got approved from the Engineer-in-charge. The cast iron flushing cistern shall be painted with one coat of anticorrosive paint and two coats of paints The flushing cistern shall be fixed on two C I brackets The C [.brackets shall conform to I S 775-1970.

**M-67. Flush cock.**

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

**M-68. Cast iron pipes and fittings.**

**68.1.** All soil water, vent and anti syphonage pipes and fitting shall conform to I S.1729-1964. The pipes' shall have spigot and socket ends with head on spigot end. The pipes and fitting 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, pinholes or there imperfection and shall be neatly dressed and carefully fettled.

**68.2.** The end of pipes and fittings shall be reasonable square to their axis.

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

**68.4. Tolerances :**

**68.4.1.** The Standard weights and thickness of pipes shall be as shown in the following table A tolerance up to minus 10 per cent may however be -allowed against these standard weights

Sr. No.	Nominal dia. of bore	Thickness	Overall	Weight of pipe	excluding ears
1.	75 mm.	5.0 mm.	12.38 Kg.	16.52 Kg.	18.37 Kg.
2	100. mm.	5.0 mm.	18.14 Kg.	21.67 Kg.	24.15 Kg.

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

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

**M-69. Nahni Trap**

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

**69.2.** The Nahni trap shall be of-quality approved by the Engineer-in-charge and shall



generally conform to the relevant Indian Standards.

- 69.3.** The Nahnitrap provide shall be with deep seal, minimum 50 mm. except at places where trap with deep seal cannot be accommodated. The cover shall be cast iron perforated cover shall be provided on the trap of appropriate size.

**M-70. Gully Trap**

- 70.1.** Gully trap shall conform to I.S. 651-1980. It shall be some, free .from defects such as fire-cracks or hair cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.

- 70.2.** The size of the gully trap shall be as specified in the item.

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

**M 71. Glazed Stone Ware pipe And Fittings**

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

- 71.2.** The pipes shall generally conform to relevant I S 651-1980.

**M-72. Wall Peg Rail**

- 72.1.** The aluminum wall peg rail shall have three aluminum pegs approved quality and size. It shall be fixed on teakwood plank of size 450 mm x 75 mm x 20 mm. The teakwood shall be French polished or oil painted as specified.

**M-73. G.I. Water Spot**

- 73.1.** The G.I. pipes of 40 mm dia shall be of medium quality and specials shall be of 'R' brand or equivalent brand of best approved quality

- 73.2.** The pipe shall have length as required for the thickness of wall in which it is fixed and at outside end tee bend cut at half the length shall be provided and at other end coupling shall be provided to have better fixing. The water spout shall be provided as per detailed drawing or as directed

**M-74. Asbestos Cement pipe (A.C. pipe)**

- 74.1.** The asbestos cement pipe of diameter as specified in the description of the item shall conform to I.S. 1626-1980. Special like bends, shoes, cowls, etc. shall conform to relevant Indian Standards The interior of pipe shall have is smooth finish, regular surface and regular internal diameter. The tolerance in all dimensions shall be as I.S. 1626-part-I-1980.

**M-75. Crydon Ball valve**

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

**M-76. Bitumen Felt For Water proofing And Damp Proofing**

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

**M-77. Selected Earth**

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

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

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

**M-78. Barbed Wire**

**78.1.** The barbed wire shall be of galvanised steel and it shall generally conform to I.S. 278-1978. The barbed wire shall be of types-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between two barbs shall be 75 mm unless otherwise specified in the item. The barbed wire shall be formed by twisting together two fine wires. One containing the barbs. The size of the line and point wires and barb spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed  $\pm 0.08$  mm

**78.2.** The barbs shall carry four points and shall be formed by twisting two point wires, each two turns tightly round one line wire making altogether four complete turns. The barbs shall have a length of not less than 13 mm and not more than 18 mm. The point shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.

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

**78.4.** The lengths per 100 Kg. of barbed wire I.S. type I shall be as under:  
Nominal 1000 meter Minimum 934 meter Maximum 1066 Meter.

**Item No. 1,2,3,4 :**

**Excavation for foundation up to 1.50M, 1.50 to3.00 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff in designated place as instructed soft morrum, Hard morrum, soft rock and Hard rock.**

**1. 0. Dense or Hard Soil**

Any soil which generally require close application of picks or jumpers or scarifies to loosen it stiff clay, gravel and rubble stone etc. fall under this category.

**1. 1. Hard murrum**

The hard murrum shall be clean of good binding quality and of approved quality obtained from approved quarries, of disintegrated rocks which contain silicons material and natural mixture of clay of calcareous origin, the size of hard murrum shall not be more than 20 mm.

**2.0. Workmanship**

**1.0. General**

1.1 Any soil which generally yields to the application of pickaxes and shovels, phawaras, rakes or any such ordinary excavating implement or organic soil, gravel, silt, sand turf loam, clay, peat etc., fall under this category.

**2.0. Clearing the site**

**2.1.** The site on which the structure is to be built shall be Cleared and all obstructions, loose stone, materials and rubbish of all kind, bush, wood and trees shall be removed as directed. The materials so obtained shall be property of the. Government and be conveyed and stacked as directed within 50 M. lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt,

**2.2.** The rate of site clearance is deemed to be included in the rate of earth work for which no extra will be paid.

**For Soft Rocks and Hard Rocks**

**2.3.** Excavation shall be done by blasting to the dimensions shown in the drawings or as directed. The blasting shall be carried out only with written permission of the Engineer-in-charge. All the laws, regulations etc. pertaining to the precautions, acquisition, transport, landing and use of explosive shall be rigidly followed. The Magazine for the storage for the explosive shall be built to the design and specifications of explosive authority and located at the approved site No unauthorized persons shall be admitted into the magazine and when not in use it shall be kept securely locked No matches or inflammable materials shall be allowed in Magazine. The Magazine shall have an-effective lightning conductor. The rules of explosive 1940 revised from time 10 times shall be followed strictly for obtaining starting, handling, and undertaking blasting work.

**2.4.** The contractor shall be responsible for damage to property, workmen public due to any accident due to use of explosives and operations

**2.5. Precautions**

2.5.1 The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the detail of handling

explosive and blasting operations. The blasting shall be carried out during fixed hours of the day, preferably during the mid-day lunch hours or at the close of the work as ordered in writing by the Engineer-in-charge. The hours of blasting shall be notified in advance to the people in the vicinity. All the charges shall be prepared by the man in charge only.

2.5.2 Red danger flags shall be displayed prominently in all directions during the blasting operations.

2.5.3 People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200 m. from the firing-site in all directions and all persons including workmen shall be excluded from the flagged area at least 1.0 minutes before the firing warning whistle being sounded for this purpose.

2.5.4 During excavation in rock by blasting, the lowest 15 cm. of stratum shall be blasted with light charge so as not to shatter or weaken the underlying rock on which the foundation will be actually laid. If excavation in rock is done to large widths and length than those shown on the drawings or as directed, no payment shall be made for such over break. If excavation is done to depths greater than shown on the drawings or directed, excess depth shall be made up with foundation grade concrete as directed at the contractor's cost.

2.5.5 The charged hole shall be drilled to the required depth and in suitable places when blasting is done with powder, the fuse cut to the required length shall be inserted in the holes and the powder dropped in. The powder shall be gently tamped with copper rod with rounded ends. The explosive powder shall then be covered with trapping materials which shall be tamped lightly out firmly. When blasting is done with dynamite and other high explosive, dynamite cartridges shall be prepared by inserting the square cut ends of fuse into the detonator, and finished with dippers at the open ends the detonator should be gently pushed into the detonator and finished with dippers at the opened ends. The detonator should be gently pushed explosive. Bore holes shall be of such size that the cartridges can be easily passed down. The holes shall be cleared of all debris and explosive inserted. The space for about 20 cms, above the charge shall then be gently filled with dry clay pressed home and rest of tamping is with firmed any convenient materials gently packed with a wooden cover.

2.5.6 At a time not more than 10 such charge shall be prepared and fired. The man in charge shall blow a whistle in a recognized manner for cautioning the people. All the people shall then be required to move to number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the work site.

2.5.7 The contractor shall be fully responsible to strictly follow the prevailing rules and procedures regarding blasting procedures

## **2.6. Misfire**

2.6.1 In case of a misfire the following procedure shall be observed:

2.6.2 Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charge.

2.6.3 If it is the blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at, about 45 cm. from the old and fired. This should blast the old charge should it not blast the old charge; the procedure shall be repeated till the old charge is blasted.

2.6.4 In case of charge of gelatins, dynamite etc, the man in charge shall gently remove the tamping and the primer with detonator and primer shall then be used to blast the charge. Alternatively the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole another hole may then be drilled 15 cm away and parallel to it. The man in charge shall report to the office all cases of misfire and cause of the same and what steps were taken in connection therewith.

2.6.6 If a misfire has been found to be due to defective or dynamite, the whole quantity in the box from which defective article was taken must be sent to authority as directed for inspection to ascertain whether all the remaining materials in the box are also defective or not.

**2.7. Accidents:**

2.7.1 The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property etc, due to the blasting, without extra claims on the department.

**2.8. Account:**

2.8.1 A careful and day to day account of explosives shall be maintained by the contractor in an approved manner and shall be open to inspection of the Engineer-in charge. Surprise visits may also be paid by the Engineer-in-charge to the storage and in case of any unaccountable shortage or unsatisfactory accounting, the contractor shall be liable to be penalized by forfeiture of part or whole of his Security Deposit or by cancellation of tender in which case he shall not be entitled for any compensation.

**2.9. Disposal of Excavated Materials:**

2.9.1 No materials excavated from foundation trenches of whatever kind they may be, are to be placed even temporarily nearer than 1.5 m or distance prescribed by the Engineer from the outer edge of excavation. All materials excavated shall remain the property of Government. Rate for excavation includes sorting out of useful materials and stacking them separately as directed within the specific lead. Materials suitable and useful for backfilling or other use shall be stacked in convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach upon the area required for constructional purpose. The site shall be left clean of all debris on completion.

**2.9.2 Disposal of excavated materials is subject to the following:**

Unsuitable materials obtained from clearing site and excavation shall be disposed off within a lead of 90 meters as directed. Useful materials obtained from clearing site and excavation shall be stacked within a lead of 90 M beyond the building areas as directed. Materials suitable for back-filling shall be stacked at convenient places within a lead of 90m from the structure for reuse. Useful stones from rock excavation shall be stacked neatly within a lead of 90 m and will be allowed to be used by the contractor on payment at rates laid down in the contract or if not so laid down, at scheduled rates of the Division or at a mutually agreed rates if there are no such rates in the schedule of rates.

2.9.3 If surplus materials are required to be conveyed beyond 90 m, conveyance will be paid for under a separate item

**4.0 setting out**

After clearing the site, the center lines will be given by the Engineer-in-charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all parts of the work.

Contractor shall supply laborers, materials, etc. required for setting out the reference marks and benchmarks and shall maintain them as long as required and directed.

#### **5.0. Mode of measurements & Payment**

5.1. The work shall be measured for the work limited to the dimensions shown on drawings or directed. Excavation to dimension in excess of the above will not be measured or paid for and if so ordered by the Engineer the contractor shall have to fill up the excess depth with cement concrete specified for foundation without extra payment.

5.2. Driving of sounding bars, drills holes to explore the nature of substratum up to a total length of meter distributed in 2 or 3 places in each foundation if necessary, will be considered incidental work and will not be paid for separately.

5.3. Removal of slips and blows in the foundation trenches will not be measured or paid for.

5.4. If it is necessary in the opinion of the Engineer-in-charge to carry foundation below the levels shown on the plans, the excavations for the 1.5 m to 3.0 m or addition depth will be included in the quantity for the particular classification and will be paid for as extra at rate to be decided under the general conditions of contract unless, the contractor is willing to accept payment as tendered rates.

5.5. The rate shall be for a unit of one cubic meter.

#### **Item No.: 5**

**Filling of plinth with using excavated usefull material partly and remaining murrum to be brought from outside in layer of 0.23 m thick including murrum and sprinkling of water, compaction etc. complete.**

#### **1.0. Workmanship**

1.1. The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.

1.2. As soon as the work in foundation has been completed and measured the site of foundations shall be cleared of all debris, brickbats, mortar dropping etc., and filled with earth in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the but ends of crow-bars, where rammer cannot be used.

1.3. The plinth shall be similarly filled with earth in layers not exceeding 20 cms. Adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

1.4. The finished level of filling shall be kept to shape as intended to be given to floor.

1.5. In case off large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required, shall also be as specified.

1.6. The excavated stuff of these selected types shall be allowed to be used in filling the trenches and plinth under no circumstances black cotton soil be used for filling the Plinth.

## **2.0. Mode of Measurements & Payment**

2.1. The payment shall be made for filling in plinth and trenches. No deduction shall be made for shrinkage or voids, if consolidated as instructed above.

2.2. The rate shall be for unit of one cubic meter.

### **Item No.: 6**

#### **Filling of Plinth in layers of 0.23 m thick including murrum and sprinkling of water, compaction etc. complete**

##### **1.0 Material:**

1.1. Murrum shall be clean of good binding quality, and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicons materials and natural mixture of clay of calcareous origin. The size of Murrum shall not be more than 20 mm. in this case if excavation material is good then 1<sup>st</sup> priority will be this material use in filling and that rate given as per Item no.02. during excavation the usable material stacking as per instruction engineer in-charge at the suitable site near the work site, for use in filling. If the earth has to be bought from outside of the site, the rate includes the purchase cost of the earth, loading and unloading, its carting from outside to site, levy royalty or any other form of taxes as per prevailing rules, screening if necessary, spreading in 200mm (6" to 8") layers consolidating with 10 ton roller, if it not possible then through electric compactors of adequate capacity. Each layer prior to putting next layers as per the instruction of engineer. The earth shall be got provided prior to bring on site. The earth shall be free from trees roots, weeds, big stones, and other objectionable materials liable to decay.

##### **2.0. Workmanship:**

2.1. The murrum or selected soil shall be filled in foundation and plinth in 20cms. layers including consolidating, ramming, watering, dressing etc. complete.

##### **3.0. Mode of measurement and payment:**

3.1. The relevant specifications of the item shall be followed.

3.2. The rate includes cost of collecting and carting murrum/or selected earth of approved quality with all lead and labor required for filling in trenches and plinth.

3.3. The rate shall be for a unit of one cubic meter

### **Item No.: 7,**

#### **Rolling work with Roller 8-10 Ton capacity over metalling murrum for soling or single layer arriving proper compaction (with watering)**

##### **Mode of Measurements & Payment**

The rate shall be for a unit of one Square meter.

**Item No.8**

**Removal of Excavated Stuff and laying within RMC limit as directed by Engineer-in-Charge**

1.0 No materials excavated from foundation trenches of whatever kind they may be, are to be placed even temporarily nearer than 1.5 m or distance prescribed by the engineer from the outer edge of excavation. All materials excavated shall remain the property of Government. Rate for excavation includes sorting out of useful and stacking them separately and as directed within the specified lead. Materials suitable and useful for back filling or other use shall be stacked in convenient place, but not in such a way as to obstruct free movement of men, animal sand vehicles or encroach upon the area required for constructional purposes.

1.1 The site shall be left clean of all debris or completion.

1.2 **Disposal of excavated materials is subject to the following.**

Unsuitable materials obtained from clearance, site and excavation shall be disposed of as directed. Useful materials obtained from clearing site and excavation shall be stacked within a lead of 500 m as directed. Material suitable for backfilling shall be stacked at convenient places within a lead of 500 m from the site for reuse. Useful stones from rock excavation shall be stacked neatly within a lead of 500m and will be allowed to be used by the contract or on payment at rates laid down by the Contractor if not so laid down, at scheduled rates of the Division or at mutually agreed rates if the rates are not in the Schedule of rate. All the excavated material shall be deposited at required location in the specification layer within RMC limit.

1.3 The rate shall be given for one cubic meter.

**Item No.: 9**

**Supply & Laying of Machine crushed aggregate of size 25-38 mm**

As per BOQ Specification

**Mode of Measurements & Payment**

The rate shall be for a unit of one Cubic meter.

**Item No.: 10**

**Dismantling of RCC and disposing it as directed by engineer-in-charge.**

As per BOQ Specification

**Mode of Measurements & Payment**

The rate shall be for a unit of one Cubic meter.

**Item No.: 11**

**Removal of Cement / Lime Plaster and disposing it as directed by engineer-in-charge.**

As per BOQ Specification

**Mode of Measurements & Payment**

The rate shall be for a unit of one Square meter.



**Item No.: 12**

**Dismantelling of masonry and disposing it as directed by engineer-in-charge.**

As per BOQ Specification

**Mode of Measurements & Payment**

The rate shall be for a unit of one Cubic meter.

**Item No.: 13,14**

**It. No.13 : Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.**

**It.No 14: Foundation filling with CC work in proportion of 1:3:6 using 1.5 cm to 2.0 cm aggregate including Ramming, Curing etc.**

**1.0. Materials**

**1.1.** Water shall conform to M-1. Cement shall conform to M-3 Sand shall conform to M-6. Stones aggregate 40 mm. nominal size shall conform to M-12.

**2.0. Workmanship**

**2.1. General**

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

**2.2. Proportion of Mix:**

**2.2.1.** The proportion of cement, sand and coarse aggregate shall be one part of cement. 2/3 parts of sand and 4/6 parts of stone aggregates and shall be measured by volume.

**2.3. Mixing:**

**2.3.1.** The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case "of break-down of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in color and consistency, However in such case 10% more cement than otherwise period 1 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

**2.4. Transporting & Placing the Concrete:**

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

**2.4.2.** The concrete shall be laid in layers of 15 cms. to 20 cms.

**2.5.1.** The concrete shall be crammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

**2.6. Curing:**

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

**2.7. Mode of Measurement & Payment:**

2.7.1. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

2.7.2. The rate shall be for a unit of one cubic meter.

**Item No.: 15,16,17,18,19,20,21,22,23,24**

**It.No.15: providing and laying Ready Mix cement concrete M-300 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in FOUNDATION FOOTING base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.**

**It.No.16: providing and laying Ready Mix cement concrete M-200 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in FOUNDATION FOOTING base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.**

**It.No.17: providing and laying Ready Mix cement concrete M-300 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in WALL base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.**

**It.No.18: Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of formwork and excluding the cost of reinforcement for reinforced concrete work in COLUMN UP TO ALL FLOOR all heights for any cross sectional area including providing & mixing plasticiser and Water Proofing Chemical in cement including scaffolding etc. and complete rate of labour material etc.**

**It.No.19: Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for PLINTH BEAMS having any cross sectional area for all floors all heights including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.**

**It.No.20: Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for BEAMS having any cross sectional area for all floors all heights including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.**

**It No 21: Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. work in SLAB having thickness of 10 cm and up to 15cm**

Complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.

It.No.22: Providing and laying Ready Mix cement concrete M-300 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. work in BOTTOM SLAB having thickness of 10 cm and up to 15cm Complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.

It.No.23: Providing and laying controlled cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. LINTEL/ RUNNER WORK having thickness of 10 cm and up to 15cm for all floors all heights including scaffolding etc complete including labour and material etc.

It.No.24: Providing and laying controlled cement concrete M-200 for RCC CHHAJJAS not exceeding 10 cm thickness including finishing the exposed surfaces with cement mortar 1:3(1-cement, 3-fine sand)to give a smooth and even surface including centering formwork and curing etc. all heights including scaffolding etc. complete including rate of labour material etc.

#### **1.0. Materials:**

1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Grit shall conform to M-8. Coarse aggregate shall confirm M-12.

#### **2.0 Concrete**

##### **2.1 General**

In concrete grade M15, M20, M25, M30 etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq.mm as per IS: 456. Concrete in the works shall be "DESIGN MIX CONCRETE" or "NOMINAL MIX CONCRETE". All concrete works of grade M5, M7.5 and M10 shall be NOMINAL MIX CONCRETE whereas all other grades, M15 and above, shall be DESIGN MIX CONCRETE.

##### **2.2 Design Mix Concrete**

###### **(a) Mix Design & Testing**

For design mix concrete, the mix shall be designed according to IS: 10262 and SP: 23 to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall in addition to such that it is cohesive and does not segregate and should result in dense and durable concrete and also capable of giving the finish as specified. For water retaining structure, the mix shall also result in water tight concrete. The Contractor shall exercise great care while designing the concrete mix and executing the workers to achieve the desired result.

Unless otherwise specially mentioned, the minimum cement content and maximum water cement ratio for Design Mix Concrete shall be as given below:

Grade of Concrete	Minimum cement Content in Kg/Cum of concrete	Maximum W/C ratio
M20	360	0.55
M25	380	0.50
M30	400	0.45

The minimum cement content stipulated above shall be adopted irrespective of whether the Contractor achieves the desired strength with less quantity of cement. The CONTRACTOR's quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the CONTRACTOR in this account. Even in the case where the quality of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the CONTRACTOR.

**It shall be the Contractor's sole responsible to carry out the mix designs at his own cost.** He shall furnish to the Engineer-in-charge at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes ascertained on 150 mm cubes as per IS:516 shall comply with the requirements of IS:456.

Grade of Concrete	Minimum compressive strength N/Sq.mm at 7 Days.	Specified characteristic compressive strength N/Sq.mm at 28 days
M15	10.00	15.00
M20	13.50	20.00
M25	17.00	25.00
M30	20.00	30.00
M35	23.50	35.00
M40	27.00	40.00

A range of slump which shall generally be used for various types of construction unless otherwise instructed by the Engineer-in-charge is given below:

Structure/Member	Slump in millimeters	
	Maximum	Minimum
Reinforced foundation walls and footings	75	25
Plain footings, caissons and substructure walls	100	25
Slabs, Beams and reinforced walls Pump & miscellaneous Equipment	75	25
Foundations	100	25
Building Column	50	25
Pavements	50	25

Heavy mass construction	50	25
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### **Batching & Mixing of Concrete**

Proportions of aggregates and cement, as decided by the concrete mix design, shall be by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value. Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the aggregates. Water-cement ratio specified for use by the Engineer-in-charge shall be maintained. Each time the work stops, the mixer shall be cleaned out, and while recommencing, the first batch shall have 10% additional cement to allow for sticking in the drum.

Arrangement should be made by the Contractor to have the cubes tested in an approved laboratory or in field with prior consent of the Engineer-in-charge. Sampling and testing of strength and workability of concrete shall be as per IS: 1199, IS: 516 and IS: 3370.

### **Ready Mix Concrete**

Minimum cement consumption shall be as specified in tender document. However, necessary computer printout for consumption of all materials and admixtures if permitted shall be made available as and when required in any frequencies as directed by Engineer – in-charge.

Necessary slump requirements at the pouring places shall be made available with ready mix concrete. Concrete mix shall be design for 33% higher strength than the grade of concrete specified. The proportions for ingredients chosen shall be such that concrete has adequate workability for condition prevailing on the work in question and can be properly compacted with the means available. Use of cementations material like Fly ash etc. shall not be permissible.

Except where it can be shown to the satisfaction of the Engineer-in-charge that a supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate should be strictly controlled. The different sizes shall be stocked in separate stock piles. Required quality of material shall be stock-piled several hours, preferably a day, before use. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequency for a given job being determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the design mix.

The quantity of both cement and aggregate shall be determined by weight. Water shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water – cement ratio constants and its correct value. To this end, the moisture content in both fine and coarse aggregates shall be

determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates, IS: 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates to allow for the variation in weights of aggregates due to variation in their moisture content.

The special Conditions / Specification regarding **Ready Mix Concrete** are as follows. The details like locations, capacity, experience, delivery schedule etc. of the **Ready Mix Concrete** agency shall be submitted by the successfully tenderer for prior approval of the undersigned. The Ready Mix Concrete shall be conforming to IS: 4926 with its latest amendments. All the responsibility of **Ready Mix Concrete** i.e. procurement for all materials, operation of plant and machinery, transit mixers, pumping machineries relevant piping etc. shall be on the account of the contractor.

The Rajkot Municipal Corporation shall not be held responsible for any delay / damage / loss due to deployment of **Ready Mix Concrete** for this project. The octroy for the **Ready mix Concrete** shall have to be borne by the contractor as per prevailing rates. **Ready Mix Concrete** process shall be fully automatic and computerized.

When a transit mixer is used for transportation of concrete, no extra water should be added to the concrete from elsewhere after initial introduction of mixing water from the batch, except when on arrival at the site of the work, the slump of the concrete is less than that Specified: such additional water to bring the mixer under such pressure and direction of flow that requirements for uniformity are met.

Records and certificates: The contractor shall keep from the manufacture batch records of the quantities by mass of all mixing and of the results of all tests. If required by the Rajkot Municipal Corporation, the contractor shall furnish certificates, at agreed intervals, giving this information.

**The contractor shall supply the following information for guidance of the manufacturer:**

- The type of cement to be used
- Details Specification of aggregates to be used.
- Type of admixture to be used. If specified.
- Min. acceptable strength
- Slump of concrete or compaction factor
- Ages at which the test cubes or beams are to be tested and the frequency and number of test to be made.
- Any other requirement.

**Tolerance:** Unless otherwise agreed to between the Rajkot Municipal Corporation (RMC) and the contractor, the concrete shall be deemed to comply with the requirements of this, if these results of testes where applicable lie within the tolerance specified below.

**Consistency of workability:** The slump average of two tests shall not differ from the specified value by + 10 mm for a specified slump of 75 mm. The compacting factor average of two tests shall be within + 0.03 of the value specified. If any other method of determining consistency to be used a suitable tolerance shall be agreed to be between the purchaser and the manufacture. The tests for consistency or workability shall be complete within 15 minutes of the time of receipt of the ready mix concrete at the site.

**Aggregate:** When tested in accordance with IS 2386 (Part-I) 1963, the quantity of aggregate larger than the max size specified by the purchaser shall not exceed 5% of the qty. of course aggregate and all such pass sieve of next higher size.

### **2.3 Nominal Mix concrete.**

#### **(a) Mix design and testing**

Mix design and preliminary test are not necessary for Nominal Mix concrete. However works test shall be carried out as per IS: 456. Proportions for Nominal Mix Concrete and w/c ratio may be adopted as per Table 3 of IS: 456. However it will be the Contractor's role responsibility to adopt appropriate nominal mix proportions to yield the specified strength.

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

Based on the adopted nominal mixes, aggregates shall be measured by volume. However cement shall be by weight only.

### **2.4 Formwork**

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

The design and engineering of the formwork as well its construction shall be the responsibility of the Contractor. However, if so desired by the Engineer-in-charge the DRAWING and calculating for the design of the formwork shall be submitted to the Engineer-in-charge for approval.

#### **Formwork shall be designed to fulfill the following requirements:**

Sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and appropriate to the method of placing and compacting. Made of suitable materials.

Capable of providing concrete of the correct shape and surface finish within the specified tolerance limits. Capable of withstanding without deflection the worst combination of self-weight, reinforcement and concrete weight, all loads and dynamics effect arising from construction and compacting activities, wind and weather forces. Capable of easy striking out without shocks, disturbance or damages to the concrete. Soffit forms capable of imparting a camber if required. Soffit forms and supports capable of being left in position if required. Capable of being cleaner and/or coated if necessary immediately prior to casting the concrete; design temporary openings where necessary for these purposes and to facilitate the preparation of construction joints.

The formwork may be of timber, plywood, steel, plastic or concrete depending upon the approval of the Engineer-in-charge. Timber of formwork shall be well seasoned, free sap, shakes, loose knots, worm holes, warps and other surface defects. Joints between formwork and formwork and between formwork and structures shall be sufficiently tight to prevent loss of slurry from concrete, using seals if necessary.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, sailings, sawdust, wire pieces dust etc. shall be removed from the interior of the forms

before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air at no extra cost.

Forms intended for reuse shall be treated with care. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the Engineer-in-charge. The Contractor shall equip himself with enough shuttering to allow for wastage so as to complete the job in time.

Permanent formwork shall be checked for its durability and compatibility with adjoining concrete before it is used in the structure. It shall be properly anchored to the concrete.

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

For liquid retaining structures, sleeves shall not be provided for through bolts nor shall through bolts be removed if provided. The bolts, in the latter case, shall be cut at 25 mm depth from the surface and the hole made good by cement mortar of the same proportion as the concrete just after striking the formwork.

Where specified all corners and angles exposed in the finished structure shall have chamfers or fillets of 20 mm X 20 mm size.

Form for substructure may be omitted when, in the opinion of the Engineer-in-charge, the open excavation is firm enough (in hard non-porous soils) to act as a form, such excavation shall be larger, as approved by the Engineer-in-charge that required as per DRAWING to compensate for irregularities in excavation.

The Contractor shall provide adequate props carried down to a firm bearing without overloading any of the structure.

The shuttering for beams and slabs shall be so erected that the side shuttering of beams can be removed without disturbing the bottom shuttering. If the shuttering for a column is erected for the full height of the column, one side shall be build up in sections as placing of concrete proceeds or windows left for placing concrete from the side to limit the drop of concrete to 1.0 m or as approved by the Engineer-in-charge. The Contractor shall temporarily and securely fix items to be cast (embodiment's/inserts) in a manner that will not hinder the striking of forms or permit loss of grout.

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

The striking time for formwork shall be determined based on the following requirement:

- Development of adequate concrete strength;
- Permissible deflection at time of striking form work;
- Curing procedure employed-its efficiency and effectiveness;
- Subsequent surface treatment to be done;
- Prevention of thermal cracking at re-entrant angles;
- Ambient temperatures;



- Aggressiveness of the environment (unless immediate adequate steps are taken to prevent damage to the concrete).

Under normal circumstances (generally where temperatures are above 20o C) forms may be struck after expiry of the time period given in IS: 456 unless approved otherwise by Engineer-in-charge, it is the Contractor’s responsibility to ensure that forms are not struck until the concrete has developed sufficient strength to support itself, does not undergo excessive deformation and resist surface damage and any stresses arising during the construction period.

### 2.5 Reinforcement Workmanship

Reinforcement bars supplied bent or in coils shall be straightened cold without damage. No bending shall be done when ambient temperature is below 5°C. Local warming may be permitted if steel is kept below 5°C.

All bars shall be accurately bent gradually and according to the size and shapes shown on the DRAWING schedules or a directed by Engineer-in-charge.

Re-bending or straightening incorrectly bent bars shall not be done without the approval of the Engineer-In-Charge.

Reinforcement shall be accurately fixed and maintained firmly in the correct position by the use of blocks, spacers, chairs, binding wire etc. to prevent displacement during placing and compaction of concrete. The tied in place reinforcement shall be approved by the Engineer-in-charge prior to concrete placement. Spacers shall be of such materials and design as will be durable, not lead to corrosion of the reinforcement and not cause spalling of the concrete cover.

Binding wire shall be 16 gauges soft annealed wire. End of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover. Substitution of reinforcement; laps/splices not shown on Drawing shall be subject to Engineer-in-charge’s approval.

### 2.6 Tolerances

Tolerance for formwork and concrete dimensions shall be as per IS: 456 unless specified otherwise.

Tolerances specified for horizontal or vertical building lines or footings shall not be construed to permit encroachment beyond the legal boundaries.

The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the Drawings within the tolerances given below:

(a)	Deviation from specified dimensions of cross section of columns and beams.	- 6mm
(b)	Deviations from dimensions of footings(tolerances apply to concrete dimensions only not to positioning of vertical reinforcing steel or dowels)	+ 12 mm
1	Dimension in plan	-12mm, +50mm
2	Eccentricity	0.02 times the width of the

		footing in the direction of deviation but not more than 50mm
3	Thickness	+0.05 times the specified thickness

### **2.7 Preparation Prior to Concrete Placement**

Before concrete is actually placed in position, the inside of the formwork shall be cleaned and mould oil applied, insert and reinforcement shall be correctly positioned and securely held, necessary openings, pockets, etc. provide.

All arrangements formwork, equipment and proposed procedure, shall be approved by the Engineer-in-charge, Contractor shall maintain separate Pour card for each pour as per the format enclosed.

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

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

In all cases concrete shall be deposited as nearly as practicable directly in its final position. To avoid segregation, concrete shall not be re-handled or cause to flow. For locations where direct placement is not possible and in narrow forms the Contractor shall provide suitable drops and "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.0 mt. Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by termites or by pipeline from the mixer and shall never be allowed to fall freely through the water.

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

- ❖ Continuously between construction joints and pre-determined abutments.
- ❖ Without disturbance to forms or reinforcement.
- ❖ Without disturbance to pies, ducts, fixing and the like to be cast in: ensure that such items are securely fixed.
- ❖ Ensure that concrete cannot enter open ends of pipes and conduits etc.
- ❖ Without dropping in a manner that could cause segregation or shock.
- ❖ In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.
- ❖ Do not place if the workability is such that full compaction cannot be achieved.
- ❖ Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary. In supported excavations, withdraw the lining progressively as concrete is placed.
- ❖ If placed directly on to hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.
- ❖ Ensure that there is no damage or displacement to sheet membranes.
- ❖ Record the time and location of placing structural concrete.

Concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn slowly till air bubbles cease to come to the surface, leaving no voids. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration blending and melting of the concrete between successive layers. Vibrators shall not be allowed to come in contact with reinforcement, formwork and finished surfaces after start of initial set. Over-vibration shall be avoided.

Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by the Engineer-in-charge. The slump shall be held to the minimum necessary for conveying concrete by this method. When concrete is to be pumped, the concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

Except when placing with slip forms, each placement of concrete in multiple lift work shall be allowed to set for at least 24 hours after the final set of concrete before the start of subsequent placement. Placing shall stop when concrete reaches the top of the opening in walls or bottom surface of slab, in slab and beam construction, and it shall be resumed before concrete takes initial set but not until it has had to settle as approved by the Engineer-in-charge. Concrete shall be protected against damage until final acceptance.

## **2.9 Mass Concrete Works**

Sequence of pouring for mass concrete works shall be as approved by the Engineer-in-charge. The Contractor shall exercise great care to prevent shrinkage cracks and shall monitor the temperature of the placed concrete if directed.

## **2.10 Curing**

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

- Premature drying out, particularly by solar radiation and wind
- Leaching out by rain and flowing water
- Rapid cooling during the first few days after placing.
- High internal thermal gradients.
- Low temperature or frost.
- Vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement.

All concrete, unless approved otherwise by the Engineer-in-charge shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, hessian or other absorbent material for the period of complete hydration with a minimum of 7 days. The quality of curing water shall be the same as that used for mixing.

Where a curing membrane is approved to be used by the Engineer-in-charge, the same shall be of a non-wax base and shall not impair the concrete finish in any manner. The curing

component to be used and shall be applied with spraying equipment capable of a smooth, even textured coat.

Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be sealed and fastened.

### **2.11 Construction Joints and Keys**

Construction joints will be shown on the DRAWING or as approved by the Engineer-in-charge. Concrete shall be placed without interruption until completion of work between construction joints. If stopping of concreting becomes unavoidable anywhere, a properly formed, construction joints shall be made with the approval of the Engineer-in-charge.

Dowels for concrete work, not likely to be taken up in the near future, shall be coated with cement slurry and encased in lean concrete as indicated on the DRAWINGS or as approved by the Engineer-in-charge.

Before resuming concreting on a surface which has not fully hardened, all laitance and loose stone shall be thoroughly removed by wire brushing/hacking and surface washed with high pressure water jet and treated with thin layer of cement slurry for vertical joints and horizontal layers.

When concreting is to be resumed on a surface which has not fully hardened, all laitance shall be removed by wire brushing the surface wetted, free water removed and a coat of cement slurry applied. On this, a layer of concrete not exceeding 150 mm thickness shall be placed and well rammed against the old work. Thereafter work shall proceed in the normal way.

### **2.12 Foundation Bedding**

All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft or spongy areas shall be cleaned out and back filled with either soil-cement mixture, lean concrete or clean sand compacted as approved by the Engineer-in-charge. The surfaces of absorptive soils shall be moistened.

Concrete shall not be deposited on large sloping rock surfaces. The rock shall be cut to form rough steps or benches by picking, barring or wedging. The rock surface shall be kept wet for 2 to 4 hours before concreting.

### **2.13 Finishes**

#### **2.13.1 General**

The formwork for concrete works shall be such as to give the finish as specified. The Contractor shall make good any unavoidable defects as approved consistent with the type of concrete and finish specified. Defects due to bad workmanship (e.g. damaged or misaligned forms, defectives or poorly compacted concrete) will not be accepted. The Contractor shall construct the formwork using the correct materials and meet the requirements of the design and to produce finished concrete to required dimension, plumbs, planes and finishes.

#### **13.2 Surface Finish Type F1**

The main requirement is that of dense, well compacted concrete. No treatment is required except repair of defective areas filling all form tie holes and cleaning up of loose or adhering debris. For surface below grade which will receive waterproofing treatment the concrete shall be free of surface irregularities which would interfere with proper and effective application of waterproofing material specified for use.

#### **2.13.3 Surface Finish Type F2**

The appearance shall be that of a smooth dense, well-compacted concrete showing the slight marks of well fitted shuttering joints. The Contractor shall make good any blemishes.

#### **2.13.4 Surface Finish Type F3**

This finish shall give an appearance of smooth, dense, well-compacted concrete with no shutter marks, stain free and with no discoloration, blemishes, arises, air holes etc. Only lined or coated plywood with very tight joints shall be used to achieve this finish. The panel size shall be uniform and as large as practicable. Any minor blemishes that might occur shall be made good by the Contractor.

#### **2.13.5 Integral Cement Finish on Concrete Floor**

In all cases where integral cement finish on a concrete floor has been specified, the top layer of concrete shall be screened off to proper level and tamped with tamper having conical projections so that the aggregate shall be forced below the surface. The surface shall be finished with a wooden float and a trowel with pressure. The finish shall be continued till the concrete reaches its initial set. No cement or cement mortar finish shall be provided on the surface. Where specified, a floor hardener as approved by the Engineer-in-charge shall be supplied and used as recommended by the manufacturer.

### **2.14 Repair and Replacement of Unsatisfactory Concrete**

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

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

Rejected concrete shall be removed and replaced by the Contractor at no additional cost of the Owner.

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

Bonding between hardened and fresh concrete shall be done either by placing cement mortar or by applying epoxy. The decision of the Engineer-in-charge as to the method of repair to be adopted shall be final and binding on the Contractor. The surface shall be saturated with water for 24 hours before patching is done with 1:1 cement sand mortar. The use of epoxy for rebinding fresh concrete shall be carried out as approved by the Engineer-in-charge.

### **2.15 Vacuum dewatering of Slabs**

Where specified floor slabs, either grade or suspended, shall be finished by vacuum dewatering including all operations such as poker vibration, surface vibration, vacuum processing, flattening and troweling as per equipment manufacturer's recommendation. The equipment to be used shall be subject to the Engineer-in-charge.

### **2.16 Hot Weather Requirements**

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

Adequate provisions shall be made lower concrete temperatures which shall not exceed 40°C at the time of placement of fresh concrete.

Where directed by the Engineer-in-charge, the Contractor shall spray non-wax based curing compound on unformed concrete surfaces at no extra costs.

### **2.17 Cold weather Requirement**

Concreting during cold weather shall be carried out as per IS: 7861(Part II).

The ambient temperature during placement and up to final set shall not fall below 5 deg.C.

Approved antifreeze/accelerating additives shall be used where directed.

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

### **2.18 Liquid Retaining Structures**

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

The minimum level of surface finish for liquid retaining structures shall be Type F2.

All such structures shall be hydro-tested.

The Contractor shall make all arrangement for hydro-testing of structure, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, and pipe lines etc.

The Contractor shall also make all temporary arrangements that may have to be made to ensure stability of the structures during construction.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period or the period for which the structure is guaranteed shall be effectively stopped either by cement/epoxy pressure grouting, grouting or such other methods as may be approved by the Engineer-in-charge. All such rectification shall be done by the CONTRACTOR to the entire satisfaction of the Engineer-in-charge at no extra cost to the OWNER.

### **2.19 Testing Concrete Structures for Leakage**

Hydro-static test for water tightness shall be done at full storage level or soffit of cover slab, as may be directed by the Engineer-in-charge as described below:

In case of structures whose external faces are exposed, such as elevated tanks, the requirements of the test shall be deemed to satisfy if the external forces show no sign off leakage or sweating and remain completely dry during the period of observation of seven days after allowing a seven day period for absorption after filling with water.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling; the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs. Over a period of seven days. Backfilling shall be withheld till the tanks are tested. The total drop in surface level over a period for seven days shall be taken as an indication of the water tightness of the structure. The Engineer-in-charge shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

Each compartment/segment of the structure shall be tested individually and then all together.

For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

## **2.20 Optional Tests**

If the Engineer-in-charge feels that the materials i.e. cement, sand, coarse aggregates, reinforcement and water are not in accordance with the Specifications or if specified concrete strengths are not obtained, he may order tests to be carried out on these materials in laboratory, to be approved by the Engineer-in-charge as per relevant IS Codes. Contractor shall have to pay for these tests.

In the event of any work being suspected of faulty material or workmanship requiring is removal or if the works cubes do not give the stipulated strengths, the Engineer-in-charge reserves the right to order the Contractor to take out cores and conduct tests on them or do ultrasonic testing or load testing of structure, etc. The Engineer-in-charge also reserves the right to ask the Contractor to dismantle and re-do such unacceptable work, at no cost to the Owner. Alternately Engineer-in-charge also reserves the right to ask the CONTRACTOR to dismantle and re-do such unacceptable work at the cost of CONTRACTOR.

## **2.21 Grouting**

### **2.21.1 Standard Grout**

Grout shall be provided as specified on the DRAWINGS.

The proportion of Standard grout shall be such as to produce a flow able mixture consistent with minimum water content and shrinkage. Surfaces to be grouted shall be thoroughly roughened and cleaned. All structural steel elements to be grouted shall be cleaned of oil, grease, dirt etc. The use of hot, strong caustic solution for this purpose will be permitted. Prior to grouting, the hardened concrete shall be saturated with water and just before grouting, water in all pockets shall be removed. Grouting once started shall be done quickly and continuously. Variation in grout mixes and procedures shall be permitted if approved by the Engineer-in-charge. The grout proportions shall be limited as follows.

Sr.No.	Use	Grout Thickness	Mix Proportions	W/C Ratio
a)	Fluid mix	Under 25 mm	One part Portland Cement to one partsand	0.44
b)	General mix	25mm and over but less than 50mm	One part Portland cement to two part sand	0.53
c)	Stiff mix	50 mm and over	One part Portland Cement to 3 part sand	0.53

### 2.21.2 Non-Shrink Grout

Non-shrink grout where required shall be provided in strict accordance with the manufacturer's instructions/specifications on the DRAWINGS

#### General Inspection

All materials, workmanship and finished construction shall be subject to continuous inspection and approval of Engineer-in-charge. Material rejected by Engineer-in-charge, shall be expressly removed from site and shall be replaced by Contractor immediately.

#### Clean-up

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood, etc. resulting from the work shall be removed and the premises left clean.

#### Acceptance Criteria

Any concrete work shall satisfy the requirements given below individually and collectively for it to be acceptable.

- ❖ Properties of constituent material
- ❖ Characteristic compressive strength
- ❖ Specified mix proportions
- ❖ Minimum cement content
- ❖ Maximum free-water/cement ratio
- ❖ Workability
- ❖ Temperature of fresh concrete
- ❖ Density of fully compacted concrete
- ❖ Cover to embedded steel
- ❖ Curing
- ❖ Tolerances in dimension
- ❖ Tolerance in

levels

- ❖ Durability
- ❖ Surface finishes
- ❖ Special requirements such as

- a. Water tightness
- b. Resistance to aggressive chemicals
- c. Resistance to freezing and thawing



- d. Very high strength
- e. Improved fire resistance
- f. Wear resistance
- g. Resistance to early thermal cracking

The Engineer-in-charge decision as to the acceptability or otherwise of any concrete work shall be final and binding on the Contractor.

For work not accepted, the Engineer-in-charge may review and decide whether remedial measures are feasible so as to render the work acceptable. The Engineer-in-charge shall in that case direct the Contractor to undertake and execute the remedial measures.

These shall be expeditiously and effectively implemented by the Contractor. Nothing extra shall become payable to the contractor by the Owner for executing the remedial measures.

## 2.22 Water stops

### 2.22.1 Material

The material for the PVC water stops shall be a plastic compound with the basic resin of polyvinyl chloride and additional resins, plasticizers, inhibitors, which satisfies the performance characteristics specified below as per IS: 12200. Testing shall be in accordance with IS: 8543.

a)	Tensile strength	3.6 N/Sq.mm minimum
b)	Ultimate elongation	300% minimum
c)	Tear resistance	4.9 N/Sq.mm minimum
d)	Stiffness in flexure	2.46 N/Sq.mm minimum
e)	Accelerated extraction	10.50% N/Sq.mm
	I) Tensile strength	minimum 250% minimum
	II) Ultimate elongation	
f)	Effect of Alkali	7 days 10% Maximum
	i) Weight increase	±5 points
	ii) Weight decrease	
	iii) Hardness change	
g)	Effect of Alkali	28 days 0.40% maximum
	i) Weight increase	0.30% maximum ±1 %
	ii) Weight decrease	
	iii) Dimensions change	

PVC water stops shall be either of the bar type, serrated with center bulb and grips for use Within the concrete elements or of the surface (Kicker) type for external use.

PVC water stops shall be of approved manufacture. Samples and the test certificate shall be got approved by the Engineer-in-charge before procurement for incorporation in the works.

### 2.22.2 Workmanship

Water stops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents.

Water stops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of water stops shall not be permitted. All jointing shall be of fusion welded type as per manufacturer's instructions.

Water stops shall be placed at the correct location/level and suitably supported at intervals with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey-combing occurs because of the serrations/end grips, by placing concrete with smaller size aggregates in this region. Projecting portions of the water stops embedded in concrete shall be thoroughly cleaned of all mortar/concrete coating before resuming further concreting operations. The projecting water stops shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this region also.

## **2.23 Preformed Fillers and Joint Sealing Compound**

### **2.23.1 Materials**

Preformed filler for expansion/isolation joints shall be non-extruding and resilient type of bitumen impregnated fibers conforming to IS: 1838(Part I)

Bitumen coat to concrete/masonry surfaces for fixing the preformed bitumen filler strip shall conform to IS: 702. Bitumen primer shall conform to IS: 3384

Sealing compound for filling the joints above the preformed bitumen filler shall conform to Grade "A" as per IS: 1834

### **2.23.2 Workmanship**

The thickness of the preformed bitumen filler shall be 25 mm for expansion joints and 50 for isolation joints around foundation supporting rotator equipment. Contractor shall procure the strips of the desired thickness and width in length as manufactured. Assembly of small pieces/thickness of strips to make up the specified size shall not be permitted.

The concrete /masonry surface shall be cleaned free from dust and any loose particles. When the surface is dry, one coat of industrial blown type bitumen of grade 85/25 conforming to IS: 702 shall be applied by brushing at the rate of 1.20Kg/sq.m. When the bitumen is still hot the preformed bitumen filler shall be pressed at held in position till completely adheres. The surface of the filler against which further concreting/masonry work is to be done shall similarly be applied with one coat of hot bitumen at the rate of 1.20Kg/sq.m.

Sealing compound shall be heated to a pouring consistency for enabling it to run molten in a uniform manner into the joint. Before pouring the sealing compound, the vertical faces of the concrete joint shall be applied hot with a coat of bitumen primer conforming to IS: 3384 in order to improve the adhesive quality of the sealing compound.

Expansion joints between beams/slabs shall be provided with 100 mm wide x 4 mm thick mild steel plate at the soffit of RCC beams/slabs to support and prevent the performed joint filler from lodging. This plate shall be welded to an edge angle of IS A 50x50x6 mm/slabs, by

intermittent fillet welding. Steel surfaces shall be provided with 2 coats of red oxide zinc chrome primer and 3 coats of synthetic enamel paint finish.

Notes: - Each pour to have separate cards, in triplicate one each for Owner/client, Contractor & site office.

Under remarks indicate deviations from drawings & specifications, congestion in reinforcement if any, unusual occurrences such as failure of equipment's, sinking of supports/Props, heavy rains affecting concreting, poor compaction, improper curing, other deficiencies, observation etc.

## **2.24 MODE OF MEASUREMENT AND PAYMENT**

The unit rate for concrete work under various categories shall be all inclusive and no claims for extra payment on account of such items as leaving holes, embedding inserts, etc. shall be entertained unless separately provided for in the schedule of quantities. No extra claim shall also be entertained due to change in the number, position and / or dimensions of holes, slots or openings, sleeves, inserts or on account of any increased lift, lead of scaffolding etc. All these factors should be taken into consideration while quoting the unit rates. Unless provided for in the Schedule of Quantities the rates shall also include fixing insets in all concrete work, whenever required.

Payments for concrete will be made on the basis of unit rates quoted for the respective items in the Schedule of Quantities. No deduction in the concrete quantity will be made for reinforcements, inserts etc. and opening less than 0.100 of a sq.m in areas where concrete is measured in sq.m and 0.010 cu.m where concrete is measured in cu.m. Where no such deduction for concrete is made, payment for shuttering work provided for such holes, pockets, etc. will not be made. Similarly the unit rates for concrete work shall be inclusive or exclusive of shuttering as provided for in the Schedule of Quantities.

Payment for beams will be made for the quantity based on the depth being reckoned from the underside of the slabs and length measured as the clear distance between supports. Payment for columns shall be made for the quantity based on height reckoned upto the underside of slab / beams.

The unit rate for precast concrete members shall include formwork, moldings, finishing, hoisting and setting in position including setting mortar, provision of lifting arrangement etc. complete. Reinforcement and inserts shall be measured and paid for separately under respective item rates.

No extra clam for any extra height for shuttering.

### **Item No.: 25**

**Providing TMT Round Bar (IS 1786 FE500/500D) reinforcement for R.C.C.work including bending, binding and placing with wire in position complete including all cost.**

#### **1:0. Materials**

1.11. TMT bars of Fe-500 should be confirming to IS: 1786.

#### **2.0. Workmanship**

2.1. The work shall consist of furnishing 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 accurate to the dimensions given in the bar bending schedules shown a 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 wills the material. Bars bent during transport or, handing shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, 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 circle having an equivalent effective area. The hooks shall be suitably encased to prevent any splitting of the concrete.

2.4. All the reinforcement bars shall be accurately placed in exact position 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 concrete, except where shown on drawings. Placing bars on, layers of freshly laid concrete as the work progresses from adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar bricks. or their 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 form corrosion, concrete cover shall be provided as indicated on drawings. All the bars producing from concrete and to which other bars are to be spliced and which are, likely to be exposed for a period 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 wire (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 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 by concrete 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 not bending moment is maximum.

2.7. Whenever 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 transit the full stresses of bar so he 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 (Latest edition)

2.8. When permitted or specified on the drawing's joints of reinforcement bars shall butt-welded so as to transit their full stresses. Welded joints shall preferably be located at points when 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 rods are welded. Only electric arc welding using a process which excludes air from the molten metal 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 (Latest edition). 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 measurements & payment**

3.1. 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, 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 Kgs. 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.

3.2. The rate for reinforcement includes cost of steel binding wires, its carting to work site, cutting, bending; placing, binding 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 and spacer bars.

3.3. The rate shall be for a unit of One Kg.

### **Item No.: 26**

**Brick Masonry work using conventional burnt clay building bricks having crushing strength not less than 35 kg/sq.cm. foundation and plinth and all above in super-sub structure for all for including scaffolding including labour and material costing in cement mortar 1:6(1, cement and 6, fine sand)**

#### **Materials:**

Water shall conform to M-1.

#### **Cement:**

Cement shall conform to M-3.

#### **Brick:**

The bricks shall be hand or machine molded and made from suitable soils and burnt. They shall be free from cracks and flaws and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colors.

The bricks shall be molded 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 thrown on the ground from a height of 600 mm.

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

The size of the conventional bricks shall be as under:

(9" x 4.3/8" x 2, 3/4") 225 x 110 x 75 mm

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

Length  $\pm 1/8$ " (3mm)

Width:  $\pm 1/16$ " (1.5mm)

Height:  $\pm 1/16$ " (1.5 mm)

The crushing strength of the bricks shall not be less than 35 kg/sq.cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc., shall be carried out as per IS: 3495 (Part I to IV) - latest edition.

**Workmanship:**

**i) Proportion:**

The proportion of the cement mortar shall be 1:6 (1-Cement, 6-Fine sand) by volume.

**Wetting of bricks:**

The bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is an indication of thorough wetting of bricks.

**Laying:**

Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete the bond; closer in such case shall be cut to required size and used near the ends of walls.

A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set frame by gently tapping with handle of trowel or wooden mallet. It's inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of coarse the vertical joints shall be fully filled from the top with mortar.

The work shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. the thickness of brick coarse shall be kept uniform.

The brick shall be laid with frog upwards. A set of tools comprising of wooden straight edges, mason's spirit level, square half meter rub, and pins, string and plumb shall be kept on site of work for frequent checking during the progress of work.

Both the faces of walls of thickness greater than 23 cms shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

All fixtures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

**Joints:**

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not expose 12 mm. The face joints shall be raked out as directed by raking tools 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 brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

**Curing:**

Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

**Proportion of foundation bed:**

If the foundation is to be laid directly on the excavated bed, the bed shall be leveled, cleared of all loose materials, cleaned and wetted before string 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 precast flooring is to be provided flush with the top of plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the following.

**Mode of measurement & Payment:**

The measurement of this item shall be taken for the brick masonry fully completed in foundation up to plinth. The limiting dimensions not exceeding those shown on the plans or as directed shall be final. Battered tapered and curved position shall be measured net.

The rate shall be for a unit of one cubic meter.

**Item No.:27**

**Cement Plaster Work 1.2 cm average thick using Cement: Mortar in proportion of 1:3 rough cast (without Niru Finishing) for All Floor and for any height.**

**1.0. Materials:**

1.1. Water M-1. The cement mortar of proportion 1:3 shall conform to M-11.

**2.0. Workmanship:-**

2.1 Scaffolding: Wooden bellies bamboos, planks treadles 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 back-ground:-**

2.2.1 The surface shall be declared of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be roughened by wire brushing if it is not hard and by racking 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 surface where necessary shall be carried out to get an even surface.

2.2.2. Racking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

2.2.3. The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry such area shall be moistened again.

2.2.4. 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 supporting 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:-**

2.3.1. The plaster about 15 x 15 cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be rough cast 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 gauge with small upward and sideways movement at a time.

2.3.2. 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.

2.3.3. Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of 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 or dry weather shall be prevented by hanging mattings or gunny bags on the outside of the plaster and keeping them wet.

### **3.0. Mode of measurements:-**

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 meters unless, otherwise specified. Length breadth or height shall be measured correct to a centimeter.

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 up to floor two level.

3.5. The measurements of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.



3.6. Soffits of stairs shall be measured as plastering on ceilings. Flowing soffits shall be measured separately.

3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5sq.mt. Each in area for ends of joints, beams, posts, girders, steps, etc. not exceeding 0.5 sq. mt. each area and for openings exceeding 0.5 sq.mt. and not exceeding 3.00sq. mt. 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. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. Of these opening for finish to plaster around ends of joints, beams, posts etc.

(b) Deduction for openings exceeding 0.5 sq. mt. but not exceeding 3 sq. mt. each shall be made as follows and no addition 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 plasters or if one faces is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from area of plaster and / or pointing as the case may be. 3.8 For openings having door frames equal to projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

3.9. In case of openings of area above 3 sq. mt. each, deduction shall be made for opening but jambs, soffits and sills shall be measured.

3.10 The rate shall be for a unit of one sq. meter.

**Item No.: 28**

**20mm thick Sand Face Cement Plaster Work in which 1 plaster in proportion of 1:3 and 2nd plaster in proportion of 1:2 using Cement: Mortar with Spot finishing etc. complete (Note: Before carrying out Plaster work on RCC, required tipping work should be carried out as instructed)**

**Material:**

Water shall conform to M-1.

Cement Mortar shall conform to M-11

**Workmanship:**

The work shall be carried out in the two coats. The backing coat (base coat) shall be 12 mm thick in C.M. 1:3 and the final coat shall be 8 mm thick in C.M. 1:2 the relevant specification is below:

**Scaffolding:**

Wooden bullies, bamboos, planks, treatles and other scaffolding shall be sound. These shall be proper examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

**Preparation of background:**

The surface shall be cleaned of all dust, loose mortar, droppings, traces of algar, efflorescence and other foreign matter by water or by brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarder has been applied to the form work, the shall be roughed by wire brushing and all the resulting dust and loose particle cleared 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 on even surface.

Raking of joints in case of masonry 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 are 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 whenever the building frame and cladding work are ready and the temporary supports of the ceilings on the wall of the floor have been removed. Ceiling plaster shall be completed before starting Plaster to Wall the plaster about 15 x 15 cms shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. the mortar shall than be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by marking a wooden straight edge reaching across the gauges with small upward and sideways movements at a time finally the surface shall be finished off true with a trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive troweling or over working 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, arises junctions etc. shall be carried out with proper templates to the size required.

Cement plaster shall be used half an hour after addition of water, and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scrapped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of features such as plaster bonds and cornices nor at the corners or arises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially be packed up later on the outside of the plaster and keeping them wet.

The thickness of back coat shall be 12 mm average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days

depending upon the weather conditions. The surface shall not be allowed to dry during this period. The second coat be started over right after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.

**Mode of measurements & Payments:**

The rate shall include the cost of all materials labour and scaffolding etc. involved in the operations described under workmanship.

All plaster shall be measured in square meter unless otherwise specified length, breadth or height shall be measured correct to a centimeter.

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.

The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height, depth of cover of cornices, if any, shall be deducted.

Soffits of stairs shall be measured as plastering on ceilings. Eloigns soffits shall be measured separately.

For jambs, soffits, sides, etc. for openings not exceeding 0.5 sq.mt. each in area for ends of joints, beams, posts girders, steps etc. not exceeding 0.5 sq.mt. each in area and for openings exceeding 0.5 sq.mt. and not exceeding 3.00 sq.mt. in each area deductions and additions shall be made in the following manner:

No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq.mt. Each and no addition shall be made for reverse, jambs, soffits, side etc. of these openings, for finish to plaster around ends of joints, beams, posts etc.

Deductions for openings exceeding 0.5 sq.mt. But not exceeding 3.00 sq.mt. each shall be made as following and no addition shall be made for reverse, joints, soffits, sides, etc. of these openings. When both faces of all walls are plastered with same plaster. Deductions shall be made for one face only.

For openings having door squares equal to or projecting beyond the thickness of wall. Full deduction for opening shall be made from each plastered face of the wall.

In case of openings of area above 3 dq.mt. each deduction shall be made for opening but Jambs, soffits and slits shall be measured.

The rate shall be for a unit of square meter.

**Item No.: 29**

**Decorative Groove Work in Cement Plaster**

External Sand Faced Plastering with groove as per given drawing detail etc. of 5 to 10, 12 to 25 cm thick in two coats on brick, concrete, parapet wall for exterior plastering of 12 mm thick backing coat in C.M. 1:3 (1 Cement: 3 Sand) and 8 mm thick finishing coat of C.M. 1:2 (1 Cement: 2 Sand) and sponge the surface to obtain an even and granular surface including curing etc. complete as directed by engineer-in-charge/consultant.

The rate shall be for a unit of one Running Meter.

**Item No.: 30**

**Supply & fixing of Vitrified flooring work (1st quality)**

**1.0 Materials:**Water shall conform to M-1. Cement mortar shall conform to M-11. Body parking finished Vitrified tile from the list of approved make and of first quality.

**1.1** Parking Vitrified floor tiles shall be finish best quality or equivalent, as approved by the Architect and Engineer-in-charge they shall conform to the relevant IS Codes.

**1.2** They shall be monolithic and available as approved by Engineer in-charge. They shall have a size tolerance of  $\pm 0.5\%$ , in length and width and  $\pm 5\%$  in thickness. Allowable warpage shall be  $\pm 0.2\%$ . Allowable squareness wedging shall be  $\pm 0.5\%$ . Their water absorption rate shall be less than 0.5%. They shall offer hard-working and hard-wearing floors for homes, public buildings, apartments and airports. The tiles shall be of ASTM or DIN standards.

**1.3** They shall be extremely strong, breaking strength of the tile being 1600 Kg/csqm., flexural strength, 200 Kg/cm<sup>2</sup> and bonding strength of 2500 Kg/csqm. They shall offer good resistance to abrasion, i.e. greater than 100. They shall be scratch resistance; their hardness on the Mohr's scale shall be min. 7. They shall be able to resist thermal shock upto 10 cycles. They shall have bond strength of 2500 Kg/csqm. and shall have a density of greater than 2.2 gm/cc. They shall have 0.60 co-efficient of friction for polished/unpolished surfaces.

**2.0 Workmanship:**

**2.1 Bedding:**

2.1.1 The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface, as described above, tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.

2.1.2 The vitrified rough finished tiles shall be laid over a minimum 20 mm. thick cement mortar 1:4 bedding laid to proper slope and level. Fixing of vitrified tile with cement mortar is to be done over 35 to 40 mm thick screed 1:2:4 (1 cement: 2 sand: 4 stone aggregate). Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of the bedding. The base shall be cleaned and well wetted, before lying. The mortar shall then be spread in thickness not less than 18 mm. at any place and average 25 mm. thick. The proportion of the cement mortar shall be as specified in the item.

**2.2 Fixing tiles:**

2.2.1 The tiles before lying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg./Cement/m<sup>2</sup>. of honey-like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The

tiles shall then be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

2.2.2 The tiles shall not have staggered joints. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The outlets for drainage shall be as per drawing and tile fixing shall be carried out accordingly after laying and testing the drainage lines. After the tiles are laid, the Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The same cement slurry shall then be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill up pinholes that may exist on the surface. White cements with or without matching pigment shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to cure undisturbed for 7 days.

2.2.3 While lying, any chiseling which may be required for making the skirting or dado flush with the plaster and/or other finishes shall be done. Necessary grooves of required size in cm. between plaster and other finishes dado or skirting (if required) shall be provided. Forming machine-cut/rounded edges, gutters, sills, platforms, channels, curbing, etc. if any, if required shall be provided as per the drawing and design.

2.2.4 All necessary slopes, gradients and levels shall be truly maintained as required and directed by the Architect and Engineer-in-charge.

### **2.3 Cleaning:**

2.3.1 The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed and cleaned by oxalic acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

2.3.2 If any tile is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

### **3.0 Mode of Measurements and Payment:**

3.1 The work done shall be measured in sqm. for the visible area of work done in floor. The length and width of the flooring shall be measured between the faces of skirting or dados or plastered face of walls as the case may be. The paving under dado or skirting shall not be measured. No deduction shall be made or extra paid for any opening in the floor of area up to 0.1 sqm nothing extra shall be paid for laying the floors at different levels in the same room. The dado will be measured from the finish floor level to the top of tile fixed.

3.2 The rate shall include the cost of all materials (inclusive of all taxes, levies, and delivery at site), labour & sundry involved in all the operations, curing etc complete, at all floors, at height and level, as described above. It shall also include for breakage and wastage. Floating materials and margin of profit shall also be included. All material samples shall be approved by the Architect/Engineer-in-charge before placing orders.

3.3 No extra shall be paid for any small quantities like narrow widths, metered & returned ends, rounds & cutting, fixing and making good upto & around pipes, fittings and fixtures etc.

3.4 The rate shall include for fixing the flooring in composite pattern as per the drawings, using different materials and sizes. The measurements of the different materials shall be taken category-wise separately and paid accordingly.

3.5 Rate including joints filled with 4mm spacer joint all around and filled with epoxy grout (avg. 4x10 to 12 mm) etc. complete as directed by engineer in charge the rate shall be for a unit of one sq.mt.

**Item No.:31**

**Supply & fixing of Vitrified for skirting work (1st quality) width upto 10 cm.**

Specification for this item shall conform to item no. 45. Except that the whole work is to be carried out by fixing vitrified finish tiles for skirting of 75 to 100 mm high.

Rate shall be for a unit of one Running Meter.

**Item No.:32**

**Providing and laying Ceramic tiles 6mm thick in flooring on a bed of 12mm thick cement Mortar 1:3 (1-cement : 3-coarse sand ) finishing with flush pointing in Color cement.**

**Item No.:33**

**Supply & Fixing of Glazed tiles (1st Quality) of required size in Cement Roga and joints to be filled with white cement after 12mm rough plaster in proportion of 1:3**

**Glazed Tiles**

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

Variation from the stated sizes, other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. except as above the tiles shall conform to I.S. Latest edition.

**BEDDING**

The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and equal on it.

The Color glazed tiles shall be laid on cement mortar bedding of 12 mm thick in C.M.1:3 the mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted.

The mortar shall then be spread in thickness not less than 10mm at any place and average 12mm thickness. The proportion of the cement mortar shall be as specified in the item.

Note: Horizontal tiles (Floor Glazed tiles) shall be laid on lime mortar bedding of 10 to 12 mm average in C.M. 1:2. (One portion of lime and two portion of sand)

#### **FIXING TILES**

The tiles before lying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg. / Cement / Sq. Mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles are smeared with neat cement slurry.

The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

The tiles shall not have staggered joints. The joints shall be true to center line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Swan) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5mm and loose material removed. White cement shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

#### **CLEANING**

The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper precaution and measures shall be taken to ensure that the tiles are not damaged many ways till the completion of the construction.

The rate for this item will be paid on one square meter basis.

#### **Item No.: 34**

**Supply, Fixing & Polishing for Granite Flooring work 18mm thick & 200 mm Base of Cement:Mortar in proportion of 1:3 and Spread Cement Slurry on Bed With Quarter Round Edge.**

As per item BOQ

The rate will be paid for a unit of one Square meter.

#### **Item No.: 35**

**Supply & Fixing of Granite Stone (Telephone Black Color) on wall after rough cast Cement Plaster in proportion of 1:3 and fixing grainage in Cement Paste**

Specification for this item shall confirm to item no.50. Except that the whole work is to be carried out by fixing Mirror polished granite stone 18mm thick For Door sill & jams in Single

Piece only instead of polished Granite stone dado. Rate including half round molding of edges as directed by engineer in charge Rate shall be for a unit of one Square Meter.

**Item No.: 36**

**Supply, Fixing & Polishing of Kota Stone Flooring work thickness 20-25 mm to be fixed in Cement:Mortar 1:3 and liquid Cement With Quarter Round Edge as instructed**

**Item No.: 37**

**Supply, Fixing & Polishing of Kota Stone work on Wall/Riser thickness 20-25 mm to be fixed in Cement:Mortar 1:3 and liquid Cement With Quarter Round Edge as instructed**

For cupboard, platform & other works. Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides thus dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be True Square and free from chippings and giving a plane surface. The thickness shall be 25 mm. (Average) as specified in this item but not less than 20 mm at any place.

Bedding for the Kota stone slabs shall be of cement mortar 1:6 (1 cement: 6 coarse sand) of average thickness 20 mm as given in the description of the item. Subgrade shall be cleaned, wetted and mopped. Mortar of the specified mix and thickness shall be spread on an area sufficient to receive one Kota stone slab. The slab shall then be washed clean before laying. It shall be laid on top pressed, tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this Surface, cement slurry of honey like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly bedded in level. With and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining the wall shall enter not less than 10 mm. under the plaster, skirting or dado. The junction between wall and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.

The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly.

Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with carborundum stones of 120 grade grit fitted in the heavy machine and then deacon polishing shall be done with carborundum stone of 220 to 350 grade grit fitted in heavy machine. Water shall be properly used during polishing.

The stone shall then be washed clean with water. When directed by the Engineer-in-charge; wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it.



The holes required for Nahni traps, pipes and other fittings shall be made without any extra cost.

The Kota stone for platform and c.b. shall be supplied and fixed with two side polished and the work shall have to be completed as per requirement and instructions of engineer in-charge.

**Mode of measurements & payment**

The rate shall include the cost of all materials and Labour involved in all the operations described above. The kota stone shall be measured in square meter.

**Item No.:38**

**Applying two coats of Birla (White Cement based) or Asian ( acrylic lapy putty) or equivalent & two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.**

**General:**

Scope of work includes cleaning off the entire surface, remove all loose particles, dust, scale, smoke, and grease from the surface, sand the surface with Emery paper 180 and wipe clean, applying 2 coats of white Birla putty.

**Material:**

Acrylic Putty of Approved Make as above or as per vender list.

**Workmanship:**

The Putty shall be of approved brand (Asian, Birla or other approved). Plaster filler (Birla, Asian

Putty) to be used for filling up uneven surfaces, small cracks and holes etc and it should be done as per the manufacturer's standard guide line. The whole process of putty required 3 times and with 180 emery paper wipe off 2 time and with 320 emery paper wipe off.

**Mode of measurement:**

All the measurement shall be taken on net surface area actually painted, deduction will be made from the area for fixtures, grills, ventilation, door, window, gap, elect boxes and such obstructions not painted, if they are individually more than 0.05 sq.m.

**Rate:**

Rate is to include for All materials of putty's, sand paper, emery paper etc with labour required for scaffolding, cleaning off the surfaces, cleaning the site after completion of job, etc as directed by engineer in charge. Rate is for the net surface area of Painted surfaces in Square meter.

**Item No.:39**

**Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on wall/ Ceiling surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth. (With two nos of Prime Coat)**

**Materials:**

The enamel paint shall satisfy in general requirements in specifications of oil paints. Plastic emulsion paint shall conform to I S Latest edition.

**Workmanship:**

The materials required for work of painting work shall be obtained directly from approved manufacturer or approved dealer and brought to the site in maker's drum, bags etc. with seal unbroken. All materials not in actual use shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin.

The materials which have become state of flat due to improper and long storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also, the paint shall be continuously stirred in smaller container. No left over paint shall be put back into store tins. When not in use, the containers shall be kept properly closed. If for any reasons, thinning is necessary, the brand of thinner recommended by the manufacturer shall be used.

The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed parts of the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before painting work is started.

**Application of paint:**

Brushing operations are to be adjusted to the spreading capacity advised by the manufacturer of particular paint. The paint shall be applied evenly and smoothly by means of crossing and lying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and lying off will constitute one coat. Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from the engineer-in-charge before next coat is started. Each coat except the last coat shall be lightly rubbed down with sand paper of fine pumice stone and cleared of dust before the next coat is applied. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of molding etc. shall be

left on the work. Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.

**Mode of measurement and payment:**

All the work shall be measured net in the decimal system as executed subject to the following limits unless otherwise stated hereinafter.

- a) Dimensions shall be measured to the nearest 0.01 meter.
- b) Areas shall be worked out to the nearest 0.01 meter.

No deductions shall be made for openings not exceeding 0.5 sq.m. Each and no additions shall be made for painting to beddings, moulding, edges, jambs, soffits, sills etc of such opening. In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. In case of trusses, if measured is sq.m compound graders, stanchions, lattices, girder and similar work, actual area shall be measured and no extra shall be paid for painting on bolts heads, nuts, washers etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

The different surfaces shall be grouped into one general item, areas of uneven surfaces being converted into equivalent plain areas in accordance with the table given as per Annexure-II for payment.

The rate is including priming coat.

The rate shall be for a unit of one square meter.

**Item No.:40**

**Finishing wall with weather proof exterior emulsion paint on wall surface (two coats) to give and required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered material etc. complete (with Base Coat)**

**1.0 Material**

1.1 The water shall conform to M – 1 and Acrylic / Semi Acrylic paint shall conform to I.S.

**2.0 Workmanship**

**2.2 Preparation of surface:**

2.2.1 The surface shall be thoroughly cleaned of all dust, dirt, mortar droppings and other foreign matter before Weather Proof Exterior Emulsion paint is to be applied.

2.2.2 Oil or Grease spots shall be removed by suitable chemical and smooth surface shall be rubbed with wire brushes.

2.2.3 All-round portion of the surface plaster shall be removed to full depth of plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portion shall be wetted and allowed to dry.

2.2.4 All unnecessary nails shall be removed; holes, cracks, patches etc. shall be made good with material similar in composition to the surface to be prepared.

### **2.3 Scaffolding**

Wherever scaffolding is necessary, it shall be erected in such a way that so far as possible no part of scaffolding shall rest on the surface to be colored. A properly secured strong and well-tied suspended platform (Zoola) may be used for color work. Where ladders are used pieces of old gunny bags shall be tied at top and to bottom to prevent scratches to the floors and wall. For color work of ceilings, proper taje scaffolding shall be erected where necessary.

### **2.4 Application of paint:**

2.4.1 No painting shall be done when the paint is likely to be exposed to a temperature below 70 C within 48 hours after application.

2.4.2 When weather condition is such as to cause be carried out "in the shadow "as far as possible. This helps the proper hardening of the paint film by keeping the surface moist for a longer period. To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket.

2.4.3 For undecorated surface, the surface shall be treated with minimum two coats of Emulsion paint. Not less than 24 hours shall be allowed between two coats. Next coat shall not be started until the proceeding coat has become sufficiently hard to resist marking by the brush being used, in hot dry weather, the proceeding coat shall be slightly moistened before applying the subsequent coat.

2.4.4 The Finished surface shall be even and uniform in shade without patches, brush mark, paint drops etc.

2.4.5 The Emulsion paint shall be applied with a brush or roller with relatively short stiff hog or fiber bristles. The paint shall be brushed or roller in uniform thickness and shall be free from excessively heavy brush marks. The lamps shall be well brushed out.

2.4.6 Weather proof exterior emulsion paint shall not be applied on surface already treated with white wash, color wash, distemper dry or oil bound varnishes, paint etc. such surface shall be scrapped first and prepared for application of paint as per manufacturers specifications.

### **3.0 Mode of Measurements & Payment:**

3.1 All the work shall be measured in the decimal system as under:

a) Dimensions shall be measured to nearest 0.01M.

b) Area in individual items shall be worked out to the nearest 0.01 Sq.mt.

All the works shall be measured in Sq. m. Deductions for jambs, soffits, sills etc. for openings not exceeding 0.5 sq.m. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq.m. each in area and for opening exceeding 0.5 sq.m. not exceeding 3.0 sq.m. each in are.

### **Deduction and additions shall be made as under:**

3.2 No deduction shall be made for ends of joists, beams, posts etc. and openings not exceeding 0.5 sq.m. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings or for finish around ends, joists, beams, posts etc.

**3.3** Deductions for openings exceeding 0.5 sq.m. but lesser than 3 sq.m. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings.

a) When both the faces of walls are provided with finish, deduction shall be made for one face only.

b) When each face of wall is provided with a different finish, deduction shall be made for that side of frame for door, windows etc. on which width of reveals is less than that of the other side. When widths of reveals on both faces of wall are equal, deduction of 50 % of area of opening on each face shall be made from total area of finish

c) When only one face of wall is treated and the other face is not treated, full deduction shall be made if the width of reveal on the treated side is less than that on the untreated side, but if the width of the reveal is equal or more than on the untreated side neither deductions for additions to be made for reveals, jambs, soffits, sills etc.

**Item No.:41**

**Enamel painting on door/window, iron door, iron grill or woodwork two coat with base Coat as directed by EIC/ consultant.**

**1.0. Materials:**

1.1. The ready mixed paint, brushing, wood primer pink shall conform to I. S.3536-1966 (Latest edition) .The enamel paint shall conform to M-44 B.

**Preparation of Surfaces:**

2.2.1. All Steel/wood work shall be dry and free from any foreign matter incidental to building operations. Nails shall be punched well below the surface to provide a firm key for stopping. Moldings shall be carefully smoothed with abrasive paper and projecting fibers shall be removed. Flat portion shall be smoothed off with abrasive paper used across the grain prior to staining and with the grain prior to staining or if the wood is to be left in its natural colour, wood work which is to be stained may be smoothed to scraping instead of by glass papering if so required.

2.2.2. Any knots, resinous or stricks or bluefish sap wood that are not large enough to justify cutting out shall be treated with two coats of pure shellac knotting applied thinly and extended about 25 mm. beyond the actual area requiring treatment.

**Application of primer:**

2.2.1. The relevant specifications of item No. 19.12 (A) shall be followed for application of primer.

**2.0 Workmanship:**

**2.1. General:**

2.1.1. The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in makers drums, kegs etc. with seal unbroken.

2.1.2. All materials not in actual use shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin

layer of turpentine to prevent formation of skin. The materials which have become stale or flat due to improper and long storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also the paint shall be continuously stirred in smaller container. No left over paint shall be put back into stock tins. When not in use, the containers shall be kept properly closed.

2.1.3. If for any seasons, thinning is necessary, the brand of thinner recommended by the manufacturer shall be used.

2.1.4. The surface to be painted shall be third and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed parts of the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before painting work is started.

## **2.2. Application:**

2.2.1. Brushing operations are to be adjusted to the spreading capacity advised by the manufacturer of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

2.2.2. Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from Engineer-in charge before next coat is started.

2.2.3. Each coat except the last coat shall be lightly rubbed down with sand paper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brush or clogging of paint puddles in the corners of panels angles of moldings etc. shall be left on the work.

2.2.4. Special care shall be taken while painting over bolts, nuts, rivets, over laps etc. Approved best quality brushes shall be used.

## **3.0. Mode of measurements & payment:**

3.1. The relevant specifications of item shall be followed for mode of measurements and payment. The rate is excluding priming coat.

3.2. The rate shall be for a unit of one sq. meter.

### **Item No.:42**

**Supplying and fixing aluminium frame 62.50 x 25 mm. size and 37.50 x 18mm size shutter with sliding frame 2-track of standard company etc. complete.**

The work shall be carried out as desired in the item as approved Colour anodized Aluminum Section sliding fully glazed windows.

The aluminum tube frame of size 63.50 mm x 38.10 mm x 1.95 mm & frame of size 61.85x 31.75 mm x 1.30 mm shall be used. The aluminum section of frame Colouranodized for shutter shall be of aluminum sliding series section complete with all standard accessories including 5mm thick transparent glass & stainless steel mosquito net for shutters etc.

The windows using section size 40.00 mm x 18 mm x 1.29 mm for shutter frame. The material shall be as per specification book and it shall be of best and approved quality as approved by the Engineer-in-charge. The glazing shall be done by means of P.V.C. rubber glazing gasket. PVC rubber glazing shall be used for operable shutters.

**Details of the Colour anodized section to be used as under:**

Tube frame of size 63.50 mm x 38.10 mm x 1.95 mm having 1.094 kg./Rmt. Weight Frame section shall be 61.50 mm x 31.75 mm x 1.50 mm having 0.695 kg./Rmt. weight. Shutter frame section shall be of 40.00 mm x 18 mm x 1.29 mm having 0.456 kg. /Rmt. Weight. Float Glass: 5mm thick transparent glass of copper tint shall be of assorted quality and of standard specification booklet of building work. Necessary glazing clips, rubber packing (silicon packing) shall be of approved quality. Assured glazing patta if any required shall be used & tried.

The fixing of aluminum section frame including intermediate vertical and horizontal member shall be rectangular extruded sections having in built grooves to room glazing. The fixing of section for frame shall be made properly in plumb as directed by the Engineer-in-charge. Necessary aluminum fixtures and fastenings shall be provided of best and approved quality as directed by the Engineer-in-charge.

The rate shall be providing aluminum necessary materials fittings and fixtures, labour for fixing in position, bearing concern of brick masonry to fixing frame of window making good the same. The rate also including necessary all fittings and fixtures etc.

The rate shall be paid on Sq. Meter of the basis of the work done.

**Item No.: 43**

**Providing and fixing IS marked Flush Door 35mm thk. wooden beading of ghana wood and size 35x6 mm, including Laminated sheet of decorative type with high density protective surface and reverse side adhesive bonding quality and 1 mm thickness and Polishing of beading area with approved brand of stainless steel fixtures like Aldrof, tadi, Stopper, Handle, buffer, magnetic catcher and eye piece of ss, ss butt hinge of approved quality and ss screw etc complete. (35 mm thickness excluding lamination thickness)**

**1.0. Material**

The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S. Latest edition.

The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the care members. The commercial plywood, cross-bands shall conform to I.S: latest edition.

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

All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plant both faces of the shutters shall be sand papered to smooth even texture.

The shutters shall be tested for

**(1) End immersion test:** The test shall be carried out as per I.S. latest edition.

There shall be no delamination at the end of the test.

**(2) Knife test:** The face panel when tested in accordance with I.S. latest edition shall pass the test.

**(3) Glue adhesion test:**

The flush door shall be tested for glue adhesive test in accordance with I.S.: latest edition. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single delamination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knot holes and other permissible wood defects shall not be considered in assessing the sample.

**The tolerance in size of solid care type flush door shall be as under:**

In Nominal thickness  $\pm 0.5$  mm & Nominal height  $\pm 3$  mm.

The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.5 mm when measured at any two points.

Both Laminated sheet having minimum thickness 1.00 mm of decorative type of approved quality and brand mechanical pressed with approved adhesive.

This Flush shutter must be framed with wooden beading at all four side. wooden beading will painted with two coat of oil paint including primer coat without extra cost.

Door Fixtures

Hinges	- 3 to 4 Nos ( IS Marked, 100 mm long, M.S.)
Handel	- 2 Nos (100 mm grip length, S.S.)
Aldrof	- 1 Nos (250 mm long, 16 mm dia bars) in SS
Tadi	- 1 Nos(250 mm long, 10 mm dia bars) in SS
Stopper	- 1 Nos(200 mm long, 8 mm dia bars) in SS
Magnetic stopper	- 1 Nos
Door floor Stopper	- 1 Nos (Double legged) in SS
Eye Piece	- 1 Nos



## **2.0. Workmanship**

The relevant specifications of Item No.10.23 shall be followed except that the shutters be non-decorative type and block board core with face veneer or plywood, with 35 mm thickness.

Readymade shutters shall be of correct size and shall fit into the door or other openings without excessive scapping of edges. Adding of battens etc., to make up to the size shall not be allowed. Flush door other than Kitply/Century/Dura/Everest or Brand included in vender list to be used by the contractor with all data and required test reports.

## **3.0. Mode of Measurement**

The rate shall be for a unit of one Sq meter.

Out to out length & width for shutter panel will be measured in millimeter. No extra length with will measured specified in drawing.

### **Item No.: 44**

**Providing and fixing FRP frame size 125x65 mm and 35mm thick FRP shutter with wood grain raised paneled design finish shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filed up with injected polyurethane foam done in situ along with embedded wooden pieces for stiffening & also taking hinges & fintures. The whole FRP frame & shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkali. Rates are to be inclusive of S.S hinges with fastener sleeve & alluminium fixtures & fastenings.**

As per item BOQ

The rate will be paid for a unit of one square meter basis

### **Item No.:45**

**Grill work for doors - windows etc. as per design on site with fitting & fixing.**

### **Item No.:46**

**Iron work as per drawing and instruction including all As Per EIC**

All structural steel shall conform to IS 266 - Latest edition. The steel shall be free from the defects mentioned in IS 226 (Latest edition) 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. River bars shall conform to IS 1148 Latest edition.

When the steel is supplied by the contractor, test certificate of the manufacturer shall be obtained according to IS 226 Latest edition and other relevant Indian Standards. The design should be made as per the instructions of engineer-in-charge.

The rate includes supplying and welding (along with labours), transportation and fixing in position of the steel work.

The rate shall be for a unit of one Kilogram.

**Item No.: 47**

**Wire fencing work using new wire (Single row)**

As per item BOQ

The rate will be paid for a unit of one meter basis.

**Item No.:48**

**CRS Pipe Work as per drawing and instruction including all as directed by EIC/ consultant.**

All structural steel shall conform to IS 266 - Latest edition. The steel shall be free from the defects mentioned in IS 226 (Latest edition) 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. River bars shall conform to IS 1148 Latest edition.

When the steel is supplied by the contractor, test certificate of the manufacturer shall be obtained according to IS 226 Latest edition and other relevant Indian Standards. The design should be made as per the instructions of engineer-in-charge. The rate includes supplying and welding (along with labours), transportation and fixing in position of the steel work.

The rate shall be for a unit of one Kilogram.

**Item No.:49**

**Providing and laying integrated cement based proprietary water proofing treatment of required thickness over the roof including 20mm thick cement mortar 1:4 and china Mosaic fitting and finally finishing the surface with white cement slurry and sloping out terrace slabs with following specification laid to required slope not flatter than 1:80 (the thickness of water proofing treatment near rainwater outlet or the lowest point of the finished slope shall not be less than 65mm, including treating the vertical surface of the parapet wall upto 30cms. height above finished level of terracing including finishing the top with joint less water proofing plaster, curing, testing etc. complete (area in plan shall only be measured and rounding, vata etc. shall not be measured). Including ten years performance of guarantee bond to be given on stamp paper. (No extra shall be paid for variation in thickness).**

**(a) Applying and grouting a slurry coat of neat cement using 2.75 Kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS-2645 over the RCC slab including cleaning the surface before treatments.**

**(b) Laying cement concrete using broken brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1-cement;5-coarse sand) admixed with proprietary water proofing**

compound conforming to IS: 2645 over 20mm thick layer of cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound conforming to IS:2645 to required slope and treating similarly the adjoining walls upto 300mm height including rounding of junctions of walls.

(c) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound conforming to IS: 2645.

(d) Finishing the surface with 20mm thick joint less cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surface with trowel with neat cement slurry and making of 300 x 300mm square.

(e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing for final test. All above operations to be done in order and as directed and specified by the Engineer in charge.

**Materials:**

Water shall conform to M-1.

Cement shall conform to M-3.

**Workmanship:-**

water proofing treatment of required thickness over the roof including 20mm thick cement mortar 1:4 and china Mosaic fitting and finally finishing the surface with white cement slurry and sloping out terrace slabs with following specification laid to required slope not flatter than 1:80(the thickness of water proofing treatment near rainwater outlet or the lowest point of the finished slope shall not be less than 65mm, including treating the vertical surface of the parapet wall upto 30cms.

(1) Applying and grouting a slurry coat of neat cement using 2.75 Kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS-2645 over the RCC slab including cleaning the surface before treatments.

(2) Laying cement concrete using broken brick bats 25mm to 100mm size with 50% of cement mortar 1:5(1-cement;5-coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 over 20mm thick layer of cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound conforming to IS:2645 to required slope and treating similarly the adjoining walls upto 300mm height including rounding of junctions of walls.

(3) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound conforming to IS: 2645.

(4) Finishing the surface with 20mm thick joint less cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surface with trowel with neat cement slurry and making of 300 x 300mm square.

(5) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing for final test. All above operations to be done in order and as directed and specified by the Engineer in charge.

**Mode of measurement & Payment.**

The rate shall be for a unit one sq meter

**Item No.:50**

**Supply & Fixing of 80 mm M-30 Grade cement concrete rubber mold paving inter locking paving block after bedding of black stone powder in line and CC on the edge in proportion of 1:2:4 with curing etc. complete as directed by EIC/ consultant.**

**Material:**

Water shall confirm to M-1, sand shall confirm to M-6, Cement shall confirm to M-3. 60mm thick with grade of concrete M300 and pneumatic compressed by mechanically pressed paver block of approved colour& shape having abrasion value not more than 2mm and water absorption not more than 6%

**Workmanship:**

Sub grade shall be cleaned, leveled, wetted and rammed as directed. 75mm thick layer of dry sand shall be spread over it. paver block of approved colour, shape and size, as instructed with concreting 1:2:4 the end blocks (without cement joints) in bedding of Bhogavo, shall be laid in different pattern/design as shown in the drawing or as directed by Consulting Architect/Engineer-in-charge as directed on top, pressed, tapped gently to bring it in line and level and inter lock with others. The joint shall be as fine as possible. The finished surface shall be true to levels and slopes as directed. Necessary testing of blocks is to be carried out.

**Mode of Measurement and Payments:**

The rate shall include the cost of all materials and labour involved in all the operations described above. The Paver block flooring shall be measured in square meters correct to two places of decimal, length and breadth shall be measured correct to a centimeter  
The rate shall be for a unit of one square meter.

**Item No.:51**

**Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length,30cm height and 15cm thick of M250 grade concrete as per approved design and including excavation for fixing in proper line and level, filling the joint with C:M 1:3 (1cement:3fine sand) etc complete.**

**Material:**

Water shall confirm to M-1, sand shall confirm to M-6, Cement shall confirm to M-3. Precast Concrete kerb block of size 300 mm x 300 mm of M 25 grade concrete approved shape.

**Workmanship:**

Subgrade shall be cleaned, leveled, wetted and rammed as directed. kerb stone of approved colour, shape and size, shall be laid in different pattern/design as shown in the drawing or as directed by Consulting Architect/Engineer in charge as directed on top, pressed, tapped gently to bring it in line and level and inter lock with others. The joint shall be as fine as

possible. The finished surface shall be true to levels and slopes as directed. Necessary testing of blocks is to be carried out. including necessary excavation, cutting the road, laying PCC 1:4:8 (1 part cement : 4 parts sand : 8 parts stone aggregate 20/37 mm. down size), 100 mm. thick, shuttering, exposed rendering, curing and filling bituminous mastic in expansion joints but excluding reinforcement as directed etc.

**Mode of Measurement and Payments:**

The rate shall include the cost of all materials and labour involved in all the operations described above.

The rate shall be for a unit of running meter.

**Item No.: 52**

રીજીડ પી.વી.સી. પાઈપ આઈ.એસ.આઈ. માર્કવાળા ૬ કિ.ગ્રા./ચો.સે.મી. પ્રેસરના જરૂરી કપ્લર સાથે સપ્લાય અને જરૂરી ફીટીંગ્સ સાથે, જરૂરી સોલવન્ટ સીમેન્ટ વાપરીને જોઈન્ટ કરી આપવાનું મજૂરી કામ. ...સદર...૧૧૦ મી.મી. આઉટર ડાયા. ના પાઈપ.

As per item BOQ

The rate will be paid for a unit of one meter basis.

**Item No.: 53**

**APPLYING AND MAKING OF FLOTTER AND BROOMING ON RCC SLAB AND VARING COAT**

As per item BOQ

The rate will be paid for a unit of one Squire basis.

**Item No.: 54**

**Supply & Fixing of Steel characters**

Specification for this item shall conform to item no. 641 of General Technical Specifications for building work. Except that the whole work is to be carried out by fixing and providing steel character of size instructed by EIC.

The Rate Shall be paid per Sq. inch basis.

**Item No.: 55**

**Numbering on Building / Quarters (Painting work) including all material and labour charge**

Specification for this item shall conform to item no. 641 of General Technical Specifications for building work. Except that the whole work is to be carried out by fixing and providing Numbering on Building / Quarters (Painting work) of size instructed by EIC.

The Rate Shall be paid per Characters basis.

# Plumbing

**Item No.:56**

**Providing and fixing wash down water closet (European type WCpan) with sit cover including jet spray and stopcock**

**1.0 Materials:**

1.1 The European Water Closet shall consist of a Wash down closet in white glazed or coloured earthenware with integral "P" or "S" trap as specified.

b. Rubber joints for inlet connection.

c. Black or any other color of solid plastic seat and cover with chromium plated hinges and rubber buffers as specified

**2.0 Workmanship**

2.1. The pan shall be sunk into the floor and embedded in a cushion of average 15cm. cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate or brick aggregate 40 mm. nominal size) or as specified. This concrete shall be left 115 mm below the top level of the pan so as to allow for flooring and its bed concrete.

The floor should be suitably sloped so that the waste water is drained into the pan. The pan shall be provided with 100 mm. 'P' or 'S' traps with approximately 50 mm. seal. The joints between the pan and the trap shall be made leak-proof with cement mortar 1: 1 (1cement: 1 fine sand).

2.2 The whole work is to be carried out necessary supply, fixing etc of required size, shape, color, as per the instructions and to the satisfaction of engineer in charge

**3.0. Mode of measurements & payment**

3.1. The rate shall include the cost of all materials and labours involved in the operations described under workmanship.

3:2. The 'P' of 'S' trap shall include and not be paid separately.

3.3. The rate shall be for a unit of one number

**Item No.:57**

**Providing and fixing Urinal of approved quality including connection with trap and with integral longitudinal flush pipe and brass screw down stop tap.(A) 15mm dia.(A) Squatting plate pattern white earthenware 550mm x 300mm.**

**Material:**

The urinal shall be of approved quality including connecting the urinal with waste pipe, tap etc. complete of required size, shape, color etc. Complete as per the instructions of engineer-in-charge.

**Mode of measurements & payment**

The rate shall be for a unit of One Unit

**Item No.:58**

**White porcelain wash basin 560/410mm indian make c.i. bracket with fitting chromium plated tops 25cm plastic waste pipe and 12mm pillar cock with comp.**

Wash basin shall be of white porcelain first quality best Indian make and it shall conform to IS: latest edition. The size of the wash basin shall be as specified in the item. Wash basin shall be of one piece construction with continued over flower rang elements. All internal angles shall be designed so as to facilitate cleaning. Washbasin shall have single tap hole or two holes as specified. Each basin shall have a circular waste hole which is either related or beveled internally with 65 mm diameter at top and 10 mm depth to suit the waste fitting. The necessary stud slot to receive the bracket on the underside of the basin shall be provided. Basin shall have an internal soap holder recess which shall fully drain into the bowl. White glazed pedestal of the quality and color as that of the basin shall be provided where specified in the item. It shall be completely recessed at the back for reception of supply and wash pipe. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from the floor to top of the rim of basin 410 mm to 800 mm as directed.

**Item No.:59**

**Providing & Fixing Brass cock screw down bolt type 15mm dia. fitting with fixing.**

**1.0. Materials:**

15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 7811977. The bib cock shall be best Indian make and quality.

**2.0. Workmanship:**

2.1. The screw down bib cock 15 mm. as specified above shall be Fixed as directed. The threaded portion shall be smeared with white or red lead and around with a Few turns of fine-spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

**3.0. Mode of measurements and payment**

3.1. The rate includes cost of all labor, materials, tools and plant etc. required for satisfactory completion of this item.

3.2. The rate shall be for a unit of One Number.

**Item No.:60**

**Providing and fixing pillar tap, capstan head, and screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.**

**1.0. Materials:** The capstan head pillar tap of specified dia. of C.R over brass shall be best quality and shall conform to I.S.:1975- 1961. The pillar taps shall be tested quality.



## **2.0. Workmanship**

**2.1.**The cap Stan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipeline white Zink end spun yarn, to make joint water tight. The work shall be carried out in best work man like manner.

## **3.0. Mode of measurements and payment**

**3.1.** The rate shall be for a unit of one number.

### **Item No.:61**

#### **flushing valve brass chromium plated push cock of handle type with flushing supply and fixing**

#### **Material:**

The flushing valve Brass Chromium plated push cock or handle type with flushing, of sheet all brand or approved quality, size is to be supplied and fixed as per the requirement. The whole work is to be carried out as per the instructions and to the satisfaction of engineer in charge.

#### **Mode of measurements & payment**

The rate shall be paid for a unit of one number basis.

### **Item No.:62**

#### **1. Brass wheel valve fitting with fixing.50mm, 40mm and 25mm dia.**

#### **1.0. Materials :**

15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 7811977.The bib cock shall be best Indian make and quality.

#### **2.0. Workmanship**

**2.1.** The screw down bib cock 15 mm. as specified above shall be Fixed as directed. The threaded portion shall be measured with white or red lead and around with a Few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

#### **3.0. Mode of measurements and payment**

**3.1.** The rate includes cost of all labor, materials, tools and plant etc. required for satisfactory completion of this item.

**3.2.**The rate shall be for a unit of One Number.

### **Item No.: 63,64,65**

#### **Providing laying and jointing in true line and level 50mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent**

**as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials. (A) 32 mm (B) 25 mm (C)15 mm dia.**

### **1.0. Materials:**

UPVC / CPVC pipes shall conform of Schedule-40/80 of any standard brand & quality and make as approved by the Engineer-in-charge.

### **2.0. Workman ship:**

#### **2.2. Fixing of the tube fitting to wall ceiling and Poor's:**

**2.2.1.**In case of fixing of tubes and fillings to the wall s or ceiling, these shall run on the surface of the wall or ceiling(not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm clear of the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in duets or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipes may be buried for short distances provided. That adequate protection is given against damage and where so required joints are not buried. Where required M.S. tubes leave shall be fixed at a place a pipe is passing through a wall or floor for expansion and contraction and other movements. In case The pipe is embedded in walls or floors, it should be painted with anti-corrosive bitu mastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.

**2.2.2.** All pipes and fittings shall be fixed truly vertical and horizontal unless un avoid able. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar1:3(1cement:3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight leng that 2 M C/C interval in horizontal run and 2.5M.interval in vertical run. For pipe of 15 mm dia. Up to 25mm.dia.the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brickwork or concrete. However for bigger diameter pipes, the holes shall be carefully made of the smallest required size. After fixing the pipe the holes shall be made good with cement mortar1:3(1cement:3 coarse sand) and properly finished to match the adjacent surface.

### **2.3. Testing of joints:**

**2.3.1.** After laying and jointing, the pipes and fittings shall be in spected under working conditions of pressure and flow. Any joint found leaking shall be re done, and al leaking pipes removed and replaced without extra cost.

2.3.2. The pipes and fillings as they are laid shall be tested to hydraulic pressure of 6Kg./sq.cm. The pipe shall be slowly and carefully Charged with water allowing all air to escape and avoiding all shock and water hammer. The draw off takes and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate.

The pipes and fillings shall be tested in sections as the work of laying proceeds keeping the joints exposed for inspection during the testing.

**3.0. Mode of measurements & payment:**

3.1. The description of each item shall unless otherwise stated, be held to include where necessary, conveyance, and delivery, handling, unloading, storing fabrication, hoisting, all labor for finishing to required shape and size; testing, fitting in position, straight, culling and waste, return of packing etc.

3.2. The length shall be measured on running meter basis of finished work. The length shall be taken along the center line of the pipe and fittings. The pipes fixed to walls, ceiling, floors etc. shall be measured and paid under this item.

3.3. All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated:

(i) Dimension shall be measured to the nearest 0.01meter,

(ii)Area shall be worked out to the nearest 0.01sq.meter.

3.4. All measurements of culling shall unless otherwise stated be held to include the consequent waste.

3.5. In case of filling of an equal bore, the largest bore shall be measured for the test

3.6. Testing of pipe lines filling sand joints include for providing all plant and appliances necessary for obtaining access to the work to be tested and carrying out the tests.

3.7. The rate includes galvanized steel tubing with screwed socket joints, together with all fittings (such as bends, sockets, springs, elbows, tees, crosses, short pieces, Clamp and plugs unions etc.) and fixing complete with clamping wall-hooks, wooden Plugs etc. and also cutting, screwing and waste and for making forged (or handmade) bends on piping as required. Connector shall be inserted, where required or directed.

The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing. Where lugs are fixed to wall, Ceiling and flooring, the rate shall not include painting of pipes, providing sleeve sands and Oiling under floor for which separate payment shall be made.

3.8. The rate shall be for a unit of one Running meter.

**Item No.: 66,67**

**Providing, fixing, jointing, testing and commissioning of PVC pipe with rubber ring joint confirming to IS : 13592, and confirming to IS : 4985 (Pipe Class III - 6 kg / sq.cm) cut to required lengths including all necessary fittings and specials such as bends, junctions offsets, access pieces (plain or door). Fixing at wall / ceiling level supported by G.I. clamps, hangers etc. duly epoxy coated. Cutting, chases/holes in floors / walls / slab. The piping should be complete with P or S trap as req. (A)75 mm (B)50 mm**

**1.0Material**

The low density polythene pipe of specified diameter with 6 kg/sq.cm working pressure shall conform to IS: 3076-Latest Edition. The specifically s and fittings required shall be of best quality.

**2.0Workmanship**

The PVC pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid PVC pipes, due allowance shall be made particularly in over ground pipelines for any change in length of pipeline which may occur during installation or when pipeline is in service Above ground installation of rigid PVC pipe should be undertaken after preparations are observed for their protection against direct sun rays and mechanical damage.

The rigid PVC pipe lines should not be kept exposed above ground when it passes through public places, railway lines, road side and footpaths.

PVC pipes shall be supported at the following intervals. 20 mm dia 500 mm 25 mm dia 750 mm 32 mm dia 900 mm Close support spacing shall be provided if recommended by the manufacturer. The guidelines indicated by the manufacturer regarding handling, transportation, storing, laying and jointing of pipes shall be kept in view during execution.

PVC pipes shall be fixed on wall with wooden plugs and suitable plastic clamp.

**Jointing the Pipes:**

The pipes and sockets shall be accurately cut. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper, and then solvent cement joint. Since solvent cement is aggressive to PVC care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement cannot be wiped off after jointing. Empty solvent cement tins, brushes, rags, or paper unprinted with cement should not be buried in the trenches. They should be gathered not left scattered about, as they can prove to be a hazard to animals, which may chew them.

If any manufacturer recommends its own methods of jointing the same shall be adopted after necessary approval from the engineer-in-charge.

**Laying of pipes in trenches:**

The pipes shall be laid over uniform relatively soft fine grained soil found to be free of presence of hard objects such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.

The pipes laid underground shall not be less than one meter from the ground level. They pipe shall be positioned in the trenches so as to avoid any induced stressed due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

### **Mode of measurements and payment**

The relevant specifications of item 2.32(A) shall be followed except that the PVC pipes of specified dia shall be paid under this item.

The unit rate shall be for a unit of one running meter.

### **Item No.:68,69**

#### **Supply and fixing 100 mm PVC cowl**

#### **Supply and fixing 75 mm PVC cowl**

This work shall consist of fixing 100 & 75 mm PVC cowl Vent of approved brand and manufacture as approved by the Engineer in charge.

### **1.0 Mode of measurements & payment**

1.1 The rate shall be for a unit of One Number.

### **Item No.:70**

#### **Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and watertight C.I. cover with frame of 300 mm. x 300 mm. size (Inside) with standard weight : (A) square mount taps 100 mm. x 100 mm. size P or R type**

### **1.0. Materials:**

(1) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Galley trap of 100 mm. x 100 mm. size shall confirm to M-70.

### **2.0. Workmanship**

2.1. Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specifications of item 4.0.0.of earth work.

### **2.2. Fixing:**

2.2.1. The gully trap shall be fixed over cement concrete 1:5:10 (1cement: 5 sand: 10 graded brick bats aggregate40 mm nominal size) foundation. 650 square and 100 mm. thick thedepth of top of concrete below the ground level shall be 675 mm. The jointing of gully outlet to the branch drain shall be done similar to jointing of S.W. pipe ac described in item No. 24.1 (A)

2.3.Brickmasonry chamber After fixing and testing gully and branchdrain, a brickmasonry300x 330mm. inside with bricks in CM 1:5 (1 cement : 5sand)shall be built with a100mm. Brick work round OH; gully trap from the top of bed concrete up to ground

level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

2.4. C.I. cover with frame 300 mm, x 300 mm. (inside) size shall then be fixed on the top of the brick masonry with C.C. 1:2:4 ( 1 cement : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gulley trap.

### **3.0. Mode of measurements & payment**

3.1. The rate includes cost of all labor, materials, tools and plant etc. required for satisfactory completion of this item as described above.

3.2. The rate shall be for a unit of one number basis.

#### **Item No.:71**

**Providing and fixing PVC SWR Nahni trap IS 14735 for drain-100mm diameter with jali of the following nominal diameter of self cleansing design with C.I. screed down or hinged grating including the cost of cutting and making good the walls.**

#### **1. Materials**

1.1. The cast iron (spun) Nahni trap shall conform to M-69. The C.I. hinged or screwed down cover shall be of best quality

#### **2.0. Workmanship**

2.1. The Nahni trap with 100mm dia inlet and 50mm dia outlet shall be fixed as per drawing or as directed.

2.2. The Nahni trap shall be jointed with C.I. Pipe, 75mm. dia. with lead joints. The lead joints shall be done in conformation with I.S.782.-1976.

#### **3.0. Mode of measurements and payment**

3.1. The rate includes cost of all labour, materials, tools and plants etc. required for satisfactory completion of this item including lead, jointing and testing.

3.2. The rate shall be for a unit of one number.

#### **Item No.:72,73**

**Providing and laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete : 100 mm. dia. and 150mm dia.**

#### **1.0. Materials**

Water shall conform to M-1(2) Cement mortar of proportion 1:1 shall conform to M-11.(3) 100mm. dia. and 150mm dia. glazed stone ware pipe shall conform to M-71.

## **2.0. Workmanship**

**2.1.** The trenches for stone ware pipe drains shall be carried out as per relevant specifications of item No. 23.4 (A) Except that the work is for stone ware pipes of 100mm dia and 150mm dia

### **2.2. Laying:**

**2.2.1.** The pipes shall be laid accurately and perfectly true to line level sand gradients, great care shall be taken to prevent and etc. from entering the pipes. The pipes between two man holes shall be laid truly in a straight line without vertical or horizontal undulation. All junctions and changes in direction and diameter shall be made in side man holes by means of curved tapered channels formed in cement concrete finished smooth and benched on both sides. The body of the pipe shall rest for its entire length, on an even level bed grips being made or left on the bed to receive the sockets of the pipes.

### **2.3. Jointing:**

**2.3.1.** Tarring or gask in or yarn soaked in neat cement slurry shall first be placed around these pipe gots to each pipe and these pipe gots shall then be placed well home into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and asking caulked home so as to fill not more than 1/4th of the total depth or (13mm. in depth) of the socket.

**2.3.2.** The remainder of the sockets shall be filled with stiff mixture of cement mortar in proportion of one part of cement and one part of sharp sand. When the socket is filled, a fillet shall be formed round the joints with a trowel, forming an angle of 45° with the barrel of the pipe.

**2.3.3.** The mortar shall be mixed as necessary for immediate use.

**2.3.4.** After the joint is made, any extra neous materials shall be removed from the inside of the joints with a suitable Scraper or "badger". The newly made joints shall be protected, until set, from the sun, dry winds, rain or frost, sacking or other suitable materials which shall be used for the purpose.

**2.3.5.** The mortar shall be cured for 10 days.

### **2.4. Testing of Joints:**

**2.4.1.** If any leakage is visible the defective part of the work shall be made good at no extra cost. The pipe line shall be tested as directed.

**2.4.2.** As light amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joints shall be watched for and taken as indicating a defect to be made good.

## **3.0. Mode of measurements and payment**

**3.1.** Pounding or buttering of the fit trenches bed to the lower part of the pipe and "Grips" dug to take socket, collars etc. are included in the rate of laying the pipes.

**3.2.** The measurements shall be net without any allowance for cutting, and waste. The length of bends, junctions, and other connections shall be included in the to all length of the

drain pipes. Nothing extra shall be paid for the same. The rate includes necessary excavation refilling trenches etc. complete.

**3.3.** The rate shall be for a unit of one running meter.

**Item No.:74**

**Providing and laying CC 1:5:10(1 cement : 5, fine sand : 10 graded stone aggregate 40 mm normal size) Bedding for Stoneware Pipes of following internal diameter with necessary formwork and curing complete (A) 150mm pipes**

**1.1. Materials & Workmanship:**

The relevant specifications of item 24.2(A) shall be followed except that the cement concrete work shall be carried out for bedding of stone ware pipe of 150 mm. dia. The average thickness of bedding shall be 166 mm. and width shall be 450mm.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item 24.2(A) shall be followed.

**2.2.** The rate shall be for a unit of one running meter.

**Item No.:75**

**Providing and laying CC 1:5:10(1 cement : 5, fine sand : 10 graded stone aggregate 40 mm normal size) Bedding for Stoneware Pipes of following internal diameter with necessary formwork and curing complete (A) 100mm pipes**

**1.0. Materials:** (1) Water shall conform to M-1 (2) Cement shall conform to M-3. (3) Sand shall conform to M-6 (4) Stone aggregate 40 run nominal size shall conform to M-12.

**2.0. Workmanship**

**2.1.** The relevant specifications of item 5.3.4 shall be followed except that the concrete work shall be carried out in trenches as bedding for stone ware pipes. The width of concrete shall be 300 mm. and average thickness of bedding shall be 112 mm the concrete shall be brought up at least to the invert level of the pipe to form a cradle and to avoid line contact between the pipe and the bed.

**3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all labor and materials required for satisfactory completion of this item.

**3.2.** The rate includes cost of necessary form work required if any

**3.3.** The rate shall be for a unit of one running meter.

**Item No.:76**

**Constructing brick masonry chambers for underground C I Inspection Chamber and bends with bricks having crushing strength not less than 35kg/sq cm in C.M. 1:5 C I cover with frame (light duty) 455x610mm internal dimension total weight of cover with frame to be not less than 38kg RCC top slab with CC 1:2:4 mix (1, cement : 2, coarse sand : 4, graded aggregate 20 mm size) foundation concrete 1:5:10 inside plaster 15mm thick with C.M. 1:3**



**finish smooth with finishing coat of neat cement on walls and bed concrete etc (inside dimension 500mm x 700mm x & 450mm deep) for single pipe lines with one of two inlets.**

**1.0. Materials:** Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14. M.S. bar shall conform to M-18.

## **2.0. Workmanship**

**2.1.** C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and felt washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:

**2.2.** The excavation shall be done true to dimensions and level shown in one of the plans or as directed.

**2.3.** Bed concrete shall be 15 cms, thick C.C. 1:5:10 (1 cement: 5 Coarse sand: 10 graded brick bat aggregates). The projection of bed concrete beyond the masonry walls shall be 7.5 cms.

**2.4.** Masonry walls and plaster work shall be carried out as per relevant specifications of item

24.40.

**2.5.** The cover slab shall be constructed as per relevant specifications of 24.27(I).

## **3.0. Mode of measurements and payment**

**3.1.** The earth work in excavation, providing and laying C.I. inspection chamber and bends shall be measured and paid for separately.

**3.2.** The rate shall be for a unit of one number.

### **Item No.:77**

**Providing erecting and fixing double coated syntax equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings and connection etc comp. on terrace**

#### **MATERIALS AND WORKMANSHIP:**

Overhead water tanks "Reno" or "Syntax" or equivalent of cylindrical vertical tanks with closed top of self-supported type having approved grade of polyethylene, molded to seamless and suitable for potable water tank of capacity as mentioned in Schedule-B as per company's dimensions provided with G.I. fittings of size 25mm Dia for inlet, outlet, over flow and scour connections and float valves etc. complete placed with all fittings fixing as directed by engineer in charge.

The rate for this work will be paid per liter basis.

### **Item No.:78**

**Providing and fixing 600 mm. x 450 mm. beveled edge mirror of superior glass mounted on 6 mm. thick A.C. Sheet or plywood sheet and fixed to wooden plugs with C.P brass screws and washers.**

#### **1.0. Materials**

**1.1.** The 600mmx450mm size mirrors will be of superior glass with edge rounded offer beveled as specified. It shall be free from flaws specks, or bubble sand its thickness shall be less than 6mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects Silvering shall have a protective uniform covering of red lead paint. The 6mm thick plywood shall conform to M-37. The 6mm. thick A.C. sheets shall conform to M-24.

## **2.0. Workmanship**

**2.1.** The mirror of 600mmx450mm. size mounted on A.C. Sheet or plywood 6mm thick with C.P. brass clips shall be fixed as directed, by fixing wooden plugs in wall and C.P brass screw sand washers. The work shall be carried out in best work man like manner.

## **3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all labour and materials, tools and plant etc. Required for satisfactory completion of this item. The rate shall be for a unit of one number.

### **Item No.:79**

**Providing and fixing PTMT liquid soap container 109mm wide, 125mm high and 112mm distance from wall of standard shape with bracket of the same material with snap fitting of approved quality and colour weighing not less than 105 gms.**

As per standard Specification soap dish chromium plated with brackets fixed to wooden cleats with CP brass screw fixing with all fitting & accessories to make the setup complete in all respect along with making wall good as req and complete in all respect.

### **1.0 MODE OF MEASUREMENT AND PAYMENT:**

**1.1** The rate shall be for unit of one number

### **Item No.:80,81**

**RCC precast frame & Cover with supply, fitting, fixing with complete as per specification 10ton size 550/550/90mm.**

**i) GENERAL:** - The R.C.C. pre-cast manhole cover shall conform to IS -12592 / 2002 or its latest version and as per detailed Drawing attached herewith.

#### **ii) SHAPES & DIMENSIONS:-**

Shapes: - The shapes of pre-cast M.H. covers shall be circular only and 10 and 20 MT capacity for MHS and 5MT for HC chambers.

**ii.a) DIMENSION & TOLERANCES:** - length, breadth & diameter of pre-cast concrete manhole covers shall be such that the maximum clearance at top between the frame & the cover shall be 5mm. The minimum thickness of HD, MD & LD covers shall be 90, 70 & 60 mm respectively.

**ii.a.i) GRADES AND TYPES:**

Manhole covers and frames shall be of the following four grades and types:

Grade Designation Type/ Shape of Cover

Light Duty LD-5 Rectangular, Square, Circular

Medium Duty MD-10 Rectangular, Circular

Heavy Duty HD-20 Rectangular (Scrapper Manhole), Square, Circular Lamp hole

Extra Heavy Duty EHD-35 Rectangular (Scrapper Manhole), Square and Circular

**i.a.ii)** Recommended locations for placement of different grades and types/shapes of manhole covers and frames are as given in ii.a.

**i.a.ii.a)** LD-5 Rectangular, Square or Circular Types Suitable for use within residential and institutional complexes / areas with pedestrian but occasional light motor vehicle traffic. These are also used for 'Inspection chambers'.

**i.a.ii.b)** MD 10 Circular or Rectangular Types

Suitable for use in service lanes / roads, on pavements for use under medium duty vehicular traffic including for car parking areas.

**i.a.ii.c)** HD - 20 Circular, Lamp hole, Square or Rectangular (Scrap per Manhole) Types.

Suitable for use in institutional / commercial areas / carriageways / city trunk roads/bus terminals with heavy duty vehicular traffic of wheel load between 50 to 100 KN, like buses, trucks and parking areas and where the manhole chambers are located in between the pavement and the middle of the road.

**iii) SAMPLE:-** The contractor shall get approved sample of R.C.C. pre-cast M.H. Cover & frame & house connection chamber frame and covers and shall supply materials as per approved samples from approved factory.

**iv) TESTS:-** The contractor / manufacturer at his own cost shall give all the required tests of RCC manhole cover and frame and all the testing facilities shall be kept open for the officers of RMC / Engineer-In-Charge at his factory.

**v) RESPONSIBILITY:-** The contractor shall be responsible for the materials for a period of defect liability period. After payment of final bill of the work and during this period he will be responsible for defects in the materials & for road accidents due to defective M.H. / H.C.C. Frame & covers. He shall have to replace defective materials during this period at his cost.

**vi) LETTER OF COMMITMENT:-** Contractor shall have to provide the letter of commitment in favor of Rajkot Municipal Corporation from the standard manufacturer of RCC Pre-cast M.H. / H.C.C. frame and covers to supply the desired quantity given in the e Tender document in time (i.e. well in advance not to remain any manhole or chamber open at site of work after construction) with all quality control. Manufacturer shall have a long experience for preparing the RCC Pre-cast M.H. / H.C.C. frame and covers of all types i.e. HD, MD and LD as

per the relevant I.S. Code of practice. A supply Schedule shall be submitted immediately on receipt of work Order.

vii) R.C.C. Manhole Covers And Frames, Following Points Should Be Considered

The Rate shall be paid per Number basis.

**SPECIFICATION  
OF  
ELECTRIC WORK**

# TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORKS

## 1. Wiring Rules:

The installation generally shall be carried out in conformity with relevant Indian Standard Specifications and code of practices prevalent, Indian Electricity Rules, 1956 and Indian Electricity Act, 1910 as amended from time to time.

## 2. Definition:

The definition of terms shall be in accordance with Indian Standard code of Practice for Electrical wiring Installation IS-732-1982 except for the definition of point in case of Internal Electrical Installation. For definition of point wiring and measurement of Electrical works IS-5908-1970 shall be referred to.

## 3. Voltage and Frequency of Supply:

All current consuming devices shall be suitable for frequency of 50C/s and system of voltage meant for unless otherwise specified.

## 4. Layout of wiring and its description:

(i) The wiring shall be carried out as per Schedule "power" wiring must be in screwed conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution boards at convenient centers and without isolated fuses. All conductors shall be run as far as possible along the walls and ceiling as to be easily accessible and capable of being thoroughly inspected. The balancing of circuits will be arranged before hand by the Ex. Engineer Electrical Division.

(ii) Within one month of the taking over the installation, the contractor shall supply to the Ex. Engineer, Elect. Division a complete set of wiring diagrams of the same on drawings to be supplied when available by the Executive Engineer, Electrical Division, and to the satisfaction of the Ex. Engineer, Elect. Dn. and these Wiring plans shall be "Drawings" within the meaning of the term as used in the General Conditions of contract.

## 5. Conductors:

All conductors unless otherwise specified shall not be less than 1.5Sq.mm for point wiring and 2.5/4Sq.mm for mains Conductors for power and lighting circuits shall be of adequate size to carry the designed circuit load without exceeding the permissible thermal limits for the installation, and such sizes will be stipulated in specifications and or drawings.

## 6. Cables:

6.1 All cables shall conform to relevant Indian Standards.

6.2 Conductors of all cable except the flexible cable shall be of aluminum. The smallest aluminum conductors for the final circuit shall have nominal cross sectional area of not less than 1.5Sq.mm. The minimum size of the aluminum conductors for power wiring shall be 4sq.mm

6.3.1 Conductors of flexible cables shall be of copper. The minimum cross sectional area of such a cables shall be 14.0193 mm. The flexible cable shall have uniform and adequate insulation.

6.3.2 Unless the flexible cables and conductors are protected by armor or tough rubber or PVC Sheath, these shall not be used in workshops and other places where they are liable to mechanical damage.

6.3.3 Core flexible cables shall be used for connecting Single phase Appliances for phase, neutral & earth connections.

#### **7. Fall of Potential:**

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in voltage between main fuses and the farthest point or any lamp shall not exceed three percent of the voltage of the consumer's with all the consuming devices in use.

7.1 If the cable size is increased to avoid the voltage drop in circuit current rating of the cable shall be more than that for which the circuit is designed. In each circuit or sub circuit every cable shall have a current rating not less than that of the fuse which protects the circuit or sub circuit respectively for current higher than the full load current.

#### **8. Ratings of lamps and fans socket outlets: Points and exhaust fans**

8.1 Incandescent lamps installed in residential and non-residential buildings shall be rated at 60 watt as &100 watts respectively.

8.2 Table fans and ceiling fans shall be rated at 60 watts; exhaust fan shall be rated according to their capacity.

8.3 5 Amp. Socket outlet points and 15 Amp. Sockets outlet points shall be rated at 100 watts and 1000 watts respectively for the purpose of load assessment unless actual values of the load are known or specified.

#### **9. Tests:**

9.1 Before the installation is commissioned following tests shall be carried out.

(1)Insulation Resistance test

(2)Polarity Tests of Switches

(3)Earth continuity tests

(4)Earth electrodes Resistance test

9.2.1.1 The insulation resistance shall be measured between earth and the whole system of conductors or any section thereof with all fuses in place and all switches closed, and except in earthed concentric wiring all amps in position or both poles of the installation otherwise electrically connected together a direct current pressure of not less than twice the working pressure provided that it need not exceed.500 volts for medium voltage circuits where the supply is derived from the three wire D.C. or a Poly phase A.C. System, the neutral pole of which is connected to earth either direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the phase conductor and the neutral.

9.2.1.2 The insulation resistance shall also be measured between all conductors to one pole or phase conductor of the supply and all the conductors connected to the neutral or. To the order pole or phase conductors of the supply with all lamp sin position and switches in 'OFF' position and its value shall be not less than in that specified in Sub Clause9.2.1.3.

9.2.1.3 The insulation resistance in Me ohms measured as above shall not be less than 50Me ohms divided by the number if outlet or when PVC insulated cables are used for wiring 12.5meohms divided by number10outlets

9.2.1.4 Where a whole. Installation is being tested; a lower value than that given by the formula, subject to a minimum of 1mega ohm is acceptable.

9.2.1.5 A preliminary and similar test may be made before lamps, etc. are installed and in this event the insulation resistance to earth should be not less than 100 mega ohms divided by the number of outlet or when PVC insulated. cables are used for wiring 25 mega ohms divided by number of outlets.

9.2.1.6 The term "Outlet" includes every switch except that as switch combined with a socket outlet, appliance or lighting fitting is regarded as one outlet.

9.2.1.7 Control rheostat heating and power appliance and electric sign may, if required, be disconnected from the circuit during the test, but in that event the insulation resistance between the case or frame work, and all live parts of each rheostat, appliance and sign, shall be not less than that specified in the relevant Indian Standard Specification or where there is no such specification shall be not less than half 'a mega ohm.

### **9.2.2 Polarity Test:**

9.2.2.1 In a two wire installation a test shall be made to verify that all switches in every circuit have been fitted in the same conductor through' out & such conductor shall be Labeled or marked for connection other phase conductor or to the non-earthed Conductor of the supply.

9.2.2.2 In a three wire or a four wire installation a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the phase conductor of the supply.

9.2.2.3 The installation shall be connected to the supply for testing. The terminals of all switches shall be tested by a test lamp one lead of which is connected to the earth. Glowing of test lamp to its full brilliance when the switch is in 'on' position irrespective of appliance in position or not shall indicate that the switch is connected of the right polarity,

### **9.2.3 Earth Continuity Test:**

The earth continuity conductor including metal conduits and metallic envelopes of cables in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit breaker measured from the connection with the earth electrode if any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

#### **9.2.3.1 Earth Electrode Resistance Test:**

Earth electrode Resistance test may be carried out by Meggar Earth Testers containing a direct reading ohm-meter a hand driven generator and auxiliary electrodes

9.3 On completion of an electric installation (addition and alteration) a certificate shall be furnished by the contractor counter signed by the certified Supervisor under whose direction supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix-'B' in addition the test certificate required by Local Electrical Supply Authorities.

### **10. Joint and looping back:**

Unless with the sanction of Ex, Engineer Electrical Divisions all joints in conductor shall be means of approved mechanical connector sin suitable and approved junction Boxes but looping back system shall be preferable. In wiring unless otherwise specified Phase and live conduct shall be looped at the switch box where a neutral conductor can be looped from light. Fan or socked. In non-residential buildings, neutral and earth continuity wire



shall be brought to each of the switch boards should be of adequate size to accommodate at least one number of 5Amps socket outlet and control switch in future.

**11. Switches:**

**Main Switchgears, Switch Board and their location:**

- 11.1 All main switches (other than those of iron clad pattern) carrying current of 10Amp. And above shall be fitted for back connections and shall be suitably protected.
- 11.2 All switches and circuit breakers shall be constructed in accordance with the I.S.4237-1967. General requirement for switch gear and control gear for voltage not exceeding 1000Volts and other relevant I.S. provided also that, spring shall be either of phosphor bronze or if steel shall be copper or Nickel plated and that handle shall be so fastened that they do not tend to unscrew or become loose.
- 11.3 All main switches shall be either of metal clad enclosed pattern or of any insulated enclosed pattern which shall be fixed at close proximity to the point of entry of supply.
- 11.4 Switch boards shall not be erected above gas Stoves, or sinks or within 2.5 m of any washing unit in the washing rooms of laundries or in the bathrooms, lavatories. Toilets or kitchens.
- 11.5 Switch boards, if unavoidably fixed in places likely to be exposed to weather to drip or to abnormal moist temperature the outlet casing shall be weather proof and shall be provided with gland socket bushing of adopted to receive crewed conduit according to the manner in which cables are run, PVC and double flanged bus shall be fitted in the holes of the switches for entry and exit of wires.
- 11.6 Switch board not be installed so that its bottom is within 1.25 m above the floor Unless the front of the switch board is completely closed by a door or the switch board is located in a position to which only authorized persons have access.
- 11.7 Switch boards shall be recessed in the wall if so specified in the schedule of work or in the special specification. The front shall be fitted with hinged panel of other suitable material such as Bakelite in wood frame with locking arrangement. the outer surface of door being flush with the walls. Ample room shall be provided at the back for connection and at the front between the switch gear mounting and the door.
- 11.8 Equipment's which are on the front of a switch board shall be so arranged that inadvertent personal contact with live parts is unlikely during the manipulation of switch gears, changing off uses or like operations.
- 11.9 No holes other than the holes by means of which the panel is fixed, shall be drilled closer than 1.3cms. from any edge of the panel.
- 11.10 The various live parts, unless they are effectively screened by substantial Barriers of non - hygroscopic, non- inflammable insulating material, shall be so spaced that spaces shall not be maintained between such parts and earth.
- 11.11 The arrangement of gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be traceable.
- 11.12 In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the off position.
- 11.13 No fuses other than fuses in instrument circuit shall be fixed on the back of or behind a switch board panel or frame.
- 11.14 All the metal switch gears and switch boards shall be painted, prior to erection with One coat of antirust primer, after erection they shall be painted with two coats of approved name or aluminum paint as required on all sides wherever accessible.
- 11.15 All switch boards connected to medium voltage and above shall be provided with

'Danger Notice Plate' conforming to relevant Indian Standards.

## **12. Control at Point of Commencement of Supply:**

- 12.1 There shall be a linked main switch gear with fuse on each live conductor of the supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of a linked switch gear the neutral shall also be distinctly marked. In this connection Rule 32(2) of the Indian Electricity Rules, 1966 (See Appendix-'A') shall also be referred.
- 12.2 The main switch gear shall be situated as near as practicable to be termination of Service line and shall be easily accessible without the use of any eternal laid.
- 12.3 On the main switch gear, where the conductor of at wo wire system or an earthed neutral conductor of a multi-wire system or a conductor which is to be connected there to, an indication of a permanent nature shall be. Provided to identify the earthed neutral conductor. In this connection Rule 32(1) of Indian Electricity Rules, 1956(see appendix. 'N ) shall be referred.

## **13.0 Switch Board & Distribution Boards:**

Metal clad switch gear shall preferably be mounted on any of the following types of Board.

### **13.1 Hinged type Metal Boards:**

- 13.1 These shall consist of a box made of sheet metal not less than 2mm thick and shall be provided with a hinged covert openable the board to swing open for examination of the wiring at the back. The joints snail be welded. A teakwood board, thoroughly protected both inside and outside with good insulating varnish conforming to IS : 1347-1952 specification for varnish shell ac, for General purpose and of not less than 6.5 mm thickness shall be provided at the back for attachment of incoming and Outgoing cables. There shall be a clear distance of not less than 2.9 cm between the Teak wood board and the cover, the distance being increased for larger board sign Order that on closing of the cover, the insulation of the cables is not subjected to Damage and no short length of cables is subjected to excessive twisting or bending in any case. The board shall be securely fixed to the wall by means of rag bolts, plugs or wooden Gut ties and shall be provided with a locking arrangement and a near thing stud. All wires passing through the metal board shall be bunched. Alternatively, hinged type metal boards shall be made of sheet covering mounted on channel or angle iron frame.

**Note:** Such type of boards is particularly suitable for small switch-boards for mounting metal-clad switchgear connected to supply at low voltages.

### **13.2 Fixed type Metal Boards:**

These shall consist of an angle or channel of iron frame fixed on the wall or on floor and supported on the wall at the top if necessary. There shall be a clear distance of one meter in front of the switch board. If there are attachments of base connections at the back of the switch board Rules 51(1)(c) of Indian Electricity Rules,1956 is gall apply.

**Note:** Such type of boards are particularly suitable for large switch board for mounting large number or switch gears or higher capacity metal clad switch gears or both.

### **13.3 Teak wood Boards:**

For small installations connected to a single phase 230 volts supply teak wood boards may be caused as main boards or sub-board. These shall be of seasoned teak or other durable wood with solid back impregnated with varnish of approved quality with all joints do vet ailed.

13.4 In large size medium voltage installations, before proceeding with the actual construction of the boards, a proper drawing showing the detailed dimension sand design including the disposition of the mountings, which shall be symmetrically and neatly arranged for arriving at the overall dimensions shall be prepared and approved by the Engineer-in- charge.

### 13.5 Recessing of Boards:

Where so specified the switch boards shall be recessed in the wall. The front shall be fitted with a hinged panel of teak wood or other suitable materials .such as Bakelite, or with unbreakable glass doors in track wood frame with locking arrangement, the other surface off the doors being flush with the walls. Ample room shall be provided at the back for connection and at the front between the switch gear mountings.

### 13.6 Arrangement of Apparatus:

- a) Equipment which is on the front of a switch board shall be so arranged that in advertently personal contact with live parts is unlikely during the manipulation of switches, changing off uses or like operation.
- b) No apparatus shall project beyond any edge of panel. No fuse body shall be mounted with in 2.5cm.of any edge of the panel and no hole other than holes by means of which the panel is fixed shall be drilled closer than 1.3 cm from any edge of the panel.
- c) The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non—inflammable insulating material, shall be so spaced that an arc cannot maintain between such parts and earth.
- d) The arrangement of the gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be easily traceable.
- e) In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the “off’ position.
- f) No fuses other than fuses instrument circuit shall be fixed on the back of or behind a switch board panel or flame.

### 13.7 Marking of Apparatus:

- a) Where a boards is connected to voltage higher than 250 volts, all the apparatus mounted on it shall be marked in the following, colors to indicate the different poles or phases to which the apparatus or its different terminals may have been connected.

<b>Alternating Current</b>	<b>Direct Current</b>
Three-phase-red, Yellow, & blue, Natural-black	Three wire system-2 outer wires Positive red & negative blue Natural- black

Where fuse-wire three phase wiring is done, the neutral shall be in one Color and the other three wires in another color.

- b) Where a board has more than one switch each such switch shall be marked to indicate which section of the installation it controls.
- c) All markings required under the rule shall be clear permanent.

### 13.7. A Main & Branch Distribution Board:

13.8.1 Main and branch distribution boards shall be of any type mentioned in 13.1

13.8.2 **Main distribution boards** shall be provided with a switch or air circuit breaker on each pole of each circuit, a fuse on the phase or live conductor and a link on the neutral or earthed conductor of each circuit. The switches shall always be linked.

**13.8.3 Branch Distribution Board:**

Branch distribution boards shall be provided with a fuse or a miniature circuit breaker or both the adequate rating setting chosen on the live conductor of each circuit and the earthed neutral conductor shall be connected to a common link and be capable of being disconnected individually for testing purposes. At least one spare circuit of the same capacity shall be provided on each branch distribution board.

13.8.3.1 In residential installations, lights and fans may be wired on a common circuit such sub circuit shall not have more than total often points of lights, fans and socket outlets. The load of such circuit shall be restricted to 800 watts. If a separate fan circuit is provided, the number of fans in the circuit shall not exceed ten. Power sub-circuits shall be designed according to the load but in no case shall there be more than two outlet so each sub-circuits.

13.8.3.2 In industrial and other similar installations requiring the use of group control of Switching operation, circuits, for socket outlets may be kept separate from fans and lights. Normally fans and lights may be wired on a common circuit, however, if need is felt separate circuits may be provided for the two. The load on any low voltage sub-circuit shall not exceed 3000 Watts. In case of new installation, all circuit and sub-circuits shall be designed by making provision of 20 percent increase in load due to any future modification. Power sub-circuits shall be designed according to the load .but in no case shall there be more than four outlets in each sub-circuits.

**13.9 Installation of Distribution Boards:**

13.9.1 The distribution fuse-boards shall be located as near as possible to the center of the load they are intended to control.

13.9.2 These shall be fixed on suitable stanchion or wall and shall be accessible for replacement off uses.

13.9.3 These shall be of either metal-clad type, or all insulated type. But if exposed to weather or damp situations, they shall be of the weather proof type and, if installed where exposed to explode to explosive dust, vapor or gas, they shall be of flame proof type.

13.9.4 Where two or more distribution fuse boards feed low voltage these distribution boards shall be:

- (1) Fixed not less than 2 m apart or,
- (2) Arranged so that it is not possible to open two at a time, namely they are Inter locked and the metal case is marked 'Danger 415Volts', or
- (3) Installed in a room or enclosure accessible to only authorized persons.

13.9.5 All distribution boards shall be marked 'Lighting', 'Power', as the case may be and also marked with the voltage and number of phases of the supply. Each shall be provided with a circuit list giving details of each circuit which it controls. And the current rating of the circuit and size of use-element.

13.9.6 Triple pole distribution boards shall not be generally used for final circuit distribution unless specific approval of Engineer-in-charge is obtained. In special cases where Use of Triple pole distribution boards are inevitable they shall be of H.R.C. fuse type only.

### **13.10 Wiring and Distribution Board:**

13.10.1 In wiring a branch board, total load of the consuming devices shall be divided, as far as possible, evenly between then number of ways of the boards leaving the spare circuit for future extension.

13.10.2 All connections between pieces of apparatus or between apparatus and terminals on a board shall be neatly arranged in a definite sequence following the arrangement of the apparatus mounted there on, a voiding unnecessary crossing.

13.10.3 Cables shall be connected to a terminal only by soldered or welded or crimped lugs using suitable sleeve, lugs or ferrules unless the terminal is of such a form that it is possible securely clamp them without the cutting away of cable strands.

13.10.4 All bare conductor shall be rigidly fixed in such a manner that a clearance of at least 2.5cm. is maintained between conductor of opposite polarity or phase and between the conductors and any material othe than insulating material.

13.10.5 If required, a pilot lamp shall be fixed and connected through on independent single-pole switch and fuse to the bus bars of the board.

13.10.6 In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable pace in between cables and shall also, if possible be fixed at the corresponding points on the switch board panel. The cables between these points shall be arranged to forma "U" or "S" shaped loop which shall be of such length as to allow the switch board panel to swing through an angle of not less than 90°.

### **14.0 Capacity of Circuits:**

14.1 Lights and fans may be issued on a common circuits and such a circuit shall not have more than a total of ten points of lights, fan and socket outlets, or a load of 800 watts whichever is less. The power circuit shall be designed with a maximum of two outlets per circuits generally when load is not known or specified. In non-residential buildings at important District centers however one outlet per circuit may be preferred. The circuit shall be designed based on the loading of the circuit where not specified the load shall be taken as 1KW per outlet, Where the load is more than 1 KW it should be controlled by a isolator switch or miniature circuit breaker.

### **15.0 Passing through Walls and Floors:**

15.1 Where conductors pass through walls one of the following methods shall be employed. Care shall be taken to see that wires pass very freely through protective pipe or box and that the wires pass through in a straight line without any twist or cross in wires, on other ends of such holes.

- (a) A teakwood box extending through the whole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cm. air space on three sides, of the casing conductor.
- (b) The conductor shall be carried either in a rigid steel conduit conforming to\*IS: 1653-1964 specification for Rigid Steel conduits of Electrical wiring (Revised) or a rigid non-metallic conduit conforming to\*18:25091963 specification for Rigid Non-Metallic conduits for Electrical Installations, or in a porcelain tube-of such size which permits easy drawing in, The end of conduit shall be neatly bushed with porcelain, wood or other approved material.

- (c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid steel conduit(see\*181653-1964)to a height not less than t.5 m above the floors and flush with the ceiling below. This steel conduit shall be earthed and securely bushed.

- 15.2 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be belt mounted and turned downwards, and properly bushed on the open-end.

#### 16.0 Fixing to Walls and Ceilings:

Plugs for ordinary walls or ceilings shall be of well seasoned teak or other approved hard wood-not less than 5cm long 2.5 cm. square on the inner end and 2cm.square on the outer end. They shall be cemented into walls to width 7.5 mm of the surface, theremainingbeingfinishedaccordingtothenatureofthesurfacewithplasteror lime punning.

- 16.1 Where owing to irregular crossing or other reasons the plugging of the walls or ceiling with wood plugs presents difficulties, the wood casing, wood batten, metal conduit, or cleat (as the case may be) shall be attached to the wall or ceiling in an approved manner. In the case of new building, wherever possible teak wood plugs shall be fixed in the walls before they are plastered.
- 16.2 To achieve neatness, plugging of walls or ceiling may be done by an approved type of asbestos, metallic or a fiber fixing plug.

#### 17.0 Branch Switches:

Where the supply is derived from a three-wire or four-wire source, and distribution is done on the two wire system, all branch switches shall be placed in the outer or live conductor of the circuit and no single-phase switch or fuse shall be inserted in the middle wire, earth or earthed neutral conductor of the circuit. Single- pole switches (Other than for multiple controls) Caring not more than15 amperes may be of tumbler type which shall be 'CN' when the handle known is down.

#### 18.0 Fittings:

Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings these must be free from sharp angles or projecting edges and such size that will enable them to be wired with the conductors used for the final sub Circuits without removing the boarding, taping or outer covering. As far as possible, all tubes and channels should be of sufficient size to permit' Looping back; of wires. Cables and flexible cords other than those designed for high temperature shall not be used for wiring fittings except for portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas filled lamps shall be adequately ventilated.

- 18.1 Where light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords may be subjected shall be as follows:

Nominal cross sectional Area cord.	No. & Dia. In mm of wires.	Max. Permissible Weight
mm <sup>2</sup>		Kg.
0.5	16/0.2	1.7
0.75	24/0.2	2.6
1.0	32/0.2	3.5
2.5	48/0.2	5.3

3.5	80/0.2	8.8
4	128/0.2	14.0

18.2 No inflammable shade shall form a part of light fitting unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

**18.3 Fitting of Wire:**

The use of fitting wire shall be restricted to the internal wiring and the lighting fittings. Where fitting wire is used for wiring, for the sub-circuit" loads shall be terminated in a ceiling zone or connector from which they shall be carried into the fittings.

**19.0 Lamp Holders:**

Lamp holders for use on brackets and the like shall be in accordance with\*IS: 1258 1967, specification for Bayonet lamp holders and all those for use flexible pendants shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where center contact Edison screw lamp holders are used, the outer or screw contacts shall be connected to the middle wire, the natural, and the earthed conductor. Of the circuit.

**20.0 Outdoor Lamps:**

External and road lamps shall have weather proof fittings of approved designs o as to effectively prevent the admission of moisture. An insulating distance piece of moisture proof materials shall be inserted in the fittings. Flexible cord and cord grip lamp holders shall not be used where exposed to whether. In verandahs and similar exposed situations where pendant are used, they shall be of fixed rod type.

**21.0 Lamps:**

All incandescent lamps, unless otherwise required and suitably protected, shall be Hung at a height of not less than 2.5 m above the floor level. They shall be in accordance with IS: 418:1957 specifications for Tungsten Filament General Service electric lamps.

**22.0 Fans, Regulators and Clamps:**

**22.1.0 Ceiling fans:**

Ceiling fans including their suspension shall conform to \*IS374-1960 specification for electric ceiling fans and regulators (Revised)& to the following requirements:

- (a) All ceiling fans shall be wired to ceiling roses or to special connect or boxes, to which fans rod wires shall be connected and suspended from hooks or shackles with insulators between hooks and suspension rods. There shall be no joint in the suspension rod, but if joints be avoidable then such joints shall be screwed to special couplers of 5mm minimum length and both ends of pipes shall touch together within couplers, and shall in addition be secured by means of split pins; alternatively, the two pipes may be welded.
- (b) Fans clamps shall be of suitable design according to the nature of construction of ceiling on which these clamps are fitted. In all cases fan clamps shall be fabricated from tested new metal of suitable sizes and they shall be as close fitting as possible. Fan clamps for reinforced concrete roots shall be buried with the casting and due care shall be taken that they shall serve the purpose. Fan clamps for wood beams shall be of suitable flat iron fixed on two sides of the beam and according to the size and section of the beam one or two mild steel bolts passing through the

beam shall. Hold both flat irons together. Fan clamps for steel joint shall be fabricated from test flat iron to fitting rigidly to the bottom flange of the beam. Care shall be taken during fabrication that the metal does not crack while hammering to shape. Other fan clamps shall be made to suit the position, but in all cases care shall be taken to see that they are rigid, and safe.

**Note:** All fan clamps shall be so fabricated that fans revolve steadily.

- (c) Canopies on top and bottom of suspension rod shall effectively hide suspensions and connections to fan motors, respectively.
- (d) The lead-in-wire shall be of nominal cross-sectional area not less than  $1.0\text{mm}^2$  With copper and  $1.5\text{mm}^2$  with Aluminum and shall be protected from abrasion.
- (e) Unless otherwise specified, the clear distance between the ceiling fan and the Floor shall be less than 2.75 m.

#### **22.2.0 Exhaust Fans:**

For fixing of an exhaust fan, a circular hole shall be provided in the wall to suit the size of the frame which shall be fixed by means of rag-bolts embedded in the wall. The hole shall be neatly plastered with cement and brought to the original finish of the wall. The exhaust fan shall be connected to exhaust fan point which shall be wired as neat to the hole as possible by means of a flexible, cord, care being taken that the blades rotate in the proper direction.

#### **23.0 Attachment of fittings and accessories:**

- 23.1 In other than conduit wiring, all ceiling crosses, brackets, pendants and accessories attached to walls or ceilings shall be mounted on substantial teak wood block twice Varnished after all fixing holes are made in them. Blocks shall be not less than 4cm.deep; Brass screws only shall be used for attaching fittings and accessories to their base blocks.

#### **24.0 Interchangeability:**

Similar part of all switches, lamp holders, distribution fuse-boards ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be inter changeable in each installation.

#### **25.0 Conduit Wiring System:**

- 25.1.1 **Type and size of conduit** –All conduit pipes shall be conforming to \*IS :1653-1964, furnished with galvanized or stove enameled surface .All conduit accessories shall be of threaded type and under no circumstances ping rip type or clamp type accessories be used. No steel conduit less than 16 mm in diameter shall be used. The numbers of insulated conductors that can be drawn in to rigid steel conduit are given in Table II.

- 25.1.2 **Bunching of cables**-Unless otherwise specified, insulated conductor of A.C. supply and D.C. supply shall be bunched 'in separate conduits.

- 25.1.3 **Conduit-joints**-Conduit pipes shall be joined by means of screwed couplers and screwed accessories only (\*IS :2667-1964).

Specification for Fittings for Rigid Steel Conduits for Electrical Wiring).In long distance stance straight turns of conduit, inspection type coupler sat reasonable intervals shall be provided or running threads with couplers and jam-puts (in the latter case the bare threaded portion shall be treated with anti-corrosive preservative) shall be provided. Thread on conduit pipes in all cases shall between 11mm to 27mm long sufficient to accommodate pipes to full threaded portion of couplers or accessories. Cut ends of



conduit pipes shall have neither sharp edges nor any buries left to avoid damage to the insulation of conductors while pulling them through such pipes;

**NOTE: 1** The table shows the maximum capacity of conduits for the simultaneous drawing-in of cables. The table applies to 250 volts grade cable. The column shaded 'S' apply to runs of conduit which have distance not exceeding 4.25 M between draw inboxes, and which do not deflect from the straight by angle of more than 15°. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15°.

**NOTE:2** In case of inspection type draw-in box has been provided and if the cables is first drawn through one straight conduit, then through the drawn box, and then through the second straight conduit, such systems may be considered as that of a straight conduit even if the conduit deflects through the straight by more than 15°.

**25.1.4 Protection against dampness** In order to minimize condensation or seating inside the tube, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects as far as possible.

**25.1.5 Protection of conduit against rust**-The outer surface of the conduit pipes, including all bends, unions, tees junction boxes, etc., forming part of the conduit system shall be adequately protected against rust particularly when such system is exposed to weather. In all cases, no bare threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.

**25.1.6 Fixing of conduit**-Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable wood plugs or any other approved plug with screws in an approved manner at an interval of not more than one meter but on either side of couplers or bends or similar fittings, saddles shall be fixed at a distance of 30cm. from the center of such fittings.

**25.1.7 Bends in conduit**-All necessary bends in the system including diversion shall be done by bending pipes, or by inserting suitable solid or inspection type normal bends, elbows or similar fittings; or by fixing cast iron inspection boxes whichever is more suitable. Conduit fitting shall be avoided as far as possible. On conduit system exposed to weather, where necessary, solid type fitting shall be used. Radius of such bends in conduit pipes shall be not less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet; the bend at the outlets not being counted.

**25.1.8 Outlets**-All outlets for fitting switches etc, shall be boxes, of suitable metal or any other approved outlet boxes for other surface mounting or flush mounting system.

**25.1.9 Conductors**-All conductors used in conduits wirings shall preferably be stranded. No single – core cable or nominal Cross-sectional area greater than 130mm<sup>2</sup> shall be enclosed in a conduit and used for alternating current.

**25.1.10 Erection and earthing of conduit**-The conduit of each circuit or section shall be completed before conductors are drawn in. The entire system of conduit and permanently connected to earth conforming to the requirements specified under pipe in a workman like manner for a perfect continuity between each wire and conduit. Gas or water pipe shall not be used as earth medium. If conduit pipes are liable to mechanical damage, they shall be adequately protected.

25.2 **Recessed Conduit wiring system with Rigid Steel conduits** – Recessed conduit wiring system shall comply with all the requirements for surface conduit wiring system specified in 6.5.1.1 to 6.5.1.10 and in addition, conform to the requirements specified in 6.5.2.1 to 6.5.2.4.

25.2.1 **Making of chase** –The chase in the wall shall be neatly made and be of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of buildings under construction, chases shall be provided in the wall, ceiling etc., at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish of the wall.

25.2.2 **Fixing of conduit in chase.** The conduit pipe shall be fixed by means of staples or by means of saddles not more than 6 Gcm. apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a Long radius which will permit easy drawing-in of conductors. All threaded joints of rigid steel conduit shall be treated with some approved preservative compound to secure protection against rust.

25.2.3 **Inspection boxes** –Suitable inspection boxes shall be provided to permit periodical inspection and to facilitate removal of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers.

25.2.4 **Type of accessories to be used**-All outlets such as switches and wall sockets, may be either of flush mounting type or surface mounting type.

25.2.5 **Flush mounting type**-All flush mounting outlets shall be of cast iron mild steel boxes with a cover of approved insulating material or shall be a box made of a suitable insulating material. The switches and other outlets shall be mounted on such boxes as would be approved. The metal box shall be efficiently earthed with conduit by an approved means of earth attachment.

(b) **Surface mounting type**-If surface mounting type outlet box is specified, it shall be of any approved insulating material and outlet mounted in an approved manner.

25.2.5 When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible conduits of the same size as the rigid conduit.

### 25.3 **Conduit Wiring System with Rigid Non-Metallic Conduits:**

Rigid Non-Metallic conduits are used for surface, recessed and concealed conduit wiring.

25.3.1 **Type and size**-All non-metallic conduits used shall conform to IS :2509-1963 and shall be used with the corresponding accessories (See IS : 3419~ 1965) specification for Fittings for Rigid Non-Metallic Conduits).

25.3.2 **Bunching off cables**- Conductors of AC supply and DC supply shall be bunched in separate conduits. The number of insulated cables that may be drawn in to the conduits are given in Table III. In this table space factor does not exceed 40 percent.

**TABLE-III MAXIMUM PERMISSIBLE NUMBER OF 250 VOLTS GRADE SINGLE-CORE CABLE THAT MAY BE DRAWN IN TO RIGID NON-METALLIC CONDUITS**

Size of cable

Nominal	No. Diameter in mm of wires	Size of conduit (mm)					
		16	20	25	32	40	50
Cross sectional mm <sup>2</sup>					(No. of cable Max)		
1.0	1/1.12*	5	7	13	20	-	-
1.5	1/1.40	4	6	10	14	-	-
2.5	1/1.80	3	5	10	14	-	-
	3/1.06*						
4	1/1.24	2	3	6	10	14	-
	7/0.85*						
6	1/2..80	-	2	5	8	11	-
	7/1.06*						
10	1/3.55+	-	-	4	7	9	-
	7/1.40*-						
16	7/1.70	-	-	2	4	5	15
25	7/2.24	-	-	-	2	2	6
35	7/2.50	-	-	-	-	2	5
50	7/3.00+	-	-	-	-	2	3
	19/1.80						

\*For Cu. Conductors only.

+For Al. Conductors only.

25.3.3 **Conduit joints**-shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain. Where there are long runs of straight conduit. Inspection type couplers shall be provided at intervals. For conduit fittings and accessories reference may be made to IS :3419-1965.

25.3.4 **Fixing of conduits** -The provision of 25.1.6 shall apply except that the spacing between saddles or supports is recommended to be 60 cm for rigid non-metallic conduits.

25.3.5 **Bends in conduit**- Wherever necessary, bends or diversions may be achieved by bending the conduits (See6.5.3.9) or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings

25.3.6 Conduit fittings shall be avoided, as far as possible on outdoor system.

25.3.7 **Outlets**-All the outlets for fittings, switches, etc. shall be boxes of substantial construction. In order to mini second sensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects etc. as far as possible.

25.3.8 For use with recessed conduit wiring system the provisions of 6.5.2.1 to 6.5.2.4 shall apply.

25.3.9 Heat may be used to soften conduit for bending and forming joints in case of plastic conduits. As the materials of them when heated, fitting of conduit in close proximity to hot surfaces should be avoided. Caution should be exercised in the use of the conduit in locations where the ambient temperature is 50°C or above Use of such conduits in place where ambient temperature is 60°C or above is prohibited.

## **PVC INSULATED AND P.V.C. SHEATHED ORT .R.S. WIRING SYSTEM**

### **26.0 GENERAL:**

This system of wiring, is suitable for l(w) pressure installation, and shall not be used in places exposed to sun and rain or in damp places, provided they are heat he din the special approved protective covering and well protected to with stand dampness.

### **26.1 Attachment to walls and ceiling:**

26.1.1 All cables on brick walls, stone or plastered walls and ceiling shall be run on well seasoned, perfectly straight and well seasoned, perfectly straight and well varnished on four sides, teak wood or any approved hard wood battens not less than 10mm finished thick, width of which shall be such as to suit total width of cables laid on the batten, prior to election, these shall be painted with one coat of varnish h or approved paint of color to match with surrounding. These battens shall be secured to wall and ceilings by flat head wood screw s to raw plug or Phil plug at an interval not exceeding

75cm. Wood plug can be used only with special approval of the Engineer-in-charge. The flat head wood screws shall be counter with in wood batten and smoothed down with file.

26.1.2 Where wiring is to be carried out a long the face of the rolled steel joints a wooden batten of adequate width shall first be laid on the same and dipped to it as in conspicuously as possible. The wiring should then be fixed to this backing shall be suitably bushed to prevent the abrasion of the cables.

26.1.3 Attachment to false ceiling In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-charge.

26.20 Link dips Only aluminum alloy clips/joint clips shall be used. The thickness shall be 0.32mm (30SWG) for lengths of 25mm to 40mm and 40mm (28SWG) for lengths of 50 mm to 80 mm. The width shall not be less than 8 mm in all these cases. Link clips/joint clips shall be so arranged that one single clip shall not hold more than two core or three single core TRS of PVC insulated and PVC sheathed up to 2.5 sq. mm above while a single clip shall hold a single twin core or two single core cables. The clips shall be fixed on varnished wood batten switch iron pin sand space at interval of 15cm both in the case of horizontal and vertical runs.

26.3.0 Bends in wiring The wiring shall not in circum stances be bent so as to for man abrupt right angle but must be rounded off at the corners to a radius not less than six times the overall diameter of the cable.

### **26.4.0 Protection of wiring from Mechanical Damage:**

26.4.1 In cases where there are chances of any damage to wiring, such wiring shall be drawn complying with all the requirements of conduit-wiring system.

26.4.2 Such protective covering shall in all cases be fitted on all down drops within 1.5 m from the floor, or from floor level up to the switch board whichever is less.

26.5.0 Passing through floors: All cables taken through floor shall been closed in heavy gauge steel conduit extending 1.5 to above the floor or up to the switch board whichever is less

and flush with the ceiling below or by means of any approved type of metallic covering. The ends of all conduits or pipes shall be neatly bushed with porcelain wood or other approved material. The conduit pipes, shall be security earthed.

26.6.0 Passing through walls when conductors pass through walls, any one of the following methods shall be employed. Care should be taken to see that wires pass very freely through protective pipe or box and that wires pass through in a straight line without any twist or crossing wires on either ends of such holes

- (a) A box of teak wood or approved hard wood extending through the hole. Thickness of the wall shall be buried in the wall and casings or conductors and casing or conductors shall be carried so as to allow 1.3 cm air space on the three sides of the casing or conductor.
- (b) The conductors shall be carried in an approved heavy gauge solid drawn or lap weld conductors in a porcelain tube of such a size. that it permits easy drawing in, the ends of conduit shall be neatly bushed with porcelain, wood or other approved material,

26.6.1 Where a wall tube passes outside building so as to be exposed to weather, the outer end shall be mounted and turned down wards and properly bushed on the open end. The conduit shall be neatly arranged so that the cables enter them without bending.

26.7.0 **Buried cables:** The TRS or PVC sheathed cable shall not normally be buried directly in plaster. Where so specified in the special specification they may be taken in teak wood channeling of ample capacity or conduit pipe buried in the wall.

26.8.0 **Stripping of outer covering.** While cutting and stripping of the outer covering of the cable care shall be taken that the sharp edge of the cutting instrument does not touch the inner insulation of the conductors. The protective outer covering of the cables shall be stripped off near connecting terminal and this protective covering shall be maintained up to the close proximity of connecting terminals as far as practicable. Care shall be taken to avoid hammering on link clips with any metal instrument after the cables are laid. Where junction boxes are provided they shall be made moisture proof with a plastic compound.

## 27.0 PAINTING WORK IN GENERAL:

27.1 **Paints:** paints, oils varnishes, etc, of approved make in original to the satisfaction of the Engineer-in-charge shall only be used.

27.2 **Preparation of surface:** The surface shall be thoroughly cleaned and dusted before painting is started. The proposed surface shall be inspected by Engineer-in-charge or his authorized agent and shall have received the approval before painting is commenced.

27.3 **Application:** Paint shall be applied with brush. The paint shall be spread as smooth & even as possible. Particular care shall be paid to rewrites, nuts, bolts and cover lapping. Before drawing cut, it shall be continuously stirred in the smaller containers with a smooth stick while it is being applied. Each coat shall be allowed to dry out sufficiently before a subsequent coat is applied.

27.4 **Scope:** Painting on old surface in indoor situations will not include primer coat except where specially mentioned in the schedule of work or special specification. However, where rust has formed on iron and steel surfaces the spots will be painted with one anti-rust primer coat.

27.5 **Precautions:** All furniture fixtures. Glazing floors, etc, shall be protected by covering. All stains, smears, polishing, dropping of every kind shall be removed. While painting of wiring etc. it shall be ensured that painting of wall ceiling etc. is not spoiled in any way.

**27.6 Painting of conduit and accessories:** After installation surface of conduit pipes, fittings switch and regulator boxes, etc. shall be painted with two coats of approved enamel paint or aluminum paint as required to match the finish of surrounding wall, trusses, etc.

**28. Link clip:**

The clip for batten wiring shall be of Aluminum conforming to I.S. specification No. 2415-1975.

## **APPENDIX-'A'**

**Important Clauses of Indian Electricity Rules, 1956. Following clauses of Indian Electricity Rules,1956 shall in particular be Taken care of in the execution of electrical works**

### **Clause No. Subject**

3. Authorization:
29. Construction, installation, protection, operation and maintenance of electric supply lines and apparatus.
31. Cut-out on consumer's premises.
32. Identification of earthed and earthed neutral conductors and position of switches and cut outs there in.
33. Earthed terminal on consumer's premises.
34. Handling of electric supply lines and apparatus.
41. Distinction of circuits of different voltages.
42. Accidental charge.
43. Provisions applicable to protective equipment.
44. Instructions for restoration of persons suffering from electric shock.
45. Precautions to be adopted by consumers, owners, electrical contractors, Electrical work men and suppliers.
46. Periodical inspection and testing of consumer's installation.
48. Precautions against leakage before connection.
50. Supply to consumers.
51. Provisions applicable to medium, high voltage installations. Point of commencement of supply.
58. Point of commencement of supply.
59. Precautions against failure of supply; Notice of failures.
61. Connection with earth,(low and Medium Voltage system.
64. Use of energy at high and extra-high voltage system.
67. Connection with earth.(High & Extra-high voltage system.
68. General conditions as to transformation and control of energy. All clauses under Chapter VIII on Overhead Lines.

137. Mode of entry.
138. Penalty for breaking seal.
139. Penalty for breach of rule-45.
140. Penalty for breach of rule-82.
141. Penalty for breach of rules.



## SPECIFICATIONS

All Specifications standard. Publication etc. specified mean the latest standards. Publication etc. pertaining to Electrical Installation and should conform to the following wherever applicable.

- 1) Indian Electricity Act, 1910 with it's amendments.
- 2) Indian Electricity Rules, 1956 and it's amendments.
- 3) Indian Electricity supply Act, 1948.
- 4) Regulation for Electrical Equipment in building by I.E.F. Landon.
- 5) The Factory Act.1948 and its amendments.
- 6) I.S.-732-1982Part-I,II&III code of practice for Electrical wiring and fittings in buildings for low and medium voltages.
- 7) I.S.4064-1967 H.D.Air break switches and fuses for Voltages not exceeding 1100 volts.
- 8) I.S.3043-Earthing code of practice for
- 9) I.S.-1554 Part-I-1970 PVC insulated (Heavy duty) Electrical Cables for working voltages up to and including 110 volts.
- 10) I.S.:694-1964 Part-II-PVC insulated cable with Aluminum conduits (revised) for voltages up to 110 volts.
- 11) I.S: 5908-1970-Electrical installations in buildings method of measurements of.
- 12) I.S.: 4237-1967 - General requirement for switch gear and control gear for voltage not exceeding 1000 volts.
- 13) IS:1653-1964-Rigid steel conduits for electrical wiring (revised)
- 14) IS: 2509-1973-Rigid steel conduits for electrical installation. (First revision).
- 15) IS: 1258-1967-Bayonetlamp holders (First revision).
- 16) IS: 418-1957-Tungston-Filament General service electric lamps (Third revision).
- 17) IS: 374-1966-Fans and Regulators. ceiling type, electric(second revision).
- 18) IS: 2667-1964-Fittings.for rigid steel conduits for electrical wiring.
- 19) IS: 3419-1976-Fitting for rigid non-metallic conduits (First revision).
- 20) National Electric Code, 1986.

**ANNEXURE I**  
**Abstract of the Wiring Rules of the Institution of  
Electrical Engineer**

Systems: All electrical system in which all the conductor and apparatus are electrically connected to a common source of supply.

- 1) **Earthed:** Effectually connected to the general mass of the earth. Solidly earthed means earthed without the intervention of a fuse, switch, circuit -breaker, resistor reactor or solenoid.
- 2) **Un insulated Conductor:** A conductor without provision, by the inter position of a di electric or otherwise, for its insulation from earth.
- 3) **Bare:** Not covered with insulating material.
- 4) **Dielectric:** any material which offers high resistance to the passage of an electric current.
- 5) **Bunch Conductor:** When more than one conductor is contained with in a single duct or groove or when they are run enclosed and not spaced apart from each other. .
- 6) **Points:** In wiring as per IS : 5908-1970-Method of measurements of electrical installation in buildings
- 7) **Switch board:** An assemblage pf switchgear with or without instruments, but the term does not apply to a group of local switches in a final sub-circuit where each switch has its own insulating base.

**Note:** In the electricity (Factories Act)special regulations, .1908 and 1944 the term "Switch board" includes "Distribution board".

- 8) **Single pole switch:** A switch suitable for closing and or opening a circuit on one phase or pole only.
- 9) **Linked switches:** A switch the blades of which are so linked mechanically as to make or break all poles simultaneously or in a definite sequence.
- 10) **Fuse Switch:** A switch the moving part of which carries one or more fuses.
- 11) **Three Wire System:**
  - a) **Outer Conductor:** Those between which there is the greatest difference of potential. This use of the word outer must not be confused with the use of the work when applied to the external conductor of a concentric main.
  - b) **Neutral Conductors:** The term includes the natural conductor of a 3 phase 4 wire system, the conductor of a single phase or d.c. installation which is earthed by the supply under taking (or. other wise at the source of the supply)and the middle wire or commoner turn conductor of a 3 wire d.c. or single phase a.c. system.
- 12) **Semi enclosed machine:** One in which the ventilating openings in the frame are covered with
  - a) Grids expanded metal or wire gauge, with openings of less than 1/4 inch so as to obstruct free ventilation.
  - b) Wire gauge, in which the openings are less than 1/41 inch but not less than

3/32 inch (diameter or width):  
c) Screens with smaller openings than the above.

**13) Totally-en closed Machine:**

One in which the enclosing case and bearings are dust proof and which does not allow circulation of air between the inside and outside of the case.

**14) Pipe Ventilated Machine:** An enclosed machine in which the frame is so. arranged that the ventilating air may be conveyed to. it through a pipe attached to. The frame, the ventilation Opening maintained by the fanning action produced by the machine -it self.

**15) Farced draught machine:** An enclosed machine in which the ventilating air supply is maintained by an independent fan external to. the machine it self.

**16) Protected Machine:** One having end shield bearings and in which there is free access to. The interior without opening doors removing

## SECTIONF-1A

### GENERAL REQUIREMENT

#### 1.1 Scope of works:

The work covered by electrical specification consists supplying and installing, electrical wiring system complete in strict accordance with this specification and the applicable drawing and subject to the terms and conditions of the contract. It includes..

- (a) Conduit a wiring system for fans, lighting points, bells, clacks sockets, etc. including fixing of lighting fixtures and fans etc. and miscellaneous points.
- (b) Conduit and wiring system for exhaust fans, power sockets.
- (c) Panel boards, distribution boards. Switch fuse units.
- (d) Complete power and lighting cable systems. Grounding system.
- (e) Grounding system.
- (f) Conduits system.
- (g) Street lighting system.
- (h) Other miscellaneous electrical work.

#### 1.2 Completeness of Contract:

Any work fittings accessories or apparatus which may not have been specifically mentioned in the specification but which are necessary in the equipment for efficient working of the plant should be deemed to be included in the contract and should be executed and provided by the contractors. All plant and apparatus should be complete in all the details, where such details, are mentioned in the specifications or not.

Three prints and one permanent negative of each of the finally approved drawings incorporating all the modifications proposed by the Department should be submitted. No modifications should be made in a drawing already approved by the Engineer-in-charge without his prior consent.

Approval of the contractor's drawing will not relieve the contractor of any part of his obligation to meet all the requirements of the contract.

#### 1.3 Guarantee:

The performance of all the equipment and the installations should be guaranteed at least for a minimum period of one year from the date of taking over the installation by the Department. All equipment must comply with the relevant IS-BS specifications.

#### 1.4 Inter change ability:

All corresponding parts of similar plant and equipment should be interchangeable in every way.

#### 1.5 Tools:

All special tools required for dismantling and assembly of the equipment covered by the contract shall be supplied as obligation under the contract.

A list of items to be supplied by the Contractor should be submitted along with the tender.

## **SECTIONF-2A**

### **Specifications for Electrical Installation in Buildings**

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

- 1.1 These specifications relate to the electrical installations in' the buildings of P.W.D. Electrical. The specifications cover general requirements to be fulfilled. These general specifications are supplemented by the specifications for the particular buildings separately attached.
- 1.2 These specifications are governed by the General conditions of the contract attached here to.

#### **1.3 APPLICABLE RULES AND REGULATIONS:**

- 1.3.1 Installation shall be carried out in conformity with the regulations for electrical equipment of buildings, published by the Institute of Electrical Engineers London(14thEdition1966 and as a mended up to date)here in after referred to as the I.E.E. wiring regulations. Where these specifications. Or the special specifications for the particular building attached here to are at variance with the I.E.E. regulations these specifications or special specifications the case may be, shall be followed. The installation shall also comply with the requirements of the Indian Electricity Act, 1910 as a mended up to date and rules issued here under and also the regulations for the Electrical Association of India. Where not specified otherwise, the installation should generally follow the Indian standard codes of practice and in their absence the relevant British Standard of practices. All the materials shall comply with the relevant Indian Standard of British Standard specifications.

#### **1.4 DEFINITIONS:**

- 1.4.1 The definitions of terms in the I.E.E. Regulations shall apply in general.

#### **1.5 DRAWINGS:**

- 1.5.1 The preliminary drawings only indicate the general scheme of requirement.  
The exact position of all points, control switch boxes, runs of wiring and/or conduits joint boxes, inspection boxes, mains, and sub-distribution boards, mains etc .shall be got approved by the Engineer-in-charge. All circuits shall be clearly numbered in wiring diagrams and building plans. The detailed design of a switch-board, special fixture or any other part of the electrical installation as may be called for by the engineer-in-charge shall also be supplied by the Contractor and should be got approved by the Engineer-in-charge. Three sets of completion drawings am wiring diagrams showing the installations as executed shall be supplied by the contractor along with the completion certificate.

#### **1.6 MATERIALS:**

All materials shall be new and of the best quality conforming to there levant I.S.B.S. specifications. They must be the products of reliable manufacturers of many years or standings. All like parts of materials shall be inter changeable. In case pf equipment such as

circuit breakers, switch fuses etc. a descriptive and illustrated literature shall accompany the tender. The names of manufacturers of various materials shall be furnished in proforma in Appendix. Samples of materials wherever required should be approved by the Engineer-in-charge before use in the installation. One set of such approved samples shall be deposited with the Engineer-in-charge. All materials shall be rust-proof or rendered rust proof by application of suitable paints. The supply of all equipment, switch gears etc. shall be complete with accessories. Fittings and mountings as may be required for their proper performance, and as specified in the relevant IS-BS Code of Practice and standards.

**1.7 WORKMANSHIP:**

- 1.7.1 Good workmanship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view to ensure fine workmanship the tenderers shall employ licensed 'wiremen, with an experience of not less than 5 years in the type of work' they are engaged. The work should be done under supervision of licensed Electrical Supervisors with good educational qualifications and considerable experience.
- 1.7.2 Tenderers shall furnish the names of Supervisor and their wiremen who will be engaged in this work with details of their experience.

**1.8 CO-OPERATIVE WITH CIVIL AND OTHER WORKS CONTRACTORS:**

- 1.8.1 The tenderer, after the award of the contract shall co-operate with the civil and other contractors and shall co-ordinate his work with the work of other contractors with the least amount of dislocation and interference to the other works. Tenderers shall go through the drawings carefully and shall furnish the Engineer-in-charge with all the details of openings in the walls etc. they may be required for concealing any of the electrical equipment or accessories. Where the contractor fails to furnish such information as may be required for the purpose of concealing the equipment etc. they shall be made at his (Contractor) cost and expense. Any alteration to parts of the building shall be carried out with prior permission of the competent authority. All chases of the structural work shall be made good at the contractor's expense and brought to the original shape finish and concur.

**1.9 TESTING:**

The electrical contractor shall be completely responsible for testing and commissioning of those installations covered by these specifications in compliance with the standard procedure, in/obtaining permission of the Government Electrical Inspector. Any modification which is demanded by Government Electrical Inspector shall have to be carried out within the scope of the contract. The contractor shall submit four copies of drawings of installations as per regulations for shall be provided by the contractor for carrying out the installation work. All tests shall be carried out in the presence of the Engineer-in-charge or his authorized representative and his approval obtained for the test results.

**1.10: COMPLETION CERTIFICATE AND MAINTENANCE GUARANTEE:**

- 1.10.1 After the completion of the installation and testing, the contractor should furnish a certificate in the Proforma in Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 24 months from the date of taking over by the Department. During the period of guarantee all defects in material or in workmanship shall be rectified or replaced free of cost to the Department.

**1.11 TENDERER'S ABILITY:**

1.11.1 In order to enable the Department to assess the ability of the tenderer to execute the work. The tenderer shall furnish evidence of his experience and capacity to carry out the work of the magnitude and nature.

**1.12 RATES:**

The rates of items shall include all taxes, transport, loading and unloading charge and all such charges that may be required to be incurred for the supply and installation of the materials at site. The rates shall be firm and variations in the market are not entertained. Break up figures as required in the schedule of work shall also be furnished. As far as possible indigenous materials only shall be included for supply. Where it is unavoidable, imported items may be included and tenderer should clearly indicate materials, quantity, rate and amount of these items.

**1.13 STORAGE SPACE:**

No covered storage space will be provided by the Department. The contractor has to make his own arrangement. However, the Department may give an open space near the place of execution where the contractor can build his own stores for executing the work.

**1.14 DEPARTURE FROM SPECIFICATIONS:**

The tenderer should clearly indicate departure, if any, from the specifications with reasons for the same.

## 2 TECHNICAL SPECIFICATION:

### 2.1 Supply System:

The wiring installation shall be suitable for 3 phase 4 wire.400-440V50 cycles system of supply. Colour code of different phase shall be followed as per standard.

### 2.2 Wiring for Lights and Fans:

2.2.1 Looping system of wiring shall be adopted. No joints shall be made at inter mediate runs of cables and where they are unavoidable. Such joints shall be through approved mechanical connections.

#### 2.2.2 Point wiring:

Point wiring shall consist of the branch wiring from the switch board together with the controlling switch or push as far as and including the ceiling rose or any other approved connector or socket. Outlets. In case of more than one light being controlled by one switch, the wiring up to the ceiling rose of the first light including the switch shall be considered as a 'Primary point'. Loop wiring from light shall be considered as a 'Secondary' point and rates shall be quoted separately, including final connections to fixtures and plugs Conductors:

No conductor for final sub circuit wiring for light and socket outlets. shall have across-section less than that of 2.5sq.m(aluminum).

**Loading:** No final sub-circuit radiating from the fuse board of a sub-distribution board and wires with 25 sq.m. (Al.) cable shall carry more than 10 lights, fans or socket outlets or ai connected load of 800 watts whichever is greater. The allowing wattages may be assumed for estimating the load on each sub-circuit unless otherwise known or specified. Incandescent Lamps 100watts Ceiling fans 60watts 5-A Socket Outlets (lighting) 100 watts 4.ft.fluorescent tube. 50watts 5ft.fluorescent tubes.100watts In each sub-distribution board at least one way preferably two ways shall be left spare for future requirement. A wiring diagram giving the details of the exact utilization of the ways shall be prepared and fixed in the sub distribution board itself or any other easily accessible place. The ways of sub-distribution boards shall be accordingly numbered.

#### Local Control Switches (General):

Local control switches for circuit carrying not less than 5-5 shall be piano type and shall conform relevant I.S. Standards. The switch shall be 'ON' when the knob is in the down position. All local control switches shall be connected in the phase or live conductor only and not in the neutral conductor, switches shall be fixed in iron clad box and shall be so placed that the center of the switch box is 1.3 meter. from the finished floor level unless otherwise stated. All switch boxes shall be provided with

1/8"thick Perspex cover fixed to the switch box with chromium plated counter sunk screws (brass).

Switches (Two ways):

- (a) Two way switches shall be piano type single pole, (double throw, 250V, suitable for flush mounting and of 5 A capacity as per the drawings. All switches shall be recessed in an embedded metal box.
- (b) Each box shall have suitable outlet for fixing conductors directly.
- (c) Each box shall have Perspex cover painted inside with the wall colour, if required.
- (d) Each switch shall be suitable for the position in a corridor stair way wiring.

Switch Boxes (General):

Electrical circuits shall be written suitably on the cover of all switch boxes as approved by the Engineer-in-charge (Elect) when ever different phase are terminated in a switch box Bakelite partition shall be provided. Each case shall be provided with a G.I. Earth stud nut and washers for earth connectors.



**Ceiling Rose:**

Ceiling rose shall be used on circuits having a voltage normally exceeding 200 V. Only one flexible cord shall be attached to a ceiling rose. Only 3-pin 5 A socket outlet shall be provided in lighting circuits. All socket outlets shall be provided with a control switch and they shall be mounted in switch boxes in an approved manner.

**Fittings:**

These shall be of approved type as specified in the tender schedule. The sub circuits leads should terminate in a ceiling rose or conductor in the fitting and internal connection made there from. Wherever these fitting are suspended they shall be done so through the conduits and ball and socket joints. All fittings shall be grounded by a G.I. conduct or not less than 16S.W.G.

**Flexible wiring:**

Flexible cords of not less than 23/0076 size shall be used. The weight of suspension shall be governed by I.E.E. Regulations.

**Ceiling Fans:**

All ceiling fans shall be wired to ceiling rose and suspended from a hook shackle or clamp and insulated from the same. All joints in the suspension road shall be Screwed and secured. By means of split pins. The fan clamps supplied by the Contractor shall be suitable for the ceiling or proof member as the case may be. For concrete roofs, fan hooks shall be buried in concrete during construction in an approved manner and securely bound to there in for cement.

**Conduits and earthing :**

All conduits feeding lighting and fan circuits shall be provided with earth continuity G.I. conductor as specified for power wiring. All conduits shall be as specified for power wiring.

**2.3.1 Point wiring:**

Point wiring for power shall be as defined under section 2.2.2 and shall include the switches and sockets.

**2.3.2 Loading:**

All distribution board for power wiring shall be not less than 15 A per way. Loading per way shall not exceed 'normally 100watts. The following loads  
May be assumed if exact figures are not known.

3-Pin 15A Outlets    100 Watts

3-Pin 5A Outlets    100 Watts

**2.3.3 Wiring for Motors:**

2.3.3.1. Final sub-circuits loop in motors shall be connected to separate ways of the Distribution board even if the current in the sub-circuit is less then 15A. No looping is permissible.

2.3.3.2 All wiring shall be carried in H.G. conduit as specified in I.S. specification for gauge for different sizes of conduits.

When the motor is resiliently mounted flexible conduit with approved adopters shall be used for the last few feet. Where cables are used sufficient loop shall be left.

2.3.3.3 All switch fuse units controlling circuits feeding motor shall be provided with H.R.C. fuses or as specified.

2.3.3.4 The frame of every motor and its association control gear shall be earthed by two separate and distinct connections to earth connector shall be capable of carrying 3 times the rating off use or 1.1/2 time the setting or the circuit breakers but in no case less than No.8S.W.G.or 7064"or equivalent cross section of copper. Where practicable, the earth connections shall be visible for periodical inspection. Gas or water pipes shall not be used for earth connections.

**2.3.3.5 Socket Outlets and Control Switches 5A and 15A:**

All socket outlets shall be of 3 pin type, the third pin being connected to the earth stud of nearest distribution board by separate earthing wire. The socket shall conform to I.S.:1293/1938, single pole, piano type. Each socket outlets shall be provided with a control switch of appropriate rating and as specified. The switch and socket shall be mounted inside the iron clad box provided with 1/8" Perspex cover as directed by the Engineer-in-charge or as specified in schedule. of quantities. In sides witch box ample space shall be available around switches for connecting wires to switches. All socket outlets for power shall be mounted at the skirting level unless otherwise specified or as directed by the Engineer-in-charge.

The three phase plug receptacles shall have their earth terminals connected by independent earth wires to ring main earth strips on the building. In buildings where explosion proof fixtures are installed single phase plug receptacles as well as light points shall be connected to ring main ground bus installed in the building by separate earth wires of approved size."

Socket outlet shall have some provision not to receive the matching plug unless the grounding pinisin correct position. The grounding pin of the plug shall make the contract first and break the contract last at the time of. Inserting or removing the plug respectively.

The grounding terminal shall be connected to the enclosed metal body by Providing G.I. stud. Nut washers welded to the box.

Each unit shall be suitable for flush mounting as required and indicated in the applicable drawings. Combination unit of socket outlet and switch shall be complete with necessary internal wiring. The witch/socket shall be mounted on M.S. bracket enclosed in a box.

**2.4 Conduit Wiring:**

2.4.1 Where conduit wiring is adopted the type and size of the conduit shall be as indicated in the drawing. The minimum of the conduit shall be 19 mm.

2.4.2 The contractor shall thoroughly study the' structural arrangements of the buildings and wherever, necessary shall in consultation with Department's representatives at site, make suitable adjustment sin the cable routings, earthing arrangements, and location boxes, fitting etc. with a view to avoid interference with any part of the building, structure, equipment or any other work in the building or to effect any improvement in the arrangement.

**2.4.3 Protection of conduit again strust:**

Conduit shall be given two coats of oxide paint before they are placed in position. All exposed conduit shall be planted after installation with the colour as approved by the Engineer-in- charge. This do not apply to galvanized conduit.

**2.4.3. A Protection against in sects and damp:**

In order to minimize cocensation or sweating inside the conduit, system shall be properly drained any ventilated in such a manner a stop revent then try of insects.

2.4.4 Conduit shall first be installed as a complete system without cables and shall be continuous from outlet to outlet from fitting to fitting and mechanically and electrically connected to all boxes and fittings.

## **2.5 SPECIFICATION FOR POWER CONTROL AND TELEPHONE CABLES:**

### **I. SCOPE:**

- i. The specifications cover the supply and installation of medium voltage power and control cables either in ground or trench depending on the conditions at site including accessories for the same. The work in general, consists of supplying, laying, jointing terminating and connecting all.1.1.KVAPLSTS PVC power and control cables.
- ii. The contractor shall supply all accessories including jointing and terminating materials, compound, tapes supporting materials, cleats cables lugs, concrete stabs, bricks sand, cable markers etc., as required to make the installation work including digging and back filling of the trenches as required.

### **II. SPECIFICATION:**

- i. All power cables to be supplied mentioned as 'APLSTS' in the Schedule should be mass impregnated, non draining, paper insulated lead sheathed. Double steel tape armored and must comply with the latest ISIBS specifications.
- ii. All cabling materials such as cable compound, cable lugs, tapes shall be of approved quality acceptable to the type recommended by the manufacturer of the cable for which it is used and approved by the Department.
- iii. Installation of all equipment shall also conform to the applicable Codes and practice as per the IS and shall be executed to comply with the late Indian Electricity rules as regards the safety. Earthing of equipment and other essential provisions specified there in.
- iv. Only approved make of cable shall be used. ICC and CCI will be preferred.
- v. The cables shall generally be laid as per is Code of practice.

### **III. GENERAL RULES CABLE LAYING:**

- i. Installation shall be carried out in a neat. Work men like manner by skilled experienced and competent workmen in accordance with the standard practices.
- ii. Cables shall be laid preferably in one piece length to avoid joints.If straight joints are found necessary. These can be introduced with prior approval of the Engineer-in-charge. The cost of the straight joint however. shall not be borne by the Department. But in no case joint shall be within the conduit G.I.pipe and duct.
- iii. Proper care should be exercised in handling the cable to avoid formation of kind etc. and should it become necessary a cable be bent to a radius not less than 20 times the overall diameter of the cable.
- iv. Method of installation, routing of cable etc. shall in every case be subject to the Department's approval and the contractor shall modify and or certify at no extra cost to the Department any portions of the installation which do not meet with the Department's approval. All damages to the civil and other work son this account shall be made good by the contractor at no extra cost to the Department.  
  
The electrical contractor while notifying the building contractor for such work shall furnish the proper drawings, fully explaining the work involved or indicate at site actual work to be carried out as may be required by the building contractor. The electrical.of any such work as soon as the, electrical work with respect to the same has been completed.
- v. Where cables pass through hume pipes. Contractor shall fix hard wood bushed round the cables at the ends of hume pipes. Where the cables pass through the floors or chamber sand in such other situations as the Engineer shall require. the contractor

shall seal cable holes in a manner approved by Engineer-in-charge. Where cable pass through roads nallahs, etc. cables must be protected by Class 'A' Hume pipe of diameter not less than 6"(15cms.)

- vi. The cable route shall be the shortest and these shall be minimum interference with built up areas, lawns etc.
- vii. Care shall be exercised for providing suitable props for supporting other service lines on earth at the time of excavation. Where cutting of a lawn become inevitable it should be with the approval of the Engineer-in-charge.
- viii. Excavation of the trenches shall be executed with vertical sides and the trenches shall be kept as straight as possible. The exact location of each trench shall be served by the Engineer-in-charge .On the site when the contract is in a position to commence ach portion of the work.  
The trench shall be not less than ½ meter wide and 90 cms deep. If more cables are to be laid. The width should be suitably increased.
- ix. After the cables are laid. The trench shall. be filed in layers, the earth in each layer being well rammed by spraying water and consolidated and sufficient allowance made for settlement. The extra earth over the trench should be removed from the place of trench to a place as decided by the Engineer-in-charge at site.
- x. Ends of cables shall be properly sealed to prevent entry of moisture prior to installation.
- xi. Where it is as specified as ½ core cables the ½ core shall be a neutral conductor having reduced section.
- xii. For all multi core cables each core and tails shall be brought out, marked and or coloured in on approved manner.
- xiii. Cables termination shall be done with suitable compression brass glands in the case of PVC cables and cast iron triturating boxes in the case of APLSTS cables. The arm or should be connected to the, right main earth in building with duplicate earth wires as per the relevant IS/BS specification.  
The core insulation over each conductor shall however be retained throughout the run of the conductor up to the end where lugs shall be fitted there on for connections. The lugs shall be fitted by means of approved solder and flux such as a leap, and Eyre NO. Liberally used. The joint shall be mechanically strong and pressure tested.

## **2.6 DISTRIBUTION BOARDS ANDPANELS:**

### **General Requirements:**

- 2.6.1 All distribution panels shall comply with I.E.E. Rules 60-61.A clear distance of 0.91 b meter in front of the switch board shall be kept. Where bare connection so attachments are provided 8t the back of the 'Switch board the space behind the panel shall be either less than 0.299 meter or more than 0.762 main width there shall be a passage way from the further rest outstanding part of any attachment or conductor. If the space behind the switch board exceeds 0.70 main width there shall be a passage way from either end of

the switch board clear to height of 1.928 m width 0299,m. All wiring connection shall be made neatly and securely.

2.6.2 For corciots carrying more than 10Amps.tinned cable sockets shall be used.

All connections shall be so made as to form their own diagram Circuit shall be clearly numbered to correspond 1 wiring diagram Names of the distribution boards shall be painted as directed by the Engineer-in-charge. All the switch fuse unit sand isolators D.Bs. shall be complete with earthing studs lugs neutral bar link, H.R.C. fuses and of approved make.

2.6.3 Skeleton type panels shall have a rigid formwork adequately braced and Supported. The switch and distribution boards shall be neatly arranged in the frame. The details of the frame work and the arrangement of switches shall be got approved by the Engineer-in-charge before the panel is fabricated:

2.6.4 All cubical type panels shall have rigid supporting frames adequately braced over which sheet metal shall be nearly secured. All switches, distribution boards etc. shall be neatly arranged en the panels and all connections made from the back of switches. The panels shall be rendered dust and vermin- proof. The interior of the panels shall not be accessible to unauthorized persons.

2.6.5 The recess type boards shall be embedded in wall in a cupboard with a metal hinged door with locking arrangement. In all recessed conduit work all distribution boards shall be recessed. When recessing is not possible, free standing panel may be provided as approved by the Engineer-in- charge.

2.6.6 All individual components i.e. switch fuse units D.Bs. etc. shall be connected by earth continuity wire of appropriate size with the main earth bus of the panel D.H. etc. The panel switches or').Bs. shall be earthed by the less than 2 distinctive paths to earth. Earthing of metallic parts of exposed metal shall not be effected through any structural metal work which houses the installation. Where metallic parts are not required to be earthed and are liable to become a live should the installation of the contractor become defective such metallic parts shall be separated by durable non-conducting material from any structural work.

(a) Power panels shall be 3 phase, 4 Wire, 400.230 volts for the Distribution of 3 phase. 01' single phase power loads. Lighting panels shall be 3 phase 4 wire 400/230 volts for single phase lighting load distribution on all 3 phase.

(b) All panels shall be done or protected front type with no mechanical or electrical defects.

(c) Bus bars shall be of electrolytic copper or aluminum as specified and the properly tinned sizes as indicated on applicable drawings as required.

(d) AU knock outs for branch circuits, conduit entries shall be drilled in Und filled as required. For lighting panels the top and bottom cover plates shall be removable type.

(e) Main disconnect device for all panel boards shall be of switches of Disconnect type and of the size as indicated shall be mounted directly below the panel or through ha short thread conduit of required size.

(f) The main disconnect for all panel boards shall have an entry suitable for PVC arm or educable from bottom.

(g) All panel boards shall be provided with an earthing terminal and lug for connection to the grounding system.

- (h) Temperature rise of all electrical parts shall not be more than 3000 with full load amperes at room temperature. Buses shall be securely supported so that ordinary vibrations will not cause any of the parts to become loose.
- (i) All barriers and supports of current carrying parts shall be of moisture resistant insulating material and shall not be adversely affected by arcing.
- (j) The locations of panels shown in the drawings are only tentative.  
Panels may be located at a place approved by the Engineer-in-charge.
- (k) All civil works connected with fixing such as grouting chasing and making good shall be the tenderer's responsibility.
- (m) Wires adequate capacity with proper size of lugs shall be used for inter connections.
- (n) Panel should be self supported on angle channel iron frame work. It should be preferably of bolted construction in case of transportation and flexibility. The frames shall be of the required size for the mounting of the equipment on it. It shall be bolted or grouted rigidly after leveling and alignment.
- (o) The cupboard and D.B. should be of such size so to be accommodated in the excising room as per I.S. rules and I.S. codes of practice for installations of medium voltage switch gear.
- (p) Fabrication drawing showing the detailed dimensions and panel and its components indicating the framework. Earthing positioning of switches. D.Bs. cable boxes. Adopter chambers etc. shall be furnished to the Engineer-in-charge for his approval. All material to be got approved by the Engineer-in-charge. Panel should be guaranteed for satisfactory operations for a period of one year after handing over.
- (q) The panel should be painted with anti corrosive paint suitable for humid and salty atmosphere on two coats of primer.

**Switch Gears, Powers Panels D.B. and S.F.Us.**

2.6.8 The main bus bar shall have continuous current rating as specified with neutral bar having half of full load rating of the phase bus bar. The sizes of the bus bars shall be selected that the current density in bar does not exceed 150 amps. Per sq.m. for copper. The length of bus-bar chamber should be as suitable length to fix all the switches etc. as per the prevailing standards, clear spacing of two adjacent buses shall be 11/2" minimum bar should be taped all along with colour coated 11KV grade PVC tape. The maximum internal of support for each unsupported length shall exceed 600 mm.

The bus bar shall be of copper/aluminum and fabricated to the relevant standards specification. In case aluminum bus bar is used special with high conductivity aluminum bus bar alloy E91 C frame conforming to E.S.S.2898 shall be used. The current density shall not exceed 800 A per sq. inch. Hylam barriers will be provided over the joints to prevent any short circuit.

The bus enclosing shall be made out not less than 16 gauges M.S. sheet construct on with angle iron support. All inter connections between bus bars S.F. Us. and D. Bs. Shall be of adequate size and details of such inter connection shall be furnished to the Engineer-in-charge for his approval.

The bus bar shall be air insulated extensible type rectangular one. The bus bars chamber shall be dust tight by providing gaskets secured properly so as to tender it vermin proof.

The Combination Fuse-switch unit should comply with IS 4064 BS 861 and BBS

2510 wherever applicable. It should be suitable to accommodate High Rupturing Capacity Cartridge Fuse links complying with IS 2208 or BS88 and having a certified rupturing capacity of not less than 35 MVA at 440 volts (AC5 duty). The switch gear (panels, D.Bs. etc.) shall be installed generally as per IS- Part-I3072 and as specified and shown in drawings. All fuse switch units shall be provided with non-deteriorating HRC fuse links complying with IS 2208-1962 and having rupturing capacity of 35 MVA at 415 volts. or as specified.

All switches above 60 amps. rating shall be provided with suitable size adapted boxes. All switches mounted on the top of the bus bars shall be provided with detachable type reverse entry adapter boxes. Suitably engraved labels shall be provided for each circuit as well as for the board.

A meters sector switches and LMH metre shall be provided where specifically mentioned. Small wiring for the inter-connecting shall be colour coded and provided with numbered fuses for easy identification of circuits.

- (a) The distribution boards should be totally enclosed metal clad complying with B.S.214. The M.S. sheet steel enclosures for recessed D.Bs. shall be of not less than 14 gauge.
- (b) The D.B. shall be with hinged door and the locking arrangements as approved by the Engineer-in-charge.
- (c) All the components shall be closed in the enclosure. The mounting of D.B. shall be got approved by the Engineer-in-charge before carrying out the installation.
- (d) The D.Bs. shall have proper size cut outs for conduit entry or cable entry as required and these shall be made on site.
- (e) Adequate spacing shall be provided inside the D.Bs. for easy removal of the fuses and carryout the interconnection:
- (f) A set of insulating barrier shall be provided between incoming Breakers switches and fuses.

#### **Switch fuse Units:**

- (a) All the D.P. T.P. and TP.N. switch fuse units shall be totally enclosed iron clad quick make, quick break type to best Indian make conforming to the I.S. or B.S. 3185 specifications. All the switch fuse units shall have mechanical inter lock with a door, so that the door can not be opened when the switches are in 'ON' position. The switches should be of double break isolation type to ensure safety.
- (b) Each TP. & TP.N. switch fuse unit shall be earthed with two distinct earth connections.
- (c) Suitable insulator shall be provided. Between phase. (d) There shall be suitable neutral link in the fuse box.
- (e) All T.P. & T.P.N. switch fuse units shall be rated for 500 volts and D.P. (required for single phase supply) and S.P.N. switches for 250 volts.
- (f) The H.R.C. cartridge fuse shall conform to H.S.88(1952). The O.C.Bs. A C B shall be suitable for 400/440 volts 3 phase 50 cycle supply capable of interrupting a fault MVA of not less than 31. The circuit breaker shall conform to the BSS-936-1940 BSS 3659 with such tripping arrangement as may be required under special specifications for the building. Efficient and fool proof mechanical inter locking shall be provided for the safe operation and maintenance. The rate shall be inclusive of the first filling of oil.

#### **2.7 Instrumentation:**

The instruments and meters wherever necessary shall be housed in special sheet steel box located between switch fuse units and bus bar chambers. The instruments etc. shall be mounted on the hinged cover with their dial flushed. All instruments shall have protective H. R. C. Fuse links. All inter connections and small wiring shall be neatly dressed arranged and duly coloured for easy identification of circuits. Meters shall be provided as required in

the Schedule, Meters shall be dead head and be suitable for 400/440volt 3 phase 4 wire 50 cycle(in balanced load)supply.

Each selector switch shall be 3 point and of minimum 250 volts grade with silver tipped contacts suitable for metering circuits, current transformers shall be of 5VA burden and commercial metering accuracy. Indicating lamps shall be panel mounting type preferably of 250 V grade. Every unit shall be rewired and interconnected to the system for its required Indicating performance. Indicating lamps shall have independent circuit fuse.

#### **2.8 FIXING OF LIGHTING FIXTURES:**

1. Location of fixtures their manner of fixing mounting height etc. are indicated in relevant drawing. Actual location and levels shall however be arrived at site inco-ordination with other service etc and prior approval of the Engineer-in- charge regarding the actual location. Manner of fixing shall be obtained before the work is taken up in hand.
2. In all cases the contractor shall provide necessary interconnection wiring earthing painting etc. all necessary for complete installation. The contractor shall also test and commission the fixtures during completion of the work.
3. The inter-connections wiring from the light outlet point up to the fixture shall be carried out by means General arrangement of fixture layout is indicated in drawings. Care shall be taken to see that all light fixtures are in a row in a room or particular area, are in absolute line and plumb and are symmetrically disposed with respect to finished surfaces of walls columns beams etc. of flexible copper wire of section not less than 1.5mm.
4. All fixture suspended by means of conduits shall be done with all and socket joints or as per approved design.

#### **2.9 Telephone System:**

1. Empty conduits shall be done, recessed or exposed to surface along with pull boxes, junction boxes and telephone outlet boxes, in areas and location as indicated in the relevant drawing as per materials and methods as described in regard to conduits under section "Wiring in Conduits" except the G.I. pull wires of gauge not less than 20 SWG shall be kept pulled through conduits in all sections so that in future telephone wires can be pulled easily.
2. Location shown on the drawing are approximate and final location shall be decided in the field by the Engineer-in-charge



**SECTION G**  
**SPECIFICATION FOR EARTHING**

**1. Installation of Earthing Plates:**

All installation of earthing shall conform to Indian Electricity Rules, 18.3043 latest edition and IEE. The copper earth plates should be tinned before installation. The earth plates of copper 60cm x60cm x3.515~ m thick size as mentioned in the schedule be –in separate pits at least 150cms to 300cms. Away from the building at a depth necessary to reach moist earth surface but with a minimum depth of 2.5 mtr from the finished ground level up to the top vertical dodge of earth electrode. The earth plate shall be thoroughly cleaned to remove all dirt from the surface and be tinned properly for electrical contact with the main ground. Each earth pit should be provided with 38 mm. dia G, I. pipe 2.5Mts. long or more depending up to the depth of pit, put over the vertical edge of earth plate' (with top end of pipe provided with a closed to coupler). Alternative layers of salt and coke shall be provided surrounding the plate. The pits shall be filled when the plates are in position and with the approval of Engineer-in-charge.

To facilitate watering the pit, a concrete compartment should be made with funnel with mesh and cover plate as per rules provided in ISI regulation. The masonry end users shall be 258mx25cmx25cm (deep) with C.I. lid of 23cmx30 cms size .After installation, the earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer-in-charge, three days after the completion of earthing work, and the value should conform to regulations.

Signature of Contractor/s

# RAJKOT MUNICIPAL CORPORATION

BANDHKAM SHAKHA

ABSTRACT FORM

**NAME OF WORK :- Construction of Retaining Wall, Compound Wall with Gate, Trimix and landscaping work at Garbage Transfar Station Near K.S. Diesels in Ward No. 6 (3rd ATTEMPT)**

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
<b>CIVIL WORK</b>					
<b>Excavation work</b>					
1	Excavation of Foundation in Hard Murrum from 0.0 mtr. to 1.50 mtr depth including lifting and laying in 90 mtr. lead area as instructed	1006.00	cu.mt.	103.50	104121.00
2	Excavation of foundation in soft rock from 0.0 mtr. To 1.50 mtr. Depth including lifting and laying in designated place as instructed.	500.00	cu.mt.	220.80	110400.00
3	Excavation of foundation in hard murrum from 1.51 mtr. To 3.00 mtr. Depth including lifting and laying in designated place as instructed.	195.00	cu.mt.	117.30	22873.50
4	Excavation of foundation in soft rock from 1.51 mtr. To 3.00 mtr. Depth including lifting and laying in designated place as instructed.	195.00	cu.mt.	255.30	49783.50
5	Filling of plinth with using excavated usefull material partly and remaining murrum to be brought from out side in layer of 0.23 m thick including murrum and sprinkling of water , compaction etc. complete.	1894.00	cu.mt.	147.00	278418.00
6	Filling of Plinth in layers of 0.23 m thick including murrum and sprinkling of water, compaction etc. complete	13000.00	cu.mt.	279.00	3627000.00
7	Rolling work with Roller 8-10 Ton capacity over metalling murrum for soling or single layer arriving proper compaction (with watering)	5368.00	Sqm	7.50	40260.00
8	Removal of Excavated Stuff and laying within RMC limit as directed by Engineer-in-Charge	347.00	cu.mt.	171.00	59337.00
9	Supply & Laying of Machine crushed agregate of size 25-38 mm	828.00	cu.mt.	971.00	803988.00
<b>Dismantalling work</b>					
10	Dismantalling of RCC and disposing it as directed by engineer-in-charge.	50.00	cu.mt.	518.00	25900.00
11	Removal of Cement / Lime Plaster and disposing it as directed by engineer-in-charge.	500.00	sq.mt.	17.30	8650.00
12	Dismantelling of masonry and disposing it as directed by engineer-in-charge.	100.00	cu.mt.	242.00	24200.00
<b>Concreting work</b>					
13	Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.	530.00	cu.mt.	3913.20	2073996.00
14	Foundation filling with CC work in proportion of 1:3:6 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.	5.00	cu.mt.	3360.00	16800.00
15	providing and laying Ready Mix cement concrete M-300 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in FOUNDATION FOOTING base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.	389.00	cu mt	6127.00	2383403.00
16	providing and laying Ready Mix cement concrete M-200 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in FOUNDATION FOOTING base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.	44.00	cu mt	5431.00	238964.00
17	providing and laying Ready Mix cement concrete M-300 and curing complete including cost form work and excluding the cost of reinforcement for reinforced concrete work in WALL base of columns and Mass concrete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including rate of labour material etc.	403.00	cu mt	7402.00	2983006.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
18	Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of formwork and excluding the cost of reinforcement for reinforced concrete work in COLUMN UP TO ALL FLOOR all heights for any cross sectional area including providing & mixing plasticiser and Water Proofing Chemical in cement including scaffolding etc. and complete rate of labour material etc.	21.00	cu mt	5959.00	125139.00
19	Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for PLINTH BEAMS having any cross sectional area for all floors all heights including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.	18.00	cu mt	5419.00	97542.00
20	Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for BEAMS having any cross sectional area for all floors all heights including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.	4.00	cu mt	6019.00	24076.00
21	Providing and laying Ready Mix cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. work in SLAB having thickness of 10 cm and up to 15cm Complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.	6.00	cu mt	5738.00	34428.00
22	Providing and laying Ready Mix cement concrete M-300 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. work in BOTTOM SLAB having thickness of 10 cm and up to 15cm Complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.	828.00	cu mt	4946.00	4095288.00
23	Providing and laying controlled cement concrete M-200 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for R.C.C. LINTEL/ RUNNER WORK having thickness of 10 cm and up to 15cm for all floors all heights including scaffolding etc complete including labour and material etc.	14.00	cu mt	5538.00	77532.00
24	Providing and laying controlled cement concrete M-200 for RCC CHHAJJAS not exceeding 10 cm thickness including finishing the exposed surfaces with cement mortar 1:3(1-cement, 3-fine sand)to give a smooth and even surface including centering formwork and curing etc. all heights including scaffolding etc. complete including rate of labour material etc.	2.00	cu mt	5723.00	11446.00
<b>Reinforcement work</b>					
25	Providing TMT Round Bar(IS 1786 FE500/500D) reinforcement for R.C.C.work including bending, binding and placing with wire in position complete including all cost.	50500.00	Kg	59.00	2979500.00
<b>Masonry work</b>					
26	Brick Masonary work using conventional burnt clay building bricks having crushing strength not less than35 kg/sq cm foundation and plinth and all above in super-sub structure for all for including scaffolding including labour and material costing in cement mortar 1:6(1, cement and 6, fine sand)	158.00	cu mt	4196.00	662968.00
<b>Plaster work</b>					
27	Cement Plaster Work 1.2 cm average thick using Cement:Mortar in proportion of 1:3 rough cast (without Niru Finishing) for All Floor and for any height.	143.00	sq mt	168.00	24024.00
28	20mm thick Sand Face Cement Plaster Work in which 1 plaster in proportion of 1:3 and 2nd plaster in proportion of 1:2 using Cement:Mortar with Spot finishing etc. complete (Note: Before carrying out Plaster work on RCC, required tipping work should be carried out as instructed)	1530.00	sq mt	217.00	332010.00
29	Decorative Groove Work in Cement Plaster	336.00	R mt	33.00	11088.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
<b>Flooring work</b>					
30	Supply & fixing of Vitrified flooring work (1st quality)	13.00	Sqm	564.00	7332.00
31	Supply & fixing of Vitrified for skirting work (1st quality) width upto 10 cm.	20.00	R.mt.	83.00	1660.00
32	Providing and laying Ceramic tiles 6mm thick in flooring on a bed of 12mm thick cement mortar 1:3 (1-cement : 3-coarse sand ) finishing with flush pointing in Colour cement.	18.00	Sq mt	638.00	11484.00
33	Supply & Fixing of Glazed tiles (1st Quality) of required size in Cement Roga and joints to be filled with white cement after 12mm rough plaster in proportion of 1:3	50.00	Sq mt	426.00	21300.00
34	Supply, Fixing & Polishing for Granite Flooring work 18mm thick & 200 mm Base of Cement:Mortar in proportion of 1:3 and Spread Cement Slurry on Bed With Quarter Round Edge.	36.00	sq mt	2743.00	98748.00
35	Supply & Fixing of Granite Stone (Telephone Black Color) on wall after rough cast Cement Plaster in proportion of 1:3 and fixing grainage in Cement Paste	11.00	sq mt	2502.00	27522.00
36	Supply, Fixing & Polishing of Kota Stone Flooring work thickness 20-25 mm to be fixed in Cement:Mortar 1:3 and liquid Cement With Quarter Round Edge as instructed	3.00	sq mt	932.00	2796.00
37	Supply, Fixing & Polishing of Kota Stone work on Wall/Riser thickness 20-25 mm to be fixed in Cement:Mortar 1:3 and liquid Cement With Quarter Round Edge as instructed	2.00	sq mt	878.00	1756.00
<b>Painting work</b>					
38	Applying two coats of Birla (White Cement based) or Asian ( acrylic lapy putty) or equivalent & two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.	143.00	sq mt	47.40	6778.20
39	Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on wall/ Ceiling surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth. (with two nos of Prime Coat)	143.00	sq mt	126.00	18018.00
40	Finishing wall with weather proof exterior emulsion paint on wall surface (two coats) to give an required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials.etc complete (with Base Coat)	2530.00	sq mt	99.00	250470.00
41	Enemal painting on door/window, iron door, iron grill or woodwork two coat with base Coat as directed by EIC/ consultant.	11.00	sq mt	113.00	1243.00
<b>Door-Window work</b>					
42	Supplying and fixing alluminium frame 62.50 x 25 mm. size and 37.50 x 18mm size shutter with sliding frame 2-track of standard compeny etc. complete.	11.00	sq mt	4088.00	44968.00
43	Providing and fixing IS marked Flush Door 35mm thk. wooden beading of ghana wood and size 35x6 mm, including Laminated sheet of decorative type with high density protective surface and riverce side adhesive bonding quality and 1 mm thickness and Polishing of beading area with approved brand of stainless steel fixtures like Aldrof, tadi, Stopper, Handle, buffer, magnetik catcher and eye piece of ss, ss butt hinge of approved quality and ss screw etc complete. (35 mm thickness excluding lamination thickness)	10.00	sq mt	2824.00	28240.00
44	Providing and fixing FRP frame size 125x65 mm and 35mm thick FRP shutter with wood grain raised paneled design finish shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filed up with injected polyurethene foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & fintures. The whole FRP frame & shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkali. Rates are to be inclusive of S.S hinges with fastener sleeve & alluminium fixtures & fastenings.	8.00	sq mt	4189.00	33512.00
<b>Fabrication work</b>					

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
45	Grill work for doors - windows etc. as per design on site with fitting & fixing.	195.00	kg	81.00	15795.00
46	Iron work as per drawing and instruction including all	2042.00	kg	86.00	175612.00
47	Wire fencing work using new wire (Single row)	2347.00	Rmt	16.90	39664.30
48	CRS Pipe Work as per drawing and instruction including all as directed by EIC/ consultant.	675.00	kg	85.00	57375.00
<b>Water-Proofing work</b>					
49	<p>Providing and laying integrated cement based proprietary water proofing treatment of required thickness over the roof including 20mm thick cement mortar 1:4 and china Mosaic fitting and finally finishing the surface with white cement slurry and sloping out terrace slabs with following specification laid to required slope not flatter than 1:80(the thickness of water proofing treatment near rainwater outlet or the lowest point of the finished slope shall not be less than 65mm, including treating the vertical surface of the parapet wall upto 30cms. height above finished level of terracing including finishing the top with joint less water proofing plaster, curing, testing etc. complete(area in plan shall only be measured and rounding, vata etc. shall not be measured). Including ten years performance of guarantee bond to be given on stamp paper. (No extra shall be paid for variation in thickness).</p> <p>(a) Applying and grouting a slurry coat of neat cement using 2.75 Kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS-2645 over the RCC slab including cleaning the surface before treatments.</p> <p>(b) Laying cement concrete using broken brick bats 25mm to 100mm size with 50% of cement mortar 1:5(1-cement;5-coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 over 20mm thick layer of cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound confirming</p> <p>(c) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound confirming to IS: 2645.</p> <p>(d) Finishing the surface with 20mm thick joint less cement mortar of mix 1:4(1-cement;4-coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surface with trowel with neat cement slurry and making of 300 x 300mm square.</p> <p>(e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing for final test. All above operations to be done in order and as directed and specified by the Engineer in charge.</p>	36.00	sq mt	710.20	25567.20
<b>Ancillary work</b>					
50	Supply & Fixing of 80mm M-30 Grade cement concrete rubber mold paving inter locking paving block (Grey colour) after beding of Bhogavo sand in line and CC on the edge in proportion of 1:2:4 with curing etc. complete	120.00	sq mt	580.00	69600.00
51	Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length,30cm height and 15cm thick of M250 grade concret as per approved design and including excavation for fixing in proper line and level,filling the joint with C:M 1:3 (1cement:3fine sand) etc complete.	336.00	Rmt	311.00	104496.00
52	રીજીડ પી.વી.સી. પાર્થપ આઈ.એસ.આઈ. માકાવાળા ૬ કિ.ગ્રા./ઓ.સે.મી. પ્રેસરના જરૂરી કવર સાથે સખાય યંત્રે જરૂરી કીટીંગ સાથે, જરૂરી સોલવન્ટ સીમેન્ટ વાપરીને જોઈન્ટ કરી આપવાનું મજૂરી કામ. ...સદર... ૧૧૦ મી.મી. આઉટર ડાય. ના પાર્થપ.	74.00	Rmt	227.00	16798.00
53	APPLYING AND MAKING OF FLOTTER AND BROOMING ON RCC SLAB AND VARING COAT	4137.00	Sq.mt.	63.00	260631.00
54	Supply & Fixing of Steel characters	300.00	Sq.inch	69.00	20700.00
55	Numbering on Building / Quarters (Painting work) including all material and labour charge	100.00	Character	10.00	1000.00
<b>PLUMBING WORK</b>					

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
56	Providing and fixing wash down water closet(european type WCpan) with sit cover including jet spray and stop cock	4.00	Nos.	2230.00	8920.00
57	Providing and fixing Urinal of approved quality including connection with trap and with integral longitudinal flush pipe and brass screw down stop tap.(A) 15mm dia.(A) Squating plate pattern white earthenware 550mm x 300mm.	4.00	Nos.	1212.00	4848.00
58	White porselin wash basin 560/410mm indian make c.i. bracket with fitting cromium plated topes 25cm plastic waste pipe and 12mm pillar cock with comp.	2.00	Nos.	1397.00	2794.00
59	Providing & Fixing Brass cock screw down bolt type 15mm dia. fitting with fixing.	8.00	Nos.	250.00	2000.00
60	Providing and fixing pillar tap, capstan head, screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.	2.00	Nos	356.00	712.00
61	flushing valve brass cromium plated push cock of handle type with flushing supply and fixing	4.00	Nos.	690.00	2760.00
62	Brass wheel valve 40mm dia. fitting with fixing.	2.00	Nos.	940.00	1880.00
63	Providing laying and jointing in true line and level 32mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	8.00	R mt	139.00	1112.00
64	Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	6.00	R mt	107.00	642.00
65	Providing laying and jointing in true line and level 15mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	6.00	R mt	84.90	509.40
66	Providing, fixing, jointing, testing and commissioning of PVC pipe with rubber ring joint confirming to IS : 13592, and confirming to IS : 4985 (Pipe Class III - 6 kg / sq.cm) cut to required lengths including all necessary fittings and specials such as bends, junctions offsets, access pieces (plain or door). Fixing at wall / ceiling level supported by G.I. clamps, hangers etc. duly epoxy coated. Cutting, chases/holes in floors / walls / slab. The piping should be complete with P or S trap as req. (B) 75mm dia.	20.00	R mt	107.75	2155.00
67	Providing, fixing, jointing, testing and commissioning of PVC pipe with rubber ring joint confirming to IS : 13592, and confirming to IS : 4985 (Pipe Class III - 6 kg / sq.cm) cut to required lengths including all necessary fittings and specials such as bends, junctions offsets, access pieces (plain or door). Fixing at wall / ceiling level supported by G.I. clamps, hangers etc. duly epoxy coated. Cutting, chases/holes in floors / walls / slab. The piping should be complete with P or S trap as req. (C) 50mm dia.	4.00	R mt	50.75	203.00
68	suply and fixing 110 mm PVC cowel	4.00	Nos.	75.00	300.00
69	suply and fixing 75 mm PVC cowel	4.00	Nos.	58.00	232.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
70	Providing SW gully trap CI grating brick masonry chamber and water tight Ci cover with frame of 300mmx300mm size inside with stander weight (B) 150mmx100mm size P or R type	2.00	Nos.	1194.00	2388.00
71	Providing and fixing PVC SWR Nahni trap IS 14735 for drain-100mm diameter with jali of the following nominal diameter of self cleansing design with C.I scread down or hinged grating including the cost of cutting and making good the walls.	6.00	Nos.	351.00	2106.00
72	Providing and laying (to leve or slope)and jointing with stuff mixture of cement mortar in proportion 1:1 solt glazed stoneware pipes following normal diameters incl. testing of pipes and joints complete(B) 150mm stoneware pipes	20.00	R mt	232.00	4640.00
73	Providing and laying (to leve or slope)and jointing with stuff mixture of cement mortar in proportion 1:1 solt glazed stoneware pipes following normal diameters incl. testing of pipes and joints complete(B) 100mm stoneware pipes	20.00	R mt	162.00	3240.00
74	Providing and laying CC 1:5:10(1,cement : 5,fine sand : 10draded stone aggregate 40 mm normal size) Bedding for Stoneware Pipes of following internal diameter with necessaty formwork and curing complete (A) 150mm pipes	20.00	Rmt	150.00	3000.00
75	Providing and laying CC 1:5:10(1,cement : 5,fine sand : 10draded stone aggregate 40 mm normal size) Bedding for Stoneware Pipes of following internal diameter with necessaty formwork and curing complete (A) 100mm pipes	20.00	R mt	89.10	1782.00
76	Constructing brick masonry chambrs for underground C I Inspection Chamber and bends with bricks having crushing strength not less than 35kg/sq cm in C.M. 1:5 C I cover with frame (light duty)45x610mm internal dimention total weight of cover with frame to be not less than 38kg RCC top slab with CC 1:2:4 mix (1,cement : 2,coarse sand: 4,graded aggregate 20 mm size) foundation concrete 1:5:10 inside plaster 15mm thick with C.M. 1:3 finish smooth with finishing coat of neat cement on walls and bed concrete etc (inside dimentions 500mm x 700mm x & 450mm deep) for single pipe lines with one of two inlets.	1.00	Nos.	3245.00	3245.00
77	Providing erecting and fixing double coated syntex equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings and connectionetc comp. on teraace	1000.00	Ltrs	4.60	4600.00
78	providing and fixing 600mmx450mm bevelled edge mirror of superior glass mounted of 0.6 mm thick A C sheet or plywood sheet and fixed to wooden pluge with CP brass screws and washers	2.00	Nos.	582.00	1164.00
79	Providing and fixing PTMT liquid soap container 109mm wide, 125mm high and 112mm distance from walof standard shape with bracket of the same material with snap fitting of approved quality and colour weighing not less than 105 gms.	2.00	Nos.	137.85	275.70
80	RCC precast frame with supply, fitting, fixing with complete as per specification 10ton size 550/550/90mm.	2.00	Nos.	466.00	932.00
81	RCC precast cover with supply, fitting, fixing with complete as per specification 10ton size 550/550/90mm.	2.00	Nos.	891.00	1782.00
<b>Electric Work</b>					
82	Supplying and erecting approved make Octagonal pole made from HR sheet steel. The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/2633/4759, suitable suspend local wind speed with integral Junction box consist of terminal plate of min 6mm Hylam sheet, standard profile 35mmX7.5mm Din-Rail for MCB Mounting, stud type terminal and arrangement for cable termination to be erected on foundation as per details given by manufacturer considering site requirement. (E) (C) 5 Mtr. Long 70 mm Top X 130 mm bottom dia, 3 mm thickness with 200mmX200mmX12mm base plate, 4-M16 Bolts and 600mm long J-Bolt.Approx Pole weight 46 kg	8.00	Ea.	8030.00	64240.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
83	Providing and erecting street light pole bracket comprising main B Class GI pipe of 4.2 cm/require outside dia. complete with suitable B Class G.I sleeve tubing of approx. 45cms.length and suitable for 76.5 mm / 80mm. / require size pole top having sufficient fasteners for fixing the brackets and having spread of 1 mtr. length with suitable rise as per site condition & suitable welded stiffener reducer and nipple with check nut complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms. [A] Single Arm bracket 1 Mtr	6.00	Ea.	716.00	4296.00
84	Providing and erecting street light pole bracket comprising main B Class GI pipe of 4.2 cm/require outside dia. complete with suitable B Class G.I sleeve tubing of approx. 45cms.length and suitable for 76.5 mm / 80mm. / require size pole top having sufficient fasteners for fixing the brackets and having spread of 1 mtr. length with suitable rise as per site condition & suitable welded stiffener reducer and nipple with check nut complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms. [B] Double Arm bracket 1 Mtr	2.00	Ea.	968.00	1936.00
85	Providing 1:2:4 cement concrete foundation & 70 % PCC from bottom including excavation for the pole of size 45 x 45 x 100 cm. Deep in below ground level with plinth of 45 cm x 45 cm (or 45 cm dia x 45 cm) high upper ground level with necessary curing and finishing in approved manner. ( for 4 & 6 mtr pole)	8.00	Ea.	944.00	7552.00
86	Miniature circuit breaker single pole 6A to 32A suitable to operate on 240 V A.C. system and having overload and short circuit tripping elements and breaking capacity 10 KA to be erected in existing M.S. box confirming to IS 8828/1996 with ISI mark. Cat. II	8.00	Ea.	315.00	2520.00
87	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminium housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses with company mark/name engraved or embossed 160 to 270 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K,Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.( fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (A) Street Light (IP-65), Surge protection -4KV integral and ,Light must have 440VAC line supply with over-voltage protection. (iii) above 24 to 36 watts	10.00	Ea.	2455.00	24550.00
88	Supplying & erecting XLPE (IS : 7098)(I)-88 ISI marked unarmoured Copper cable 1.1 KV. Grade with necessary clamps on wall of following size. (E) 3 core 2.5 sqmm	80.84	Rmt.	158.00	12772.72
89	Supplying & erecting approved make IP 55 grade Company fabricated Timer Panel of following capacity for switch On-Off street lights on time scheduling basis made from 16G CRCA sheet duly epoxy power painted inside and outside with hinged doors and locking arrangement consisting of suitable size of 4 Pole MCB and 4 pole contactor (cat-III)with analog time switch, auto manual switch of same make and suitable input and output Bakelite terminals and with door earthing approved by Engineer in charge. (C) 63 Amp	1.00	Ea.	19930.00	19930.00
90	Providing and erecting XLPE (IS : 7098)(I)-88 ISI marked armoured cable multistrand Copper conductor for 1.1 KV to be laid on wall with necessary clamps or in existing cable trench / pipe at road crossing or floor of following size of cables. (A) 4 core 2.5 Sq. mm	200.00	Rmt.	314.00	62800.00
91	Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene(conforming to IS 14930 II )with necessary connecting accessories of same material at required depth in existing trench for laying of cable. below ground / road surface for enclosing cable (A)50 mm outer dia	200.00	Rmt.	72.00	14400.00



Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
92	Providing and erecting iron clad cable route marker duly marked with ELE.CABLE of size 23 cms. X 12 cms. Flushed with ground in cement foundation as directed by Engineer in charge.	5.00	Ea.	280.00	1400.00
93	Soldieries crimping type Copper lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. (A) 4 Sq. mm	48.00	Ea.	9.00	432.00
94	Providing and erecting Hot Deep Galvanized iron wire 8 to 16 S.W.G.	50.00	Kg	90.00	4500.00
95	Supplying & erecting earth pit of minimum bore dia.150mm size approved make Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free hot dipped G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanising, Inner pipe dia of 25 mm having 200-250 Micron galvanising, connection terminal dia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications with chamber and heavy duty cover.(approved make OEM has to submit test certificate) & having back filling compound of (B) Inner chemical (CCM Compound)- Resistivity:- 0.2 @/ meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphar content:- <2%(C) Back fill Compound :- Earthing compound should be capable to retain moisture for long time Necessary test report must be submitted. (a) For Electrical Installation up to 440V in normal soil Length of pipe - 1 Mtr Back filling compound - 1 Nos Bag of 15 Kg.	1.00	Ea.	5363.00	5363.00
<b>Total Amount</b>				₹	<b>22,954,120.52</b>
<b>Say Amount</b>				₹	<b>22,954,121.00</b>

## Schedule of Testing

Sr No	Materials	Test to be carried out	Frequency of tests	Acceptance criteria
				As per IS 456-2000
1	Water	Chemical analysis	Once for approval of source and Subsequently in case of doubt.	TDS:(mg./liter) 2000 Sulphate(asSO <sub>4</sub> : (mg./liter) 400 P.H.value6.5 to8.5 Chloride:(mg./liter) 1000 for plain concrete, 500 for RCC work Organic matter : 2000 Inorganic Matter: 3000 Fluoride: (asF)mg/L1.5 Magnesium: (as Mg) mg/L100 Alkanity: (asCaCo <sub>3</sub> ) mg/L600

For 53 Grade As per IS 12269-1987(Reff-1999)

2	Cement	[a]	Consistency	One test for every 50 M.T. and on Change of brand	[a]	Above 30%				
		[b]	Setting time		[b]					
		[i]	Initial		[i]	Not less than 30				
		[ii]	Final		[ii]	Not More than 600				
		[c]	Fineness by specified Surface		[c]	2250 Cm <sup>2</sup> /g for O.P.C				
		[d]	Compressive Strength, N/mm <sup>2</sup> not less than		[d]	IS 269	IS 8112	IS 12669		
					1989	1983	1987			
					Gr.33	Gr43	Gr53			
		[i]			3Days	[i]	16			
		[ii]			7Dyas	[ii]	22	33	37	
		[iii]			28Days	[iii]	33	43	53	
		[e]			Soundness by lechatel	[e]	Not More than10mm			

					As per IS 380-1970	
3	Sand	[a]	Silt content	On test during working season. Minimum two tests. i.e. prior to Monsoon and after monsoon (Minimum one test for 150 m3 of material used)	[a]	Upto3%
		[b]	Gradation,fineness Modulus		[b]	As per standard fixed under specification. Looking to thepurpose of theuse. For - Concrete – IS383-1970- Masonry Mortar–IS2116-1980-Plaster–IS 1542-1992
		[c]	Zoning tests		[c]	Ordinary sand falling under zone(iv) shall not be Used.
		[d]	Sp.Gravity		[d]	As per IS 383–1970
		[e]	Water absorption		[e]	As per IS 383–1970

					As per IS 380-1970	
4	Kapchi and Metal (For RCC Work)	[a]	Specific gravity	2 tests preseason i.e. prior to and After monsoon/ minimum one test for 150 m3 of material used.	[a]	Up to 3.00 generally
		[b]	Absorption		[b]	Upto1.5%
		[c]	Impact value%		[c]	Not more than 45% or as per IS 2386(part-I)-1986
		[d]	Flaking Index		[d]	Not more than 25% or as per IS 383-1970
		[e]	Gradation percent Passing of IS sieve		[e]	As per IS 2386(part-I)-1986

					As per IS 1077-1992	
5	Bricks	[a]	Water Absorption	One set of test every 50,000 bricks And on change of brand mark	[a]	Not more than20%
		[b]	Efflorescence		[b]	Moderate
		[c]	Compressive strength		[c]	Minimum range 35 Kg/Cm2 individual result may Fall below up to.
		[d]	Dimension		[d]	Length 452 to 468 cm Width 216to224cm Depth136to144 cm
						OR requirement as per IS 1077-1992

				As per IS 1786-1985		
6	Reinforcement	[a]	Ultimate tensile strength	Each set of test for each diameter of Bars for every 40 M.T. Or part there of.	[a]	42Kg/mm <sup>2</sup> for M.S. bars and 49.50Kg/mm <sup>2</sup> for Twisted &TMT bars
		[b]	Yield stress(Proof stress)		[b]	26Kg/mm <sup>2</sup> for M.S. bars and 42.50Kg/mm <sup>2</sup> for Twisted &TMT bars
		[c]	Elongation		[c]	23% of M.S. bars and 14.50% for twisted &TMT bars(CTD)

				As per IS 456-2000			
7	C.C.Cubes	Ordinary & controlled concrete (IS 456/2000) quantity of concrete. Number in work of Cu mt of sample.		Strength of cubes for different grade at 28days.			
				[1]	Grade M100-100Kg/cm <sup>2</sup>		
				[2]	Grade M150-150Kg/cm <sup>2</sup>		
				[3]	Grade M200-200Kg/cm <sup>2</sup>		
		Qty	No of	[4]	Grade M250-250Kg/cm <sup>2</sup>		
		Cumt	Sample	[5]	Grade M300-300Kg/cm <sup>2</sup>		
		1-5	-				
		6-15	1				
		16-30	2				
		31-50	2				
		51&Above	2				
One additional sample for each 50 Cumt or part thereof.(One sample consists of 3 cubes minimum)							

### Properties of Soil Physical

8	Soil	1	Grain size analysis	As per Site Condition	1	AS per IS.2720(Part-IV)-1985(Reaff-2006)
		2	Attrberg limits	As per Site Condition	2	AS per IS. 2720(Part-V)-1985(Reaff-2006)
		3	Proctor	As per Site Condition	3	AS per IS.2720(Part-VII)-1980(Reaff-2002)
		4	Shrinkage limit	As per Site Condition	4	AS per IS.2720(Part-VI)-1972(Reaff-2001)
		5	Swelling index	As per Site Condition	5	AS per IS.2720(Part-XL)-1977(Reaff-2002)
		6	Swell pressure	As per Site Condition	6	AS per IS.2720(Part-XLI)-1977(Reaff-2002)
		7	Box Shear	As per Site Condition	7	AS per IS.2720(Part-XIII)-1986(Reaff-2002)
9	Bela Stone	[a]	Water Absorption	2 set of test per working seasons i.e. Prior and after Monsoon.	[a]	Not more than5%
		[b]	Crushing Strength		[b]	As per IS 1123-1975 or its Latest Version
		[c]	Specific Gravity		[c]	As per IS 1128-1975 or its Latest Version
10	Teakwood	[a]	Colour	One Test		As per IS 4970
		[b]	Hardness			
		[c]	Density			
		[d]	Moisture			
		[e]	Porosity			
		[f]	Soft			
		[g]	identification			

					Test Method as per IS 1708(Part I to XVIII)				
11	Seasoned and Chemically Treated Wood	[a]	Moisture Content						
		[i]	Doors and windows			Zone-I	Zone-II	Zone-III	Zone-IV
		[ii]	50 mm and Above in Thickness			10	12	14	16
		[iii]	Thinner than 50mm			8	10	12	14
					Average moisture content of all the sample from A lot shall be within +3 percent. Samples with 45% of the maximum permissible moisture content for the particular and use and locality indicated above.				
	[b]	Absorption of the Preservative Windows	One Sample from Lot		Preservation		Recommended Absorption Kg/m		
	[a]				CTC/ LTC		80		
	[b]				CCA		4		
	[c]				RCC		4		
	[d]				CCE		6.5		
[e]				CZC		6.5			
[f]				Coppet Naphtenate Abietate		0.4			
[g]				ZineNaphttenate Abietate		0.6			
[h]				PCP		5			
[i]				Boric Acid		5			

12	Crushed Metal & Kapchi (For Road Work)	1	Gradation	1 Test for 100Cumt	1	A per IS 2386(Part-1)1986
		2	Flakiness	3 Test for 101 to 500 Cumt	2	Not more than 15% for WBM Not more than 25% for RCC wearing surface Not more than 25%for bituminous wearing surface
		3	Impact Value	5 Test for 501 to 1500 Cumt	3	Not more than 35% for WBM Not more than 45% for RCC wearing surface Not more than 30% for bituminous wearing surface
		4	Soundness	7 Test for 1501 to 5000 Cumt	4	Not more than 20% for WBM Not more than 12 %for bituminous wearing surface
		5	Specific Gravity		5	Up to3.00%
		6	Water absorption		6	Up to1.50%

						Tolerance As per IS Code Provision	
13	G.I. pipes Medium GradeISI	1	15mmdia	Weight Test (Field Test)	1	1.22Kg/ Rmt	
		2	20mmdia	Weight Test (Field Test)	2	1.58Kg/ Rmt	
		3	25mmdia	Weight Test (Field Test)	3	2.44Kg/ Rmt	
		4	32mmdia	Weight Test (Field Test)	4	3.14Kg/ Rmt	
		5	40mmdia	Weight Test (Field Test)	5	3.61Kg/ Rmt	
		6	50mmdia	Weight Test (Field Test)	6	5.10Kg/ Rmt	
		7	65mmdia	Weight Test (Field Test)	7	6.51Kg/ Rmt	
		8	80mmdia	Weight Test (Field Test)	8	8.47Kg/ Rmt	

14	C.C. Blocks	[a]	Block Density	10000-1 set of Sample	[a]	Minimum C.C. block density1800 kg/ Cumt
		[b]	%Water Absorption	10000-1 set of Sample	[b]	Average Value of % Water Absorption<10%
		[c]	Compressive	10000-1 set of Sample	[c]	Minimum Average compressive strength more Than 5.0 N/Sq mm strength
		[d]	Dry Shrinkage	20000-1 set of Sample	[d]	Average Value of Dry Shrinkage<0.06%
		[e]	Moisture Content	20000-1 set of Sample	[e]	Average Moisture Movement-0.09%

Test requirement as per IS : 155622: 2006

15	Vitrified Tiles	1	Water Absorption(% By mass)	One test of every 10000 no of Tiles Used in change of brand mark	1	Gr.Bla (WA≤0.08%)				
		2	Modulus of Rupture (MOR)N/mm2		2	(Gr.Bla) Average 47/N/mm2 individual 44 N / mm2 minimum.				
		3	Breaking Strength(N)		3	(Gr B la Thickness >7.5 mm For 1500N,minimum				
		4	Thermal Shock resistance		4	(Gr.Bla) Should not show any visible defect when subjected to test method IS 13630 ( Part-5) 2006.				
		5	Scratch Hardness of Surface on Mohr's Scale		5	(Gr.Bla)6,minimum				
		6	BulkDensity		6	(Gr.Bla) 2.2 gm/ cc, minimum				
		7	Dimension (LXW)		7	(Gr.Bla)				
		[a]	The devlationin Percent of the average size for each tile (4side) from the work size.		[a]	±0.1%				
		[b]	The devlationin percent of the average size for each tile (4side) from the work size of the 10 test specimens ( 40 Sides).		[b]	±0.1%				



8	Straightness of sides (facial Sides) the maximum deviation from straightness in percent related to the corresponding work size		8	(Gr.Bla) ±0.1%			
9	Rectangularity the Maximum deviation from Rectangular it yin percent related to the corresponding work size		8	(Gr.Bla) ±0.1%			
10	Surfaceflatness		10	(Gr.Bla)			
[a]	Centre of curvature Related to diagonal calculated from the work size.		[a]	±0.2%			
[b]	Edge of curvature related to corresponding work size		[b]	±0.2%			
[c]	Warpage, related to the Diagonal calculated from the work size		[c]	±0.2%			
11	Deep abrasion		11	Removed volume in mm <sup>3</sup> for Unglazed tiles100 max.			
12	Chemical resistance		12	Test requirement as per IS : 155622: 2006			

	Chemical resistance Of 5 test specimens (Size approx 50x50 mm <sup>2</sup> ) of each tiles were treated with following solution for 28 days than 7days in running water and boiled ½ hr. in water		Once at the time of Brand approval and if Required as per instruction of Engineer in charge.
[i]	Hose hold chemical		
[a]	ammonium chloride Soln(100gm/1)		Required
[b]	Standard cleaning Agent Soln. (As per Provedure)		Required
[ii]	Swimming pool Salts		
[a]	Sodium hypochlorite Soln.(20mg/1)		Required
[b]	Copper Sulphase Soln (20mg/ 1)		Required
[iii]	Acids		
[a]	Sulfuric Acid Soln 70%(v/v)		Required
[b]	Lactic Acid Soln5 % (v/v)		
[iv]	Alkali Potassium hydroxide Soln(200 gm/ 1)		-----
13	Skid resistance		
[a]	Condition of test surface		Fraction[1]0.66,[2]0.41,[3]0.40,[4]0.44,[5]0.56,[6]0.51

	Direction of Test		
1	Parallel to sides (4 measurements)		
2	Diagonal to sides (2 measurements)		
14	Glossiness	1 no. of tiles selected at random from	
		The lot was subjected to	gloss
		measurement are given.	
		Statistical Sample population	96
		Angle	60
		Minimum(GU)	40.5
		Maximum(GU)	76.1
		Mean	61.42
		Std.Dev(SD)	7.725
15	Whiteness Index	L	72.48
		a	2.07
		b	10.42
		CIE76,Whiteness index (10 deg/D65)	
		Tint Factor	-9.45R
		ISO Brigness2470	36.23
		ISO BrignessR457	36.51

16	Ceramic Tiles	1	Water Absorption(% By mass)	Onetestofevery10000noofTiles usedinchangeofbrandmark	1	Gr.BII (3%WA≤6%)
		2	Modulus of Rupture (MOR)N/mm2		2	(Gr.BII) Average 30N/mm2 individual 28N/mm2
		3	Breaking Strength(N)		3	Gr.BII Thickness≤7.5mm For 500N,Minimun
		4	Scratch Hardness of Surface on Moh's Scale		4	Gr.BII for Commercial app in.=6 minimum of r Home app in.=5Miniumum

5	Crazing resistance		5	Gr.BII None of the tile should show any sign of Crazing on the glazed surface when subjected to auto calving at a steam pressure of 750±20 Kpa for 4 Cycle of 2Hrs duration.			
6	Thermal Shock resistance		6	GRBII Should not show any visible defects When subjected to test method as IS13630( Part-5)2006.			
7	Dimension(LXW)		7	Gr.BII			
[a]	The devlationin Percent of the average size for each tile (4side) from the work size.		[a]	±0.4%			
[b]	The deviation in percent of the average size for each tile (4side) from the work size of the 10 test specimens ( 40 Sides).		[b]	±0.4%			
8	Straightness of sides (facial Sides) the maximum deviation from straightness in percent related to the corresponding work size		8	±0.3%			

9	Rectangularity the Maximum deviation from Rectangularity in percent related to the corresponding work size		8	±0.3%			
10	Surface flatness the Maximum deviation from flatness in percent.						
[a]	Centre of curvature Related to diagonal calculated from the work size		[a]	±0.5%			
[b]	Edge of curvature related to corresponding work size		[b]	±0.5%			
[c]	Warpage, related to the Diagonal calculated from the work size		[c]	±0.5%			
11	Resistance to surface Abrasion		11	As per IS 13630(Part-11)2006.			
12	Stain resistance & Chemical Resistance (Five test) specimens when Treated with following solution.	One at the time of Brand approval And if required as per instruction of Engineer-In-Charge.	12	As per IS 15622: 2006			
[i]	Stain						
[a]	Methylene blue soln. (10Gm/ 1)			"Class-1"min.			

		[b]	Potassium permanganate soln (10gm/ 1)		"Class-1"mim.
		[ii]	Household chemical		
		[a]	Ammon Chloride soln (100 gm/1)		"Class-AA"mim.
		[b]	Standard cleaning Agent Soln. (As per Procedure)		
		[iii]	Swimming pool salts		
		[a]	Sodium hydro chlorite sol (20 gm/ 1)		"Class-AA"mim.
		[b]	Copper Suplphate soln(20gm/ 1)		"Class-AA"mim.
		[iv]	Acids		
		[a]	Hydrochloric Acid soln,3%(V/v)		-----
		[b]	CriticAcidSoln(100 gm/ 1)		-----
		[v]	Alkali		
		[a]	Potassium Hydroxide soln ( 200 gm / 1)		-----

					Test requirement as per IS 15622-2006
17	Glazed Tiles	1	Water Absorption(% bymass)	One test of every 10000 no of Tiles Used in change of brand mark	1 ≥10 percent, when the value exceed 20 percent this shall be indicated by the manufacture. (average10percent)
		2	Modulus of Rupture N/mm2		2 Average12 for thickness<7.5mm average15 For thickness ≥7.5mm

3	Breaking Strength(N)		3	200 for ≤7.5mm thickness, min 500for>7.5 Mm thickness, min
4	Moisture Expansion in mm/ m		4	0.04
5	Scratch Hardness of Surface (moh's)		5	3,min
6	Coefficient of Linear Thermal expansion from ambient temperature to100c		6	$9 \times 10^{-6} K_{-1}, \max$
7	ThermalShock resistance		7	10 cycles,min
8	Crazingresistance		8	4 cycles @7.5 bar,min
<b>Chemical Properties</b>			As per IS 15622: 2006	
[i]	Resistance to staining Glazed tiles	One at the time of Brand approval And if required as per instruction of Engineer-In-Charge.	[i]	Class-1,min
[ii]	Resistance to house Hold chemical and swimming pool waste cleansers except to cleansing agent containing Hydrofluoric acid and its compounds		[ii]	Class-AA,min
[ii]	Resistance to acid And alkalis(with the exception of hydrofluoric acid and its compounds)		[ii]	Required if agreed according to the chemical Resistance class indicated but the manufacturer,
<b>Dimension and surface Quality</b>				
[i]	Length and width			

[a]	The deviation in Percent of the average size of each tile(2or 4side) from the work size (W) tile with spacer lugs.		[a]	$  \leq 12\text{cm}: \pm 0.5   > 12\text{cm}: \pm 20 \pm 0.6 / -0.3$			
[b]	The deviation in Percent of the average size of each tile(2or 4side) from the average size of the 10 test specimens(20to 40 sides) tile with spacer lugs.		[b]	$  \leq 12\text{cm}: \pm 0.4 / -+0.2,   > 12\text{cm}: \pm 0.15 \pm 0.25$			
[ii]	Thickness the deviation in percent of the average thickness of each tile from the work size thickness						
[a]	<250cm <sup>2</sup>			±3.0			
[b]	>250to500cm <sup>2</sup>			±3.0			
[c]	>500to1000cm <sup>2</sup>			±4.0			
[d]	>1000cm <sup>2</sup>			±4.0			
[iii]	Straightness of side2 (Facial sides) the maximum deviation from straightness, in percent related to the corresponding work sizes.			±0.15			



		[iv]	Rectangularity the maximum deviation from Rectangularity in percent related to the corresponding work sizes tiles with spacer lungs.		± 0.15 ± 0.15
		[v]	Surface Flatness : the maximum devaluation from flatness in percent		
		[a]	Center curvature related to diagonal calculated from the work sizes		±0.22
		[b]	Edge of curvature related to the corresponding work size		±0.22
		[c]	Wrap age related to diagonal calculated from the work size		±0.22
		[vii]	Surface quality		Minimum 95 % of the tiles shall be free from Visible defects that would impire the appearance of a major area of tiles

## Approved Make List for Civil Works

ITEM	Approved Brands/Quality
ORDINARY PORTLAND CEMENT (OPC 53 )	UltraTech, Siddhi, Binani, Sanghi, Ambuja, Hathi, Jaypee, J K Lakshmi
WHITE CEMENT	Birla White, J K White, Nihon White
TMT FE-500 OR FE- 500 D RIBBED BARS	ASR, NATIONAL, GERMAN–TMX, JINDAL, SAIL, VIZAG, TATATISCON, ELECTROTHERM (ETTMT), UTKARSH, GALLANT
AUTOCLAVED AERATED CONCRETE BLOCKS	UltratechXtralite, J K Smart Blox, Aerocon, Ecogreen, Accurate, Wonder Block, Efcon
TEAK WOOD	Valsad, Ghana, Nigeria, Bulsar, C P Teak or as approved by director project. free from knots, cracks.
FLOAT/ TINTED GLASS	Modi Guard / Asahi / Saint Gobain
INTERLOCKING PAVER BLOCKS-MACHINE PRESSED	Locally available as approved shape and size, Rubber moulded, having crushing strength not less than as described in Item.
M.S. SECTIONS	Any I.S.I.
G.I. SHEET/SSR	Jindal, ASR,Essar
INSULATION	AEROLAM/ROCKWOOL
<b>CONSTRUCTION CHEMICALS</b>	
ANTITERMITE TREATMENT HEPTACHLOPR	Durmet by Cynamid India, Nocil Pyramid , Lyntric by Bayer India
SPECIALISED CONSTRUCTION CHEMICALS	Fair-Mat, Fisher,Fosroc, Sikka, Pidilite, Global, BASF, Dr. Fixit
WATER PROOFING MATERIALS	Fair-Mat, Fosroc, Sikka, Pidilite, BASF, Dr. Fixit, Zycosil
<b>TILES</b>	
CERAMIC TILES	Somany, Kajaria, Jonson, Asian, Varmora, Sunheart, Simpolo,Zealtop, Swastik, Bell
GLAZED TILES	Somany, Kajaria, Jonson, Asian, Varmora, Sunheart, Simpolo, Zealtop, Swastik, Bell
VITRIFIED TILES	Somany, Kajaria, Jonson, Asian, Varmora, Sunheart, Simpolo, Zealtop, Swastik, Bell
<b>PAINT</b>	
ACRYLIC PAINT	ICI, Dulux,Asian,Nerolac, Burger, Jotun, Global
OIL BOUND DISTEMPER	ICI, Dulux, Asian, Nerolac, Burger, Jotun, Global
FIRST QUALITY ENAMEL PAINT	ICI, Dulux, Asian, Nerolac, Burger, Jotun, Global
PUTTY	ICI ,Dulux, Asian , Birla White Wall Care, Global,JK

WEATHER PROOF EXTERIOR EMULSION PAINT	ICI, Dulux, Asian, Nerolac, Burger, Jotun, Global
WALL TEXTURE	Jotun, Heritage, Global, Asian
<b>ALUMINIUM</b>	
ALUMINIUM SHEETS AND ACCESSORIES	Jindal, Hindalco, Banko, National
ALUMINIUM EXTRUDED DOOR/ WINDOW SECTION	Jindal, Hindalco, Banko, National
ALUMINIUM HARDWARE	Everite, Garnish, Crown Classic, Glider
<b>FURNITURE / WOOD WORK</b>	
PLY/ BLOCK BOARD	KIT Ply, Anchor, Greenply, Uniply, Century, Archidply
ADHESIVE	Fevicol SH, Araldite, SR 998, Century SH.
WOOD PRESERVATIVE	STP- Pentaphene pale, Pest Control (India)
FLUSH DOOR – DECORATIVE / NON-DECORATIVE(IS Marked)	KIT Ply, Anchor, Greenply, Uniply, Century, Archidply
PVC DOOR	Rajshree, Vikas, Sintex
LAMINATE SHEET	Century, Formica, Greenlam, Alfa-ica, Decolam, Sundek,Merino, Aerolam, Bell
WOODEN ADHESIVES	Fevicol, Blue coat, Araldite.
DOOR HARDWARE	Kich, Dorma, Palladium, Magnum, Dorset, Godrej, Arch, Ozone
DOOR CLOSER, FLOOR SPRING	Kich, Dorma, Palladium, Magnum, Dorset, Godrej, Arch, Ozone
DEAD LOCKS/ MORTISE LOCKS	Kich, Dorma, Dorset, Godrej,Arch, OZONE
HIGH BACK CHAIR	Featherlite, optima, Wipro
MEDIUM BACK CHAIR	Featherlite, Wipro
LOW BACK CHAIR	Featherlite, Wipro
STADIUM CHAIR	TSI/ KF System/ Featherlite or Equivalent as approved by Architect.
Wooden Sports Flooring	Ebaco/ tarkett/ Horner/ Robbins
Squash court Wooden Flooring	Ebaco/ tarkett/ Horner/ Robbins
Gypsum ceiling	SaintGobainGyporc/ USG BORAL/ Asian Gypsum Industries Pvt. Ltd
MieralFibre Acoustical Suspended Ceiling System	Amstrong/ Durlum/ Anutone or Equivalent as approved by Architect and EIC
Aluminium Baffle System Ceiling	Amstrong/ Durlum/ Anutone or Equivalent as approved by Architect and EIC

Notes:

- a) The contractor shall produce samples of the materials for approval of the Executive Engineer/PMC. The materials of the makes out of the above as approved by the EIC shall be used on the work. EIC member has not bide to give any reason for rejection of any brand from the above list and its decision will be consider as final.
- b) In respect of materials for which approved makes are not specified above, these will be of makes to be decided by the PMC/Engineer in Charge.

## Approved Make List for Sanitary and Plumbing Works

ITEM	Approved Brands/Quality
<b>SANITARY AND PLUMBING</b>	
SANITARY WARE	Cera,Hindware,Parryware, Johnson, Somany, Tita
P.V.C. PIPES AND FITTING (UPVC/CPVC)	Finolex, Supreme, Kisan,Ashirwad, Astral, Dutron, Prince, Precision, Ajay, Waterflow
CHROMIUM PLATED WATER SUPPLY FITTINGS	Hindware, Jaquar, Aquel, Kohler, Essco, Grohe, Plumber, Cera, Somany,DCI
C.I. MANHOLE COVER	ISI approved make
PLUMBING FIXTURES	Hindware, Jaquar, Aquel, Kohler, Essco, Grohe, Plumber, Cera, Somany, DCI
PVC WATER TANK (100% VIRGIN PVC)	Syntex , Aqua, Aris
S.S. SINKS	Nirali, Navkar, Parryware
SLUICE VALVE	Kirloskar, Kartar, Sir, Krisna
NON RETURN VALVE	Kirloskar, Kartar, Krisna

### Notes:

a) The contractor shall produce samples of the materials for approval of the Executive Engineer/PMC. The materials of the makes out of the above as approved by the EIC shall be used on the work. EIC member has not bid to give any reason for rejection of any brand from the above list and its decision will be considered as final.

b) In respect of materials for which approved makes are not specified above, these will be of makes to be decided by the PMC/Engineer in Charge.

**LIST OF MATERIALS OF APPROVED BRAND/ MANUFACTURER  
(ONLY FIRST QUALITY TO BE USED (ELECTRICAL WORKS))**

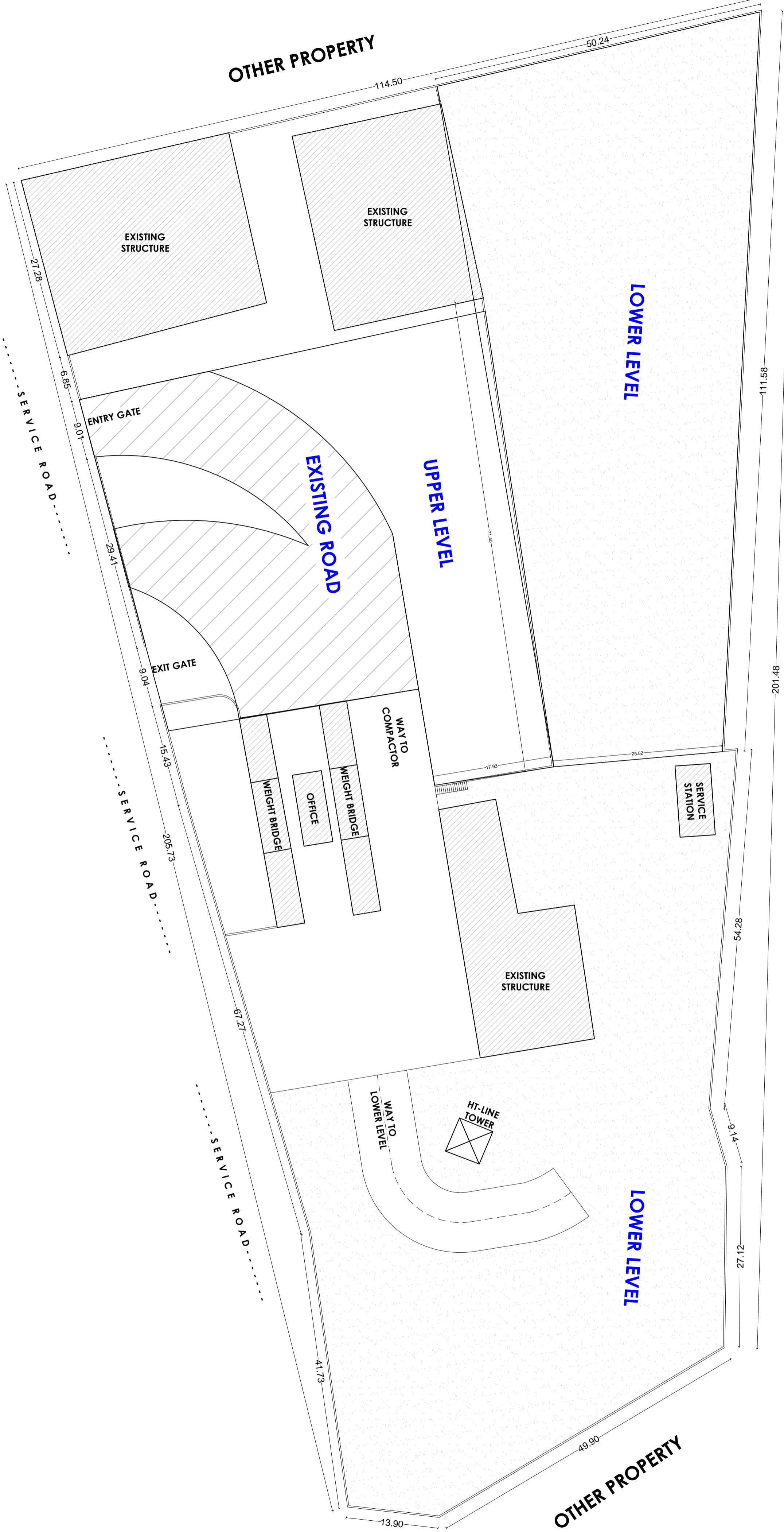
<b>MAKE LIST FOR ELECTRICAL WORKS</b>		
<b>SR.NO.</b>	<b>ITEM</b>	<b>STANDARD MAKE</b>
1	DRY TYPE TRANSFORMER	SCHNEIDER / VOLTAMP / KIRLOSKAR / CROMPTON
2	H.T.VCB / PANEL	ABB / SIEMENS / SCHNEIDER ELECTRIC / L&T
3	PROTECTION RELAY FOR H.T PANEL	GE / ABB / L&T / SIEMENS / SCHNEIDER
4	H.T.XLPE CABLE	POLYCAB / FINOLEX / HAVELLS/ KEI
5	H.T.JOINT (HEAT SHRINKABLE)	RAYCHEM / 3-M
6	LT PANELS	CPRI / ERDA APPROVED PANEL BUILDER. 70KA SHORT CIRCUIT WITHSTANDS STRENGTH. ACCESSORIES AS PER MENTIONED IN MAKE LIST.SUBJECT TO CLIENT CONFIRMATION.
7	DISTRIBUTION BOARDS	LEGRAND / SCHNIEDER / HAGER / L&T / SIEMENS
8	MEDIUM VOLTAGE CABLE & WIRE	FINOLEX / POLYCAB / KEI / HAVELLS
9	CABLE TRAY (ALLTYPE )	PROFAB / PRECISION / UNIVERSAL / INDIANA
10	LT SWITCH GEAR (ALL RANGE)	AS PER SPECIFIED PANEL DESCRIPTION IN BOQ. MODEL AS PER SPECIFIED IN BOQ ABB/ SIEMENS/ L&T/ LEGRAND / SCHNIEDER C & S Ancnor
11	LT MCCB	SIEMENS / SCHNEIDER / LEGRAND / ABB / L&T
12	LT MCB, ELCB	LEGRAND / SIEMENS / SCHNEIDER / L&T / ABB
13	LTSFU	SIEMENS / SCHNEIDER ELECTRIC / L&T / ABB
14	LT CONTACTORS	SIEMENS / SCHNEIDER ELECTRIC / ABB / L&T / LEGRAND

15	AUTO CHANGE OVER SWITCH	SCHNEIDER / ABB / L&T / SIEMENS / LEGRAND
16	STARTER (STAR-DELTA /DOL)	SCHNEIDER / ABB / L&T / SIEMENS / LEGRAND
17	SUBMERCIBLE MOTOR / MONO BLOCK PUMP SET	CROMPTON / KBL / FALCON / LUBI
18	METERS (DIGITAL)	ENERCON / SCHNEIDER /L&T / SECURE / ABB
19	RELAYS- EARTH FAULT	SIEMENS / SCHNEIDER ELECTRIC / L&T / LEGRAND
20	INDICATING LAMP	SIEMENS / SCHNEIDER ELECTRIC / ABB / KAPPA / TEKNIC
21	ELECTRIC TIMER	SIEMENS / LEGRAND / L&T
22	ROTARY SWITCH	SIEMENS / SCHNEIDER ELECTRIC / KEYCEE / SALZER
23	PUSH BUTTON AND PUSH BUTTON SET	SIEMENS / SCHNEIDER ELECTRIC / L & T/ BCH / RAAS CONTROL
24	SELECTOR SWITCH	KEYCEE / SALZER / SCHNEIDER / SIEMENS
25	ANNUNCIATOR	PROTON / EAPL
26	LUGS	DOWELL'S / 3D / JAINSON / COMET / HMI
27	BIMETALLIC LUGS	ISMAL / HMI / DOWELLS
28	CABLE GLAND	JAINSON / 3D / COMET / HMI
29	PVC CONDUITS AND ACCESSORIES	PRECISION / NIHIR / POLYCAB / ASTRAL
30	CASING CAPING	PRECISION / NIHIR / POLYCAB
31	MODULAR SWITCHES, SOCKETS & OTHER ACCESSORIES	MK / LEGRAND / HAVELLS/ANCHOR
32	PVC TAPE	STEEL GRIP / ANCHOR
33	WIRES FOR INTERNAL WIRING	FINOLEX / HAVELLS / POLYCAB /RR
34	CO AXIAL TV CABLE	DELTON /NATIONAL /HAVELLS / FINOLEX
35	CONNECTORS (COLOURS AS PER PHASE & NEUTRAL)	SALZER / ELEMEX / L&T / CONNECT WELL / PHOENIX

36	LED LIGHT FIXTURES / POST TOP LENTRAN LIGHT	PHILIPS SIGNIFY / HAVELLS / WIPRO / CROMPTON / BAJAJ AS PER MODEL SPECIFIED IN BOQ
37	LIGHTING CONTROLLER	DYNALITTE / ATCO / ANCHOR / LEGRAND / C&S
38	CEILING FAN/ EXHAUSTFAN	CROMPTON / USHA / HAVELLS / ORIENT AS PER MODEL SPECIFIED IN BOQ
39	SENSORS	MK / CRESTON / LUTRON / LEGRAND
40	COMPUTER	HP/ DELL/ LENOVO/ IBM
41	CAT6 / RJ45 / CAT6 JACK PANEL	TYCO / SYSTIMAX / SCHNEIDER –DIGI LINK / LE GRAND
42	UNDER FLOOR METAL TRUNKING / CABLE MANAGEMENT SYSTEM ONWALL	MK / LEGRAND / SCHNEIDER
43	UPS	EMERSON /NUMERIC/EATON
44	LIGHTNING PROTECTION	ASHLOK / LPI / ALSTORM
45	DG SET	CUMMINS / CROMPTON GREAVES / KOEL / VOLVO
46	DG SET AMF PANEL	AS PER THE DG SET SUPPLIER. (SWITCH GEAR AS PER MAKE LIST.)
47	TV MONITOR	HP/DELL
48	DIGITAL MULTI FUNCTION METER	SECURE/AE/ CONZERV/ENERCON
49	LT CABLE LUGS	DOWELS/3M/COMET
50	CHEMICAL EARTHING ( BORE TYPE)	ASHLOK / LPI
51	CCTV SYSTEM ( CAMERA, DIGITAL VIDEO RECORDER)	HONEYWELL/ SONY/ SCHNEIDER (PELCO) / PANASONIC
52	LIFT (ELEVATOR)	OTIS, MITSUBISHI, SCHINDLER, JOHNSON, Express Lift, Omega
53	SPLIT AC	HITACH/BLUE STAR/DAIKIN/MITSUBISHI/O-GENERAL/CARRIER/TOSHIBA



54	U-PVC WATER PIPE	PRINCE / SUPREME / ASTRAL / FINOLEX
55	STREET LIGHT POLE AND BRACKET	BAJAJ, TRANSRAIL, VALMONT.
56	AUDIO-VIDEO SYSTEM	BOSE, YAMAHA, SONY, EPSON, PURE LINK (AS PER BOQ SPECIFICATION)
57	RO SYSTEM	AQUA GUARD, KENT, AQUA ULTRA UV, AO SMITH.
58	WATER COOLER	USHA, CELLO, BLUESTAR.
<b>Special Note:-</b>		
1	Client has all right to check the challans of supplier.	
2	The MCB and MCB DBs must be of same make.	
3	Contractor has to take Prior approval for all the make of material from Client/Consultant/PMC before execution.	
4	The Client/Consultant/PMC reserves the right to select the manufacture or approved make from the above list.	
5	Any make not mentioned in the above lists must be approved from Client/Consultant before execution.	
6	All the material should be ISI and as per standards mentioned in specifications and BOQ.	
7	In case of shortage of material or un-time delivery or change in model take prior approval from client/consultant	

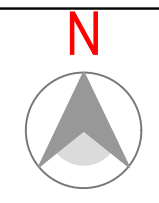


**LAYOUT PLAN**

NORTH							
REV. NO.	DATE	I	S	S	U	E	

PROJECT: "PROPOSED GARBAGE STATION AT AJI"  
 DRG.TITLE:

EMAIL ID : atec.rajkot@gmail.com  
 DEALT BY : ATEC CONSULTANT



ARCHITECT :  
**ATEC**  
 AANANDJIWALA TECHNICAL CONSULTANCY  
 9, Shivaranjani Row houses,  
 Near Shivaranjani Cross Roads,  
 Ahmedabad, Gujarat 380015